NEW YORK STATE SUPERFUND CONTRACT

REMEDIAL DESIGN WORK PLAN

Davis-Howland Oil Corp. Site (No. 8-28-088)

Work Assignment No. D002676-31

DATE: August 1998

Prepared for:

New York State Department of Environmental Conservation

50 Wolf Road, Albany, New York 12233
John Cahill, *Commissioner*

Division of Environmental Remediation
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By:

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REMEDIAL DESIGN PROJECT

NEW YORK STATE SUPERFUND STANDBY CONTRACT

DAVIS-HOWLAND OIL CORPORATION SITE

Monroe County

Site I.D. No. 8-28-088

WORK ASSIGNMENT No. D002676-31

Prepared For

NEW YORK STATE
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF HAZARDOUS WASTE REMEDIATION

July 1998

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REMEDIAL DESIGN WORK PLAN SUMMARY

I. INTRODUCTION

On March 30, 1998 the New York State Department of Environmental Conservation (NYSDEC) issued a State Superfund Work Assignment No. D002676-31 for a project at the Davis-Howland Oil Corporation (the project site) located in Rochester, New York to Lawler Matusky & Skelly Engineers (LMS) and Galson Corporation The site reference number is 8-28-088. The site, a former petroleum packaging and blending facility, includes an area of groundwater contamination with volatile organic compounds (VOC) and metals levels observed at levels exceeding NYSDEC Groundwater Standards. The site also has soils which are contaminated with petroleum compounds, VOCs and metals. This Project Scoping Plan has been developed at the request of NYSDEC and is responsive to the information provided on the project to date.

1. BACKGROUND

The Davis-Howland Oil Corporation site is located at 200 Anderson Avenue, Rochester, Monroe County. The site consists of two adjacent land parcels. The Davis-Howland plant is situated on one parcel at 200 Anderson Avenue. The second parcel adjoins the first parcel on the west side, and has been leased to Davis-Howland. The site property containing two parcels is owned by Mr. Larry Klepper and Mr. Gary Stern, (Stern Development, 247 North Goodman Street, Rochester, NY 14607). The site is situated in an area which combines residential, commercial, and industrial facilities. The site is approximately 1 acre in size. The site is bounded on the south by Anderson Avenue, on the west by light industrial and commercial/retail buildings, and on the north and east by Conrail tracks and right-of-way. No significant surface water is located in the immediate area of the site. The site is underlain by a thin fill layer (2-5 feet thick), outwash sand and gravel (5-20 feet), glacial till (5-15 feet), and bedrock consisting of the Penfield Dolostone. Shallow groundwater is encountered in the outwash and deep groundwater is encountered in the bedrock unit.

The main contaminants of concern include volatile organic compounds (VOCs) (dichloroethene, trichloroethane, trichloroethene, etc.), semivolatiles (SVOCs) (naphthalene, 4-methyl-2-pentanone, etc.), and metals (cadmium, chromium, lead) found in soil and groundwater.

2. SITE HISTORY

The project site has reportedly contained industrial commercial chemical product operations since 1942. A company referred to as H&W Chemicals reportedly operated at the project site from 1942 to 1972. Since 1972, Davis-Howland has operated at the site. Davis-Howland's operations significantly declined in 1994 at the site. During the course of operations at the Davis-Howland site, there were evidently numerous incidences when material leaked or was spilled onto the ground. There is no single occurrence which can account for the majority of the contamination now found at the site.

Between 1974 and the early 1990s, there were many reports to the NYSDEC of releases of materials ranging from waste oil and mineral oil to hydrochloric and sulfuric acids at the Davis-Howland site.

In June 1991, NYSDEC staff inspected the site in response to a report of an oil spill. They found several hundred drums of oils and solvents, some of which were leaking, and several areas of stained soils.

3. PREVIOUS SITE INVESTIGATIONS

A number of site studies have occurred at the site since 1991. In July 1991, NYSDEC conducted a site inspection. NYSDEC, along with a contractor, AES, performed a waste inventory, characterization, sampling and containerization. In the Fall of 1991, Dunn Engineers performed site investigation activities including test pits and soil gas probing. Dunn prepared a report of these activities dated November 26, 1991, which confirmed the results of the initial DEC inspection. Soil sampling indicated that soil was contaminated with petroleum and solvents. In June 1992, Clean Harbors, Inc. (CHI) performed further site investigation and remediation activities including soil removal and groundwater well installation. CHI prepared a report dated June 15, 1992. Results of this investigation indicated soil contamination and significant

contamination of groundwater with chlorinated and non-chlorinated solvents. During the same period, Clean Harbors also conducted a drum removal and surface soil excavation and removal. The soil removal consisted of the removal of the top one foot of soil and subsequent offsite disposal.

In December 1994, the NYSDEC resampled the Clean Harbors wells and found similar types of contamination.

Summary of the Remedial Investigation

The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the site.

The RI was conducted in two phases. The first phase was conducted between July 1995 and October 1996 and the second phase between November 1996 and January 1997. A report entitled, "Davis-Howland Oil Corporation Remedial Investigation," dated October 1996, has been prepared describing the field activities and findings of the Phase I RI in detail. The Feasibility Study (March 1997) and the Phase II Remedial Investigation Report (October 1997), describe the remedy selection process and the Phase II investigation results, respectively.

The RI included the following activities:

- Area well inventory and literature search.
- Soil gas survey to help define the limits of contamination.
- Piezometer and monitoring well installation to collect groundwater samples and determine the direction of groundwater flow.
- Surface and subsurface soil sampling and analysis.
- The installation of exploratory soil borings.
- The sewer line near the site was inspected using a remote camera system.
- An exposure pathway analysis and habitat based assessment were conducted to determine potential impacts to humans and the environment.

The Phase II RI included the following activities:

- Installation and development of six bedrock monitoring wells.
- Installation and development of four overburden monitoring wells.
- Sampling and analysis of groundwater from all of the Phase I and Phase II monitoring wells.

- Groundwater level monitoring and contouring.
- Surface soil samples from the area around DHSS-7 and DHSS-9, and two soil samples from between DHSS-6 and DHSS-7 (See Figure 3).
- An air sparging and soil vapor extraction pilot study to assess the effectiveness of these technologies in addressing OU-1 groundwater contamination.

Based upon the results of the remedial investigation in comparison to the SCGs and potential public health and environmental exposure routes, certain areas and media of the site require remediation. These are summarized below. More complete information can be found in the RI Report and Phase II RI Report.

As described in the RI Report, many surface soil, subsurface soil and groundwater samples were collected at the Site to characterize the nature and extent of contamination.

During the RI, soil and groundwater samples were analyzed for volatile organics (VOCs), semivolatile organics (SVOCs), pesticides, PCBs, and metals. Surface soils were found to contain SVOCs including benzo(a)anthracene, benzo(a)pyrene, and chrysene, and metals including lead, chromium, cadmium, and zinc. Subsurface soils were found to contain VOCs including 1,2-dichloroethene and trichloroethene, and metals including mercury and zinc. Low levels of SVOCs were also detected in subsurface soils. Groundwater was found to contain VOCs including those found in soil, vinyl chloride, 1,1,1-trichloroethane, and xylene. The only SVOC detected at significant levels was naphthalene. Metals detected include lead and manganese. PCBs and pesticides were not detected at concentrations of concern in these media.

Soil Analytical Summary Information

Surface Soil: After completion of the surface soil removal IRM, only trace levels of VOC contamination were found in this media. Total SVOC contamination in this media ranged from non-detect to 448 ppm. All samples except DHSS-5 had at least one exceedence of soil standards for SVOCs. In general, the highest levels of contamination were found in the area behind the site building and along the railroad tracks. Specifically, the highest levels of SVOCs consist of PAHs. Individual SVOCs with the greatest exceedences of their soil cleanup goals were benzo(a)anthracene (37 ppm) and chrysene (33 ppm). Also found at elevated concentrations in this media were metals. Elevated levels of cadmium, chromium, mercury, lead,

and zinc were detected in soil samples. The highest levels of these were detected at DHSS-7, located between the gray brick warehouse and the railroad tracks. Highest of these metals were lead (2020 ppm) and zinc (43800 ppm).

Two areas of surface soil contamination were identified as requiring remediation due to elevated metals contamination. These two areas comprise an estimated 33 cubic yards of soil.

Subsurface Soil: The subsurface soil samples were higher in concentrations of VOCs and lower in SVOCs and metals. Highest VOCs were trichloroethene (6.4 ppm), xylene (5.1 ppm), and toluene (4.6 ppm). SVOCs were not encountered at levels of concern in subsurface soils. Of the metals, significant levels of mercury (0.37 ppm) were detected.

The highest levels of VOCs were generally encountered at or near the water table. They are likely to be associated with the groundwater contamination. It is likely that the metals and SVOCs are a surface artifact and are not necessarily associated with the spillage of oils or solvents at the site.

Groundwater

Shallow groundwater flows to the south with a limited component of flow in a more easterly direction under the site. Data from the investigations indicate that the contamination levels reach non-detect just south of Anderson Avenue in front of the Davis-Howland building. Highest contamination is found in the area immediately behind the Davis-Howland building.

Bedrock groundwater appears to flow predominantly to the east in the area of the site. Bedrock contamination is greatest in the areas of monitoring wells MW-1R and MW-5R, which are located on the south side of Anderson Avenue and northwest of the Davis-Howland building, respectively. Contamination levels decrease to the east of the site.

It may be postulated that the difference in levels of contamination between the Shallow and bedrock groundwater units are due to the glacial till between the two units. This layer inhibits the rate of migration of contamination from the near surface to the bedrock located, on average, at a depth of 20 to 25 feet.

Shallow Groundwater: Shallow (overburden) groundwater contamination consists primarily of the same VOCs found in subsurface soils. Highest contaminant levels were 1,2-dichloroethene and trichloroethene (both 98 ppm) and 1,1,1-trichloroethane (34 ppm). The only SVOC detected at significant concentrations was naphthalene (0.29 ppm). The only significant metal detected was lead (0.819 ppm).

Bedrock Groundwater: Bedrock groundwater is contaminated with most of the same components found in Shallow groundwater. Levels of contamination are, for the most part, lower. Highest levels are for 1,2-dichloroethene (8.6 ppm), vinyl chloride (0.84 ppm), and trichloroethene (0.74 ppm).

II. SCOPE OF WORK

The tasks and requirements of this work assignment are specified in State Superfund Standby Contract, Work Assignment (WA) Section II. "SCOPE OF WORK", and is governed by the Superfund Standby Contract between the New York State Department of Environmental Conservation (NYSDEC) and LMS.

Galson and LMS will prepare detailed plans and specifications for use in competitively bidding the construction of systems to implement the March 26, 1997 and March 1998 RODs. The remedy includes, excavation and offsite disposal of metals contaminated soils from the area of surface soil samples 7 and 9 (DHSS-7 and DHSS-9), installation of air sparging points to remove VOCs from the concentrated Shallow groundwater plume, vapor extraction points to capture sparged VOCs and reduce soil VOC contamination under the Davis-Howland buildings, vapor phase treatment for extracted VOCs, installation of a fence to protect above ground equipment, installation of two or three bedrock monitoring wells to confirm the southern extent of the bedrock plume, a groundwater sampling and analytical task to assess whether anaerobic biodegradation of VOCs is occurring in OU-No.1, and a monitoring program to confirm the effectiveness of the selected remedy. As part of the pre-design investigation, a limited pump test will be conducted to assess interconnections between bedrock wells, bedrock and overburden wells, and provide an "order of magnitude" estimate of

quantities of water which would have to be pumped to manage contaminated bedrock groundwater.

The main elements and goals of the design will include:

- Verification of the components of the design and provide the details necessary for construction of the remedial program.
- Conduct predesign investigation as needed to confirm the metals contaminated soil volumes to be excavated and disposed of offsite. The goal of soil remediation is the removal of surface soil, from the area of DHSS-7 and 9, which exceed the SCGs for metals in the ROD.
- Design a mobilization/demobilization plan which will evaluate existing utilities and specify necessary upgrades to conduct the remedy. Presently, utilities are available in onsite buildings and at the street in front of the site. The front of site is fenced with access gates.
- Design an air sparging system to remove VOCs from Shallow groundwater.
- Design of a testing program to determine the relative significance of anaerobic degradation of VOCs through field and laboratory analysis of groundwater samples from twelve (12) existing wells located in the area of highest concentrations of chlorinated contaminants, for pH, dissolved oxygen, Eh (redox potential), temperature, chloride, Fe^{2+}, Fe^{3+}, and the two (cis- and trans-) isomers of 1,2-DCE, among other parameters.
- Design a soil vapor extraction system to collected sparged VOCs and enhance the removal of VOCs from subsurface soils.
- Develop a removal plan for metals contaminated surface soils from the areas of DHSS-7 and 9.
- Design a fence appropriate to the goal of limiting outside access to onsite equipment.
- Design a long-term monitoring plan to assess the effectiveness of the remedial action and act a trigger for the contingent remedy.
- Install 2-3 bedrock monitoring wells to define the southern extent of the plume.
- Design a pump-test to assess the interconnections between bedrock wells, and between bedrock and overburden wells, and to aid in the design of the contingent remedy, if needed.

III. TASK 1: BACKGROUND REVIEW AND WORK PLANS

Subtask 1.1: Background Review and Site Visit

Galson will review the Records of Decision; prepared by the NYSDEC, dated March 1997 and March 1998, the RI Report dated October 1996, the FS Report dated March 1997, and the

Phase II RI dated October 1997. This task will also include a site visit by the project manager, lead design engineer, and other justifiable critical personnel.

Subtask 1.2: Scoping Meeting and Remedial Design Work Plan

Galson's Project Manager and Lead Design Engineer will participate in a scoping meeting with Department representatives to be held at the NYSDEC Central Office in Albany. Galson will submit a detailed outline of the proposed activities to be completed along with a list of all deliverables and a project schedule.

Galson herein submits six (6) copies of the Draft Remedial Design work plan. The purpose of this work plan is to accomplish the following: (1) provide more detail to the scope of work presented in the work assignment, where necessary, to support Galson's level of effort estimates in the project budget; (2) provide and justify recommendations for any changes to the conceptual design that the Galson judges to be necessary or advisable; (3) provide estimate of subcontractor's cost based on written quotations and estimated budget; and (4) present a work assignment budget and a schedule for completion of the work assignment.

This work plan includes; 1) a summary of the scope of the project; 2) a complete budget package for the entire work assignment including all schedules, details of the consultants costs for the work assignment, and documented costs for all subcontracted services (with estimated level-of-effort broken down and presented on a subtask level as well as in the 2.11s format); 3) a work assignment progress schedule with milestones and deliverables; 4) a staffing plan identifying management and technical staff to be assigned to the work assignment, along with their areas of responsibility and NSPE grade levels; and 5) an identification of proposed subcontractors, including a Minority and Women Owned Business Enterprise (M/WBE) and Equal Employment Opportunity (EEO) Utilization Plan.

This work plan includes the details of the pre-design field investigation activities and describes the number of environmental samples including; groundwater monitoring and soil sample locations, number of samples, method of sampling, type of analysis, and QA/QC

requirements. The Analytical Service Protocol (ASP), December 1991, has been followed in formulating this plan. This plan should includes a health and safety plan for the field activities which includes provisions to protect the local community. Proposed subcontractors are identified. Galson will provide the Department with a Data Usability Report on the collected data.

Subtask 1.3: Project Management - Task 1

This subtask has been set up to cover the management of the first task of the Davis-Howland project. Included in this task is the time required to manage and administer all of the activities performed by project personnel in the execution of this task.

IV. TASK 2: PRE-DESIGN INVESTIGATIONS:

After the approval of the work plan, approval of the subcontractors, and issuance of the Notice to Proceed, the Galson will commence field work within 14 days. Galson will be responsible for providing on-site field oversight of subcontractors, preparation of daily field logs, evaluating data and preparing a report which describes the findings and conclusions from the investigation and lists recommendations.

Subtask 2.1: Installation of Two (2) Bedrock Groundwater Monitoring Wells

During Task 1, the locations for the installation of two bedrock monitoring wells will be selected. These wells will be situated to the south of existing well cluster MW-1R and MW-1S to determine the southern extent/concentration of the bedrock groundwater plume. Complete details of the well design are available in the Phase II RI Field Activities Plan (FAP) prepared by Galson. All work will be completed according to NYSDEC Guidelines and protocols for monitoring well installation and the Phase II Remedial Investigation Field Activities Plan (FAP) prepared by Galson. Each monitoring well will be installed with a unique designation, surveyed, and plotted on the site base map

Prior to initiating the well installation task an updated utilities identification effort will be conducted at the project site to assess the existence of gas lines, electrical lines, water supply lines, storm and sanitary sewer lines, telephone conduits, etc. The utilities identification will be conducted through a variety of methods including on-site inspection, coordination with local utility companies and water authorities such as Rochester Gas & Electric (RG&E), Rochester Telephone Corporation (a/k/a Frontier Corporation), City of Rochester Water Division, the Monroe County Water Authority, and Pure Waters Division etc. In addition, Conrail will be contacted to ascertain the existence of utilities installed in the adjacent rail yard/main rail lines. Available diagrams, plans, drawings and maps will be reviewed. This effort will focus on verification of the effort from 1995, with the goal of updating the base map (if necessary).

The scope for bedrock monitoring wells detailed herein is based on the Guidelines and the FAP. All well installations will be performed at the Davis-Howland site using standard rotary drilling equipment and techniques following ASTM-D 1586 methods (Appendix D). A truck mounted rotary drill rig capable of performing well installation will be utilized. The wells will be installed in a manner that will not exacerbate the spread of contaminants in the subsurface. Waste containment and reduction procedures will be followed, including the containment of drilling fluids during drilling activities. In addition, the well construction will allow for long term integrity of the wells and collection of representative samples of site groundwater.

For the installation of two bedrock monitoring wells, soils drilling will be accomplished using 6-1/4 inch inside diameter (I.D.) hollow-stem augers. The borehole will be advanced approximately two to three feet into the top of bedrock to create a rock socket. The rock socket will be advanced by water rotary drilling with a 5-7/8 inch inside diameter (I.D.) roller bit using the hollow-stem augers as a temporary casing. Four inch I.D. Schedule 80 PVC casing will be placed to the bottom of the rock socket with the aid of centralizers. Cement/bentonite grout will be injected around the casing through a tremmie pipe and the augers will be withdrawn, with the grout maintained at or near the elevation of the ground surface during auger withdrawal. The grout will be allowed to set for a minimum of 24 hours prior to drilling out the open rock interval using water rotary drilling methods and a 3-7/8 inch roller bit to a depth of ten feet below the bottom of the 4 inch I.D. well casing.

At both well locations a steel and aluminum flush mount curb box with water-tight covers will be installed within a two foot diameter concrete pad around the top of each well. Locking J-plug well caps with keyed -alike locks will be installed on each well.

Equipment Decontamination

All drilling equipment and down hole tools which are in contact with the subsurface materials including drilling bits, augers and casings will be decontaminated prior to project site entry, between each well location and between successive depth intervals if significant contamination is encountered.

Disposal

The subsurface soil generated from the exploration activities at the site will be screened with an organic vapor analyzer for volatile organic vapors. The soils will be disposed based on the total organic vapors detected. Soils which do not contain elevated organic vapors will remain at the borehole location and will be graded evenly at these locations. Soils which contain elevated organic vapors will be placed in labeled 55 gallon drums. It is not anticipated that soils of this character will be encountered and no costs for RCRA waste characterization or associated costs for transportation or disposal have been included in the project budget.

All circulation water used during the drilling will be placed into clean DOT Spec 17H 55-gallon open top steel drums and staged on site pending groundwater analytical results. Similarly, all cuttings generated during drilling will be placed into clean DOT Spec 17H 55-gallon open top steel drums which will be sealed, labeled and staged within a secure portion of the site itself, on wooden pallets, pending disposal.

Water

The groundwater and drilling fluids generated from the well installation at the site will be placed in labeled 55 gallon drums. The disposal of the water will be based on the additional results from groundwater samples. Non-contaminated water will be discharged to the ground surface. Contaminated water will be pumped through activated carbon in an 55-gallon drum and then

discharged to the ground surface. If the volume of treated water proves to be so large as to render the disposal to ground surface impractical, disposal will be to the sanitary sewer.

Well Development

Each of the monitoring wells will be developed, after installation, in order to enhance the hydraulic connection between the monitoring well intake internal (open rock hole) and the surrounding deposit or formation.

Subtask 2.2: Environmental Sampling and Pump-Test:

Soil Sampling

Additional soil data is required to support the design of the remedy. Specifically, the volume of soil to be excavated from the area of surface soil sample 7 (location DHSS-7) must be ascertained. Soil samples will be collected along a grid based system, at ten locations, and analyzed for cadmium, chromium, lead and zinc to delineate the zone of elevated metals contamination of soils in this area so as to determine the area requiring remediation through excavation and disposal of the impacted soil.

Each sample will be collected using a field decontaminated stainless steel shovel to excavate to depths of six (6) inches and eighteen (18) inches below surface grade at each location. Field decontaminated stainless steel scoops (decontaminated in the field in accordance with the June 1995 FAP) will be used to collect the soil sample from each excavation and transfer the soil to the laboratory-supplied sample jars.

A field blank will be taken using laboratory-prepared deionized water, a stainless steel scope and an aluminum pan. This procedure will also be performed in the same manner as the collection of the soil samples in accordance with the FAP.

Packaging and shipping of the soil samples will be completed in accordance with the FAP. Each sample container will be properly labeled and a chain-of-custody seal was placed over its cap. The caps and the labels will be secured with clear sealing tape and the containers will then be

placed in coolers filled with ice and bubble wrap. A chain-of-custody form will be completed for each shipment of samples and placed in the appropriate cooler with the samples. The coolers will be sealed, labeled and hand delivered to the Rochester Airborne Express office for overnight shipment to the laboratory. Analytical parameters for soil samples are presented in Table 1.

Upon completion of sample collection, each sampling location will be marked in the field with spray paint and flags, and distances to physical features will be field measured with a tape measure relative to fixed site features for reference for the site base map.

Groundwater Sampling

Groundwater sampling of the newly installed bedrock monitoring wells will also be conducted. The sampling event will occur after well development of the new site monitoring wells and after they have been surveyed.

Samples will be taken using the applicable NYSDEC field methods, the June 1995 Quality Assurance Project Plan (QAPP) and the procedures described in this section. A minimum of three (3) well volumes will be removed or the well completely evacuated before sampling occurs. All samples will be preserved according to the prescribed methods and chain of custody forms competed by project staff. The samples will be immediately shipped to the laboratory for analysis. Analytical parameters for groundwater samples are presented in Table 1.

As previously stated, ASP, December 1991, will be adhered to for all laboratory analytical work. Galson will be responsible for determining that the analytical laboratory has and maintains DOH ELAP certification in all categories of CLP and Solid and Hazardous Waste analytical testing for the duration of the project. Data validation will consist of analysis with "Class B" deliverables. Galson will provide the Department with a Data Usability Report on the collected data.

As part of the program to determine the relative significance of anaerobic degradation of VOCs, groundwater samples from twelve (12) existing wells located in the area of highest concentrations of chlorinated contaminants will be sampled and analyzed per the sampling

protocol presented in Appendix C - *Sampling Protocol to Obtain Natural Attenuation Data at Dover Air Force Base.*

Table 1 - Analytical Parameters
Davis-Howland Oil Corporation, Rochester, NY (NYS DEC Site No. 8-28-088)

SAMPLING METHOD	MATRIX	NO. OF SAMPLES	PARAMETER	ANALYTICAL METHOD
Surface Soil Sampling	Soil	12	TAL Metals Cd, Cr, Pb & Zn Only	ASP 1995 CLP-M
Well Sampling	Groundwater	38	TCL Volatile Organics	ASP 1995 CLP (95-1)
Well Sampling	Groundwater	14	Chloride	EPA 325.2
Well Sampling	Groundwater	14	Iron (ferrous & ferric)	EPA 6010
Well Sampling	Groundwater	14	Alkalinity	EPA 310.1
Well Sampling	Groundwater	14	Sulfate	EPA 375.4
Well Sampling	Groundwater	14	Sulfide	EPA 376.2
Well Sampling	Groundwater	14	Nitrogen, Nitrate, Nitrite	TKN 351.3
Well Sampling	Groundwater	14	Phosphorus	EPA 365.2

Pump Test

A limited pump-test will be conducted to assess the extent of interconnections between the bedrock and overburden aquifers. This test will be qualitative in nature and is not expected to provide detailed quantitative results such as hydraulic conductivity, etc. The pump test will be run at wells MW-2R and MW-14R, located northeast of the Davis-Howland Building. Pumping rates are anticipated to be in the range of one to two gallons per minute (gpm). The testing will be sequenced such that one well will be pumped with attendant measurement of the water table response in four (4) nearby wells, followed by decontamination of the pump and electronic water level meter(s), and performance of the test in the second well. Water levels will be recorded by the Galson site coordinator on a log form during the performance of the test at the following intervals:

Time since pumping started (or ceased) in minutes	Time interval between measurements (min.)
0 - 10	0.5 - 1
10 - 15	1
15 - 60	5
60 - 120 (end test)	30

The drawdown and recovery data collected during the test will be analyzed to provide estimates of the extent of interconnections between the bedrock and overburden aquifers.

Subtask 2.3: Air Sparging and Soil Vapor Extraction Pilot Test:

To provide the data necessary for the design of an air-sparge/soil vapor extraction system to remediate OU-1, a pilot study will be conducted by ERD Environmental, Inc. to determine the effectiveness of this system to remediate the shallow groundwater and subsurface soil. The air-sparge/vapor extraction pilot study at the site will be performed in accordance with the following scope of work:

1. Installation of air sparging and soil vapor extracting point(s) necessary for conducting the test with materials suitable to the site.
2. Determination of the likelihood that injected air will short-circuit to the atmosphere prior to being collected by the vapor extraction points.
3. Determination of both the sparging and vapor extraction area of influence.
4. Determination of the required distance between the sparge and vapor extraction points.
5. Establishment of a contaminant base line, through groundwater and soil vapor testing, for the test points prior to starting the pilot test.
6. Determination of the injection pressure and extraction vacuum needed for proper operation of the pilot test.
7. Determination of the necessary flow rates for injected air and for vacuum extraction.
8. Consideration of the likelihood that the sparging operation will create "mounding" of groundwater such that the plume of dissolved phase contaminants will not be contained.
9. Identification of concerns that may prevent remediation under the buildings.

10. Generation of a written report summarizing the results of the pilot study. The pilot study report will focus on the open areas of the site and make recommendations for air-sparging and vapor extraction under the building.

Subtask 2.4: Summary of Data and Letter Design Report:

Galson will evaluate all data collected during the pre-design sampling and analysis, the RI/FS, and the Phase II RI, and prepare a report listing the findings and conclusions of the study and list recommendations. This design report will address all of the questions listed above in Section II, Scope of Work. The report will evaluate the conceptual design as proposed in the ROD and make any recommended changes or additions to the design based upon the results of the predesign investigations. The report will include the following:

- identification of any necessary pre-treatment requirements for the extracted groundwater (pump test derived),
- identification of necessary air emission requirements and prepare draft air permits,
- determination of the proper management of treatment residues,
- identification of the magnitude of the effect of natural anaerobic attenuation of chlorinated solvents in shallow groundwater,
- selection of the optimal placement and number of air sparging points and vapor extraction points, and;
- identification of other concerns which may adversely affect the environment or operation of the remedy.

The discussions in the report regarding site background and contaminant characterization will be limited and focused on only those issues important to the remedial design. Galson will prepare six (6) copies of the draft Design Report, with one round of comments on the initial draft report assumed, and also prepare six (6) copies of the final report.

Subtask 2.5: Project Management - Task 2

This subtask has been set up to cover the management of the first task of the Davis-Howland project. Included in this task is the time required to manage and administer all of the activities performed by project personnel in the execution of this task.

V. TASK 3: PLANS AND SPECIFICATIONS

Galson will prepare complete plans and specifications (including design drawings) to be used in competitively bidding the construction of the remedy and initiation of the operation and maintenance of the remedy in conformance with New York State and applicable federal laws, rules, regulations and guidelines. Galson will also produce a Limited Site Data Document summarizing data gathered during the RI/FS, for use by the contractors during the bidding process. All standards, criteria and guidance (SCGs) identified in the RI/FS will be incorporated into the design by Galson. The Department will review and provide comments on the various work products produced by Galson under this work assignment. Galson will provide responses to these comments and incorporate changes into the design documents.

Galson understands that, subject to revision during scoping and design, the Department anticipates that the requirements will include (at a minimum):

- A site mobilization and demobilization plan, a site restoration plan, and a site security plan.
- The Remedial Contractor will be required to develop a Health and Safety Plan, signed by a certified industrial hygienist, for the site construction and operation of the remedial equipment.
- The Remedial Contractor will be required to construct, shakedown, and then continuously operate the air sparging and vapor extraction components of the remedy through a demonstration period (approximately three months). Elements to be tested during the demonstration period will include; areas of influence, contaminant removal rates, and compliance with air discharge limitations.
- The specifications will include performance criteria for all components which the Remedial Contractor must ensure are met before system O&M is transferred.
- The Remedial Contractor will be required to develop an O&M Plan before completion of construction activities. Galson understands that the Department will issue a separate work assignment to carry out construction oversight, preparation of the O&M Manual, and system O&M after initial operation of the system by the Contractor. Galson, in the design specifications, will include minimum requirements for the preparation of the O&M Manuals. The Design will identify the existing monitoring wells to be retained for future monitoring or to be decommissioned if not needed. Decommissioning procedures will be described and be consistent with NYSDEC monitoring well decommissioning guidance.
- The Remedial Contractor will be responsible for the preparation of the Site Health and Safety Plan and a Construction QA/QC Plan. The design specifications will include minimum requirements for these items.

Subtask 3.1: Preliminary Design:

Galson will submit to the NYSDEC's Authorized Representative six (6) copies of preliminary construction plans and specifications when the design is 30 percent complete. By that time Galson will have verified the existing field conditions. Supporting data, documentation, and design calculations will be provided with the design documents defining the functional aspects of the project. All major design issues will be resolved in the preliminary design submittal.

Subtask 3.2: Intermediate Design:

At the option of the Department, Galson will submit to the NYSDEC six (6) copies of intermediate construction plans and specifications when the design is 60 percent complete. Supporting data, documentation, and design calculations will be provided in the format of a design report.

Subtask 3.3: Pre-Final and Final Design:

Upon completion of the design documents, Galson will submit to the NYSDEC for review, six (6) copies of the pre-final plans, specifications, supporting data/documentation (which should include information to be subsequently used in the preparation of an O&M Plan), the Task 2 letter design report, and design calculations in the format of a design report. Prior to this submittal, Galson will thoroughly coordinate and cross check the bid form, specifications, and drawings to ensure consistency within the contract documents. Written comments on the various design submittals will be provided by the NYSDEC describing the changes required to consider the plans and specifications acceptable for bidding. The final design documents will incorporate all comments from the Department. After approval of the final design by the NYSDEC, LMS will submit 50 copies of the plans and specifications for bidding, plus Mylars (25 additional copies may be needed), and plans and specifications on disk in AutoCAD97LT for Windows 95, format.

Subtask 3.4 Project Cost Estimate:

Galson will submit a pre-bid cost estimate for the project along with LMS' submittal of the final design plans and specifications. The pre-bid estimate will be supported by quantity take-off sheets and the basis for the development of unit and lump sum prices used in the estimate.

Subtask 3.5: Project Management - Task 3

This subtask has been set up to cover the management of the first task of the Davis-Howland project. Included in this task is the time required to manage and administer all of the activities performed by project personnel in the execution of this task.

VI. TASK 4: PRE-AWARD SERVICES

Galson will provide general support services to the NYSDEC for the purpose of competitively bidding the site remediation contract. These are described under the following subtask sections.

Subtask 4.1 Prebid Conference:

Galson will attend and conduct a pre-bid meeting at the site with prospective bidders, at the option of and in conjunction with the Department. At the pre-bid conference, Galson will emphasize to the bidders important technical items of the project, tour the project site, answer any questions, and prepare minutes of the meeting.

Subtask 4.2 Addenda:

In responding to all questions from prospective bidders, Galson will draft the addenda and the Department will approve and transmit them.

Subtask 4.3 Bid Review:

Galson will review and provide comments on all bid submittals and shop drawings required by the contract documents, and identified, in part, within Section III of the standard construction contract, as required five (5) day and 14 day submittals after bid opening.

Subtask 4.5: Project Management - Task 4

This subtask has been set up to cover the management of the first task of the Davis-Howland project. Included in this task is the time required to manage and administer all of the activities performed by project personnel in the execution of this task.

B. PROJECT MANAGEMENT APPROACH

1. PROJECT STAFFING PLAN

a. LMS

Dr. Michael J. Skelly, Ph.D., P.E., of LMS (NSPE Grade 9), will be the partner-in-charge for this work assignment. As partner-in-charge he will review the major technical conclusions drawn and administrative decisions made.

Mr. Edward A. Maikish, P.E. (NSPE Grade 7), from LMS will be the program administrator for this work assignment. Mr. Maikish will be directly responsible to the NYSDEC for the overall completion of the project and will provide overall supervision and guidance to project personnel. He will ensure staff resources are available for completion of the project and will approve assignments, work scopes, budgets, and staffing plan and provide technical advice on project approach.

Dr. Bradley Williams of LMS (NSPE Grade 5) will be the project Quality Assurance Officer (QAO). In this capacity, Dr. Williams will review the site-specific Quality Assurance Project Plan (QAPP) and provide ongoing surveillance of project activities to ensure conformance with the QAPP.

b. Galson

The **Project Manager,** Paul Micciche, PG (NSPE V) is responsible for the successful completion of work assignments within budget and schedule. The project manager is responsible for the following:

- Preparing and organizing project work.
- Selecting team personnel and briefing them on specific assignments.
- Coordinating with the task leaders to complete the work planned.
- Completing final reports.
- Establishing safety and equipment requirements that are to be met, and monitoring compliance with those requirements.
- Coordinating with regulatory agencies.
- Assisting in quality assurance efforts including validation of field logs, data entry review and calculations checking. Meeting project objectives within an established budget and schedule.
- Administering all contractual agreements.
- Assuring that staffing level and technical expertise are provided.
- Informing the senior management of Galson on matters relating to the project.

The **Project Quality Assurance Officer**, Theresa A. Beddoe, CPG (NSPE VII) will be responsible for Galson's quality program for this project. She will provide overall supervision of the project to ensure that the technical work is directed to meeting the project objectives. She will be involved in reviewing the results of the study and assisting with keeping LMS informed on the progress of the investigation. Ms. Beddoe's duties will include reviewing deliverables prior to issue.

Mr. Scott Parmelee, IHIT (NSPE III) will serve as the **Project Health and Safety Officer** (HSO) for this work assignment. Mr. Parmelee is an Industrial Hygienist in Training (IHIT) with experience in industrial hygiene monitoring and hazardous site cleanups. Mr. Parmelee and all Galson personnel who will work on this site have received at least the minimum required OSHA safety training for work on hazardous waste sites required by OSHA 29 CFR 1910.120.

The health and safety representative will be responsible for safety procedures and operations at the site, including the following:

- Determining the level of personnel protection required.
- Updating equipment or procedures based on new information gathered during the site inspection.
- Changing the levels of protection based on site observations.
- Monitoring compliance with the safety requirements.

- Stopping work as required to protect worker safety or where non-compliance with safety requirements if found.
- Determining and posting emergency telephone numbers (including poison control centers) and routes to medical facilities; arranging for emergency transportation to medical facilities.
- Informing personnel (other than team members) who want access to work areas of the potential hazards of the site.
- Determining that each team member has been given the proper medical clearance by a qualified medical consultant; monitoring team members to determine compliance with applicable physical requirements as stipulated in the health and safety program.

In addition, Mr. Parmelee will serve as the quality assurance officer for this project. His duties will also include a review of non-laboratory produced data for:

- Determining the required precision and accuracy.
- Determining data completeness.
- Determining the representativeness of the data.
- Determining the comparability of the data.
- Determining the intended uses of the data.
- Conducting internal quality control checks and performance audits of investigation procedures.
-

Providing input to the program director and project manager as to corrective actions required resulting from the above-mentioned evaluations.

Kevin McGovern (NSPE I) will act as the **Site Coordinator** for this project. His duties will consist primarily of acting to facilitate communication and coordinate efforts between subcontractors and the project manager. Mr. McGovern will conduct an ongoing evaluation of the project information and data goals set by the project manager to ensure they are addressed and met by the project field tasks.

Derek Anderson, P.E. (NSPE V) will serve and as **Project Engineer** for the Davis-Howland site. Mr. Anderson's responsibilities include:

- evaluation of data and report generated as a result of the air sparging pilot test.
- assisting project manager with preparation of data summary and design report.
- preparation of plans and specifications for the air sparging system.
- attendance at prebid meetings.
- assisting the Department in responding to questions from prospective bidders.
- bid review.
- assisting the project manager with project cost estimates.
- preparation of the design report.
- completion of the design calculations
- ensuring consistency between the design plans and the design specifications

- completion of the cost estimates
- recommedations to the Department regarding an engineering approach to each of the major design issues.
- stamping of the plans and specifications.

Project personnel resumes are contained in Appendix B.

2. PROJECT ORGANIZATION AND SCHEDULE

Galson will use a project team of hydrogeologists, geologists, environmental engineers, civil engineers and technicians experienced with remedial system design and site characterization. The Galson team will consist of a program director, project manager, quality assurance officer, project engineer, site coordinator, a health and safety representative, and additional staff as necessary. Figure 1 contains the project organization chart.

3. PROJECT SCHEDULE

The anticipated schedule for the implementation and execution of the work plan in presented in the Project Work Schedule (Figure 2). The estimated time frames presented in this figure are subject to revision based on NYSDEC response time-frame and requested revisions. Weather and other natural conditions affecting field activities may also make schedule revisions necessary.

4. PROPOSED SUBCONTRACTORS LIST

The proposed subcontractors to perform activities during the Davis-Howland project are listed below:

- Nothnagle Drilling Company - Drilling and monitoring well installation
- Intertek Testing Services - Laboratory analysis of soil and groundwater samples
- ERD Environmental, Inc. - sparge and SVE pilot study
- Popli Engineering Surveyors - survey of bedrock wells

5. MBE/WBE UTILIZATION PLAN

This section outlines the LMS/Galson MBE/WE utilization plan as required by the New York State Superfund Standby Contract. The purpose of the plan is to document our intent to comply with the regulations under 9NYCRR Part 543, entitled "Requirements and Procedures Regarding Business

Participation Opportunities for Minorities and Women on State Contracts". LMS and Galson will make every effort to meet the goals established by those regulations, i.e., 15 percent MBE participation, through implementation of our proposed utilization plan as described below.

LMS and Galson are committed to equal opportunity employment, with corporate involvement meeting or exceeding the state regulations referenced in this contract. Evidence of our commitment is that LMS employs 8% minorities and 28% women, while Galson employs 4% minorities and 24% women. To ensure full implementation of equal opportunity employment policy, we will take steps to:

a. Recruit, hire, assign, and promote persons without regard to race, religion, marital status, color, sexual orientation, national origin, sex, veteran's status, age, or non job-related disability of any kind.

b. Administer all personnel actions, including compensation, benefits, transfers, layoffs, and recall from layoffs, access to training, education, tuition assistance, and social recreation programs without regard to race, religion, marital status, color, sexual orientation, national origin, sex, veteran's status, age, or non job-related disability of any kind.

To date, LMS and Galson have made a good faith effort to obtain MBE/WBE subcontractors for completion of this work assignment. The MBE and WBE firms that will be utilized as subcontractors for this project are listed below:

MBE UTILIZATION

- Popli Engineering & Surveyors will provide surveying services. The MBE contribution resulting from the utilization of the above listed subcontractor is $850 (0.6%).

WBE UTILIZATION

- No WBE firm was low bid on subcontracted work, however, LMS/Galson expects to utilize a WBE for minor work items such as printing.

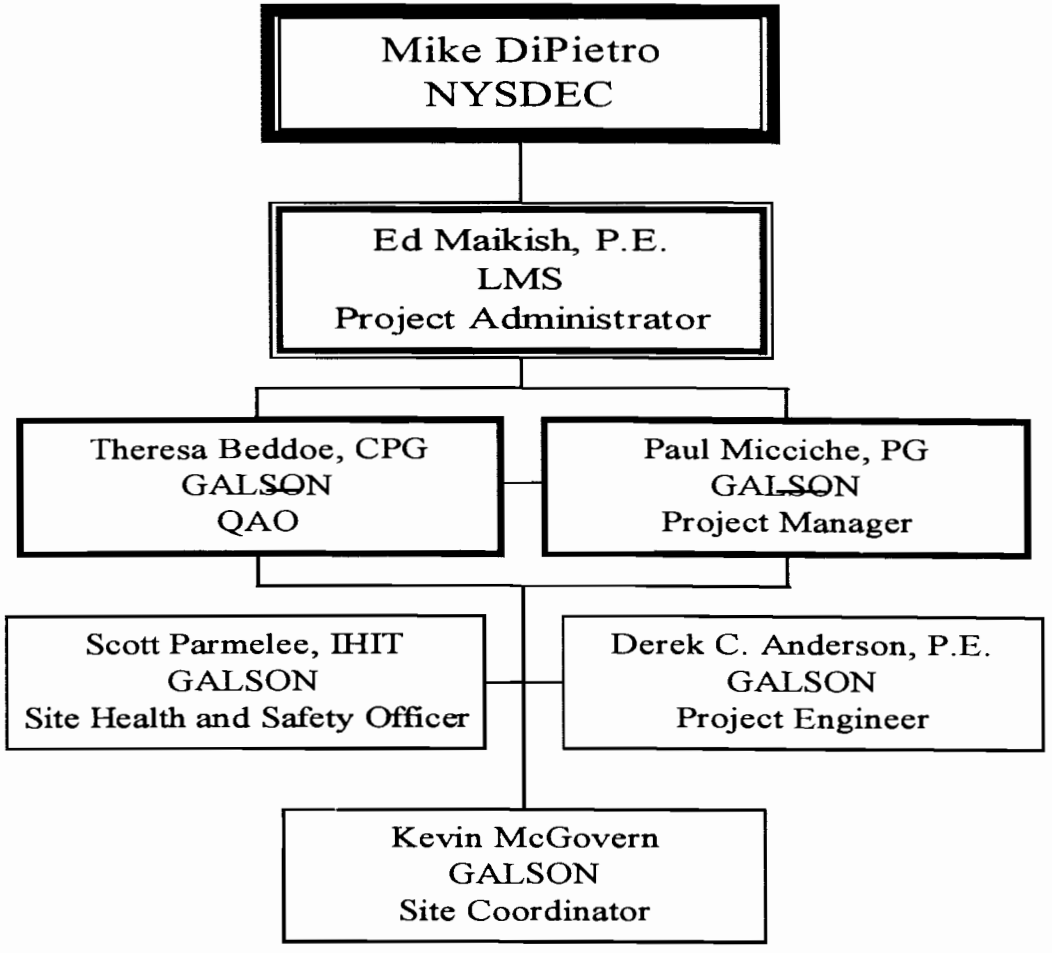
6. PROJECT DELIVERABLES

Project deliverables are tabled below:

ACTIVITY/ITEM	DATE DUE	DELIVERABLE
Scoping Meeting	April 23, 1998	Attend Meeting
Background Review and Site Visit	May 1, 1998	none
Draft Remedial Design Work Plan with Budget	June 17, 1998	Draft Work Plan
NYSDEC Review and Comment	July 17, 1998	Comments
Revise Work Plan	July 31, 1998	Work Plan
NYSDEC Work Plan Approval/Notice to Proceed	August 6, 1998	Notification
Re-Procure/Procure Contractors	August 14, 1998	Subcontracts
Install Bedrock Wells	August 27, 1998	Start Field Work (1st task)
Soil and Groundwater Sampling	September 4, 1998	2nd Field Task
Perform Pump Test	September 18, 1998	3rd Field Task
Perform Sparging/SVE Pilot Tests	September 11, 1998	4th Field Task
Survey New Bedrock Wells	August 28, 1998	5th Field Task
Letter Design Report	October 8, 1998	Design Report
Project Meeting with NYSDEC	October 6, 1998	Attend Meeting
Department's Review and Comment on Report	October 16, 1998	Comments
Finalize Letter Design Report	October 29, 1998	Final Design Report
Preliminary Design	November 12, 1998	Design Documents (Prelim.)
Department Review and Comment	November 26, 1998	Comments
Intermediate (60 percent) Design Submittal (*if requested*)	January 21, 1999	Design Documents (60%)
Department Review and Comment	January 21, 1999	Comments
Pre-Final and Final Design	March 3, 1999	Final Design Documents
Department Review and Comment	March 19, 1999	Comments
Project Cost Estimating	March 19, 1999	Cost Estimates
Prebid Conference	March 25, 1999	Attend Meeting - Mtg. Notes
Addenda	April 9, 1999	Addenda to Design Docs.
Bid Review	April 22, 1999	Bid Award

PROJECT ORGANIZATION CHART

PROJECT ORGANIZATION



SCHEDULE

7/29/98

Work Assignment Progress Schedule

Davis-Howland Oil Company, Site #6-28-006, WA #D002276-31

FIGURE 3

PA

TASKS	Wk. 1 4-20	Wk. 2 4-27	Wk. 3 5-4	Wk. 4 5-11	Wk. 5 5-18	Wk. 6 5-25	Wk. 7 6-1	Wk. 8 6-8	Wk. 9 6-15	Wk. 10 6-22	Wk. 11 6-29	Wk. 12 7-6	Wk. 13 7-13	Wk. 14 7-20	Wk. 15 7-27	Wk. 16 8-3	Wk. 17 8-10
1.1 - Background Review & Site Visit																	
1.2 a Scoping Meeting (4-23)	*																
1.2 b Remedial Design WP (draft)	80d																
1.2 c NYSDEC Review of WP									4wk								
1.2 d Revise WP													14d				
1.3 Issuance of Notice to Proceed																*	
2.1 Contract Finalization/Mobilization																10d	
2.2 Install Bedrock Wells																	
2.2 a Environ. Sampling																	
2.2 b Pump Test																	
2.2 c Pilot Tests (Sparging)																	
2.3 Data Summary & Design Report																	
2.3 a Letter Report																	
2.3 b Mtg. w/ NYSDEC																	
2.3 c NYSDEC Review & Comment																	
2.3 d Finalize Report																	
3 Plans and Specifications																	
3.1 Preliminary Design (30%)																	
3.1 a NYSDEC Review & Comment																	
3.2 Intermed. Design (60%)																	
3.2 a NYSDEC Review & Comment																	
3.3 Pre-Final & Final Design																	
3.3 a NYSDEC Review & Comment																	
3.4 Project Cost Estimating																	
4.1 Prebid Conference																	
4.2 Addenda																	
4.3 Bid Review																	

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Work Assignment Progress Schedule

Davis-Howland Oil Company, Site #8-28-088, WA #D002676-31

FIGURE 3

TASKS	Wk. 18 8-17	Wk. 19 8-24	Wk. 20 8-31	Wk. 21 9-7	Wk. 22 9-14	Wk. 23 9-21	Wk. 24 9-28	Wk. 25 10-5	Wk. 26 10-12	Wk. 27 10-19	Wk. 28 10-26	Wk. 29 11-2	Wk. 30 11-9	Wk. 31 11-16	Wk. 32 11-23	Wk. 33 11-30
1.1 - Background Review & Site Visit																
1.2 a Scoping Meeting (4-23)																
1.2 b Remedial Design WP (draft)																
1.2 c NYSDEC Review of WP																
1.2 d Revise WP																
1.3 Issuance of Notice to Proceed																
2.1 Contract Finalization/Mobilization																
2.2 Install Bedrock Wells	7d															
2.2 a Environ. Sampling		10d														
2.2 b Pump Test					2d											
2.2 c Pilot Tests (Sparging)			10d													
2.3 Data Summary & Design Report																
2.3 a Letter Report						14d										
2.3 b Mtg. w/ NYSDEC								*								
2.3 c NYSDEC Review & Comment							14d									
2.3 d Finalize Report										7d						
3 Plans and Specifications																
3.1 Preliminary Design (30%)			10wk													
3.1 a NYSDEC Review & Comment													14d			
3.2 Intermed. Design (60%)														9wk		
3.2 a NYSDEC Review & Comment																
3.3 Pre-Final & Final Design																
3.3 a NYSDEC Review & Comment																
3.4 Project Cost Estimating																
4.1 Prebid Conference																
4.2 Addenda																
4.3 Bid Review																

7/29/9[illegible] Work Assignment Progress Schedule [illegible] FIGURE 3 PAGE [illegible]

Davis-Howland Oil Company, Site #8-28-088, WA #D002676-31

TASKS	Wk. 34 12-7	Wk. 35 12-14	Wk. 36 12-21	Wk. 37 12-28	Wk. 38 1-4	Wk. 39 ###	Wk. 40 1-18	Wk. 41 1-25	Wk. 42 2-1	Wk. 43 2-8	Wk. 44 2-15	Wk. 45 2-22	Wk. 46 3-1	Wk 47 3-8	Wk. 48 3-15	Wk. 49 3-22	Wk. 50 3-29	Wk 51 4-5
1.1 - Background Review & Site Visit																		
1.2 a Scoping Meeting (4-23)																		
1.2 b Remedial Design WP (draft)																		
1.2 c NYSDEC Review of WP																		
1.2 d Revise WP																		
1.3 Issuance of Notice to Proceed																		
2.1 Contract Finalization/Mobilization																		
2.2 Install Bedrock Wells																		
2.2 a Environ. Sampling																		
2.2 b Pump Test																		
2.2 c Pilot Tests (Sparging)																		
2.3 Data Summary & Design Report																		
2.3 a Letter Report																		
2.3 b Mtg. w/ NYSDEC																		
2.3 c NYSDEC Review & Comment																		
2.3 d Finalize Report																		
3 Plans and Specifications																		
3.1 Preliminary Design (30%)																		
3.1 a NYSDEC Review & Comment																		
3.2 Intermed. Design (60%) - contin.																		
3.2 a NYSDEC Review & Comment					10d													
3.3 Pre-Final & Fin. Design						7wk												
3.3 a NYSDEC Review & Comment											4wk							
3.4 Project Cost Estimating													14d					
4.1 Prebid Conference																*		
4.2 Addenda															21d			
4.3 Bid Review																		

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Work Assignment Progress Schedule
Davis-Howland Oil Company, Site #8-28-088, WA #D002676-31

FIGURE 3

TASKS	Wk. 52 4-12		Wk. 53 4-19	
1.1 - Background Review & Site Visit				
1.2 a Scoping Meeting (4-23)				
1.2 b Remedial Design WP (draft)				
1.2 c NYSDEC Review of WP				
1.2 d Revise WP				
1.3 Issuance of Notice to Proceed				
2.1 Contract Finalization/Mobilization				
2.2 Install Bedrock Wells				
2.2 a Environ. Sampling				
2.2 b Pump Test				
2.2 c Pilot Tests (Sparging)				
2.3 Data Summary & Design Report				
2.3 a Letter Report				
2.3 b Mtg. w/ NYSDEC				
2.3 c NYSDEC Review & Comment				
2.3 d Finalize Report				
3 Plans and Specifications				
3.1 Preliminary Design (30%)				
3.1 a NYSDEC Review & Comment				
3.2 Intermed. Design (60%)				
3.2 a NYSDEC Review & Comment				
3.3 Pre-Final & Final Design				
3.3 a NYSDEC Review & Comment				
3.4 Project Cost Estimating				
4.1 Prebid Conference				
4.2 Addenda				
4.3 Bid Review	7d			end

TABLE of CONTENTS
For
PLANS and SPECS

SPECIFICATION SECTIONS

SECTION	DESCRIPTION
DIVISION 1	**BIDDING AND CONTRACT REQUIREMENTS**
01010	Summary of Work
01015	Work Limits For the Contractor
01039	Coordination and Meetings
01045	Cutting and Patching
01051	Survey
01090	Reference Standards
01300	Submittals
01340	Required Shop Drawings, Products, and Samples
01390	Remedial Action Phase Health and Safety Plan Submittal
01410	Testing Laboratory Services
01510	Temporary Facilities and Services
01590	Field Offices
01700	Contract Closeout

DIVISION 2	SITE WORK
02200	Earthwork Terms
02111	Excavation and Handling of Contaminated Material
02120	Transportation and Disposal of Hazardous Materials
02221	Trenching, Backfill and Compaction
02509	Asphalt Concrete Pavement Replacement
02605	Underground Piping – General
02616	Sewer Laterals
02622	PVC Sewer Pipe
02625	PVC Pressure Pipe
02671	Monitoring Wells, Air Sparge Points, and Vapor Extraction Points
02750	Pressure Pipe Testing
02831	Chain Link Fences and Gates

DIVISION 3	CONCRETE
03001	Concrete
03300	Cast-In-Place Concrete
03310	Pre-Cast Concrete Building

DIVISION 11	EQUIPMENT
11015	Identification Systems
11100	Soil Vapor Extraction System
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DIVISION 16	ELECTRICAL
16010	Basic Electrical Requirements
16050	Basic Electrical Materials & Methods
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16430	Metering
16440	Disconnect Switches – Service
16450	Grounding
16471	Panelboards – 277/480 V Distribution
16472	Panelboards – 120/208 V Branch Circuit
16481	Motor Control Starters

LIST OF DRAWINGS

C. PROJECT BUDGET

SCHEDULE 2.11 (a)
SUMMARY OF WORK ASSIGNMENT PRICE
Work Assignment Number D002676-31
Davis-Howland Oil Co. RD

LINE ITEM		AMOUNT ($)
1. Direct Salary Costs (Schedules 2.10 (a) and 2.11 (b))		4,250
2. Indirect Costs (Schedule (2.10 (g))		6,588
3. Direct Non-Salary Costs (Schedules 2.10 (d,e,f) and 2.11 (c,d)		335
Subcontract Costs:		
Name of Subcontractor	**Services to be Performed**	**Subcontract Price**
1. Galson/Lozier	Professional Services	126,710
4. Total Cost-Plus-Fixed Fee Subcontracts		126,710
Unit Price Subcontracts (Schedule 2.10 (f) and 2.11 (f))		
Name of Subcontractor	**Services to be Performed**	**Subcontract Price**
5. Total Unit Price Subcontracts		0
6. Subcontract Management Fee (Schedule 2.11[f])		0
7. Total Subcontract Costs (lines 4 + 5)		126,710
8. Fixed Fee (Schedule 2.10 (h))		1,084
9. Total Work Assignment Price (lines 1 + 2 + 3 + 6 + 7)		138,967

SCHEDULE 2.11(b)
LABOR COST SUMMARY
Work Assignment Number D002676-31
Davis-Howland Oil Co. RD

LABOR CATEGORY AVERAGE SALARY RATE (1997)	IX $63.86	VIII $49.09	VII $43.07	VI $40.35	V $35.99	IV $28.15	III $25.21	II $24.51	I $18.59	WP $16.55	TOTAL
Task 1	0	0	18	0	0	0	0	0	30	0	48
Task 2	1	0	8	0	24	0	0	0	4	0	37
Task 3	2	0	10	0	0	0	24	0	5	0	41
Task 4	0	0	6	0	0	0	0	0	3	0	9
Subtotal Hours:	3	0	42	0	24	0	24	0	42	0	
TOTAL HOURS:	3	0	42	0	24	0	24	0	42	0	135
Total Direct Labor Costs	191.58	0.00	1,808.94	0.00	863.76	0.00	605.04	0.00	780.78	0.00	4,250.10

INDIRECT LABOR COSTS:	6,587.66
SUBTOTAL:	10,837.76
FIXED FEE:	1,083.77
TOTAL BUDGETED LABOR COSTS:	11,921.53

ENGINEER/CONTRACT No.: Lawler, Matusky & Skelly Engineers LLP
PROJECT NAME: Davis-Howland Oil Co. RD
WORK ASSIGNMENT No.: D002676-31

DATE PREPARED: 04 Aug 98

SCHEDULE 2.11(b-1)
DIRECT ADMINISTRATIVE LABOR HOURS BUDGETED

NSPE LABOR CLASSIFICATION	IX	VIII	VII	VI	V	IV	III	II	I	WP	TOTAL No. OF DIRECT ADMINISTRATIVE LABOR HOURS BUDGETED
Task 1	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0	7.0
Task 2	0.0	0.0	4.0	0.0	0.0	0.0	0.0	0.0	4.0	0.0	8.0
Task 3	0.0	0.0	4.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0	9.0
Task 4	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	6.0
TOTAL HOURS:	0.0	0.0	13.0	0.0	0.0	0.0	0.0	0.0	17.0	0.0	30.0

Contract/Project administrative hours would include but not necessarily be limited to the following activities:

1. Work Plan Development
   - Conflict of Interest Check
   - Develop of budget schedules and supporting documentation
2. Review work assignment (WA) progress
   - Conduct progress reviews
   - Prepare monthly project report
   - Update WA progress schedule
   - Prepare monthly M/WBE Utilization Report
3. Review work assignment costs
   - Prepare monthly cost control report
   - Cost control reviews
4. CAP Preparation
   - Oversee and prepare monthly CAP
   - Respond to payment issues/disallowances
   - NSPE list updates
   - Equipment Inventory
5. Manage subcontracts
6. Implement and manage program management and staffing plans
7. Conduct Health and Safety Reviews
8. Word processing and graphic artists
9. Report editing

Contract/Project administration hours would NOT include activities such as:

1. QA/Qc reviews
2. Technical oversight by management
3. Develop subcontracts
4. Work plan development
5. Review of deliverables

SCHEDULE 2.11(c) - DIRECT NON-SALARY COSTS
Work Assignment Number D002676-31
Davis-Howland Oil Co. RD

ITEM	MAXIMUM REIMBURSEMENT RATE ($)	UNIT	ESTIMATED NUMBER OF UNITS	TOTAL ESTIMATED COST ($)
A. Material Costs:				
Telephone	1.00	(at cost)	44	44.00
Reproduction	0.07	(per page)	2,550	178.50
General PC usage	1.50	(per hr)	9	13.50
			SUBTOTAL:	236.00
B. Travel Costs:				
Personal mileage	0.32	(per mile)	290	91.35
Tolls	1.00	(at cost)	8	8.00
			SUBTOTAL:	99.35
C. Equipment Costs:				
			SUBTOTAL:	0.00
			TOTAL DIRECT NON-SALARY COSTS:	335.35

SCHEDULE 2.11(e)

COST-PLUS FIXED FEE SUBCONTRACTS

Work Assignment Number D002676-31
Davis-Howland Oil Co. RD

NAME OF SUBCONTRACTOR	SERVICES TO BE PERFORMED	SUBCONTRACT PRICE
1. Galson/Lozier	Professional Services	$126,710.15

A. Direct Salary Costs

PROFESSIONAL RESPONSIBILITY LEVEL	LABOR CLASS.	MAXIMUM REIMB. RATE ($/hr)	ESTIMATED NUMBER OF HOURS	TOTAL ESTIMATED DIRECT SALARY COST ($)
	VI	35.25	28.5	$1,004.63
	V	30.62	0	$0.00
	IV	27.59	633	$17,464.48
	III	23.65	327.5	$7,745.38
	II	22.15	0	$0.00
	I	17.00	445.5	$7,573.50
		TOTAL DIRECT SALARY COSTS:		$33,787.99

FOOTNOTES:

1 - These rates will be held firm until October 31, 1997.
2 - Reimbursement will be limited to the lesser of either the individuals actual hourly rate or the maximum rate for each labor category.
3 - Reimbursement will be limited to the maximum reimbursement rate for the professional responsibility level of the actual work performed.
4 - Only those labor classifications indicated with an asterix will be entitled to overtime.
5 - Reimbursement for technical time of principals, owners and officers will be limited to the maximum maximum reimbursement rate of that labor category, the actual hourly labor rate paid, or the Federal GS-18 rate, whichever is lower.
6 - The maximium rates in each labor category can be modified only by mutual written agreement and approved by both the Department and the Comptroller.
7 - This footnote applies to Schedules for years 4 thru 7 only. If the U.S. cost-of-living index increases at a rate greater than 6% compounded annually, the maximum salary rates will be subjuect to renegotiation for future years of the contract.

SCHEDULE 2.11(e)

COST-PLUS FIXED FEE SUBCONTRACTS

Work Assignment Number D002676-31

Davis-Howland Oil Co. RD

B. Indirect Costs

Indirect costs shall be paid based on a percentage of direct salary costs incurred which shall not exceed a maximum of 144.58% or the actual rate calculated in accordance with 48 CFR Federal Acquisition Regulations, whichever is lower.

Amount budgeted for indirect costs: $48,850.68

C. Maximum Reimbursement Rates for Direct Non-Salary Costs

ITEM	$ MAX REIMBURSEMENT RATE (Specify Unit)	EST. NO. OF UNITS	TOTAL EST. COST ($)
Materials			$9,208.95
Travel			$171.83
Equipment			$3,573.00
Subs			$24,728.00
* - See attached scehdules for detailed breakdown.			
		TOTAL DIRECT NON-SALARY COSTS:	$37,681.78

D. Fixed Fee

The fixed fee is:

See Schedule 2.10(h) for how the fixed fee should be claimed: $5,784.70

Mgmt Fee: $605.00

TOTAL: $126,710.15

SCHEDULE 2.11 (e)-1a

SUMMARY OF WORK ASSIGNMENT PRICE

Work Assignment Number D002676-31

Davis-Howland Oil Co. OU-1 Remed.

LINE ITEM	AMOUNT ($)
1. Direct Salary Costs (Schedules 2.10 (a) and 2.11 (b))	33,788
2. Indirect Costs (Schedule (2.10 (g))	48,851
3. Direct Non-Salary Costs (Schedules 2.10 (d,e,f) and 2.11 (c,d)	12,954

Subcontract Costs:

Name of Subcontractor	Services to be Performed	Subcontract Price
4. Total Cost-Plus-Fixed Fee Subcontracts		0

Unit Price Subcontracts (Schedule 2.10 (f) and 2.11 (f))

Name of Subcontractor	Services to be Performed	Subcontract Price
1. Nothnagle Drilling	Drilling - Well Installation	6,318
2. Om Popli	Survey Wells	850
3. ITS Laboratory	Soil and Groundwater Analytical	5,460
4. ERD Environmental	Air Sparging Pilot Test	12,100

5. Total Unit Price Subcontracts	24,728
6. Subcontract Management Fee (Schedule 2.11[f])	605
7. Total Subcontract Costs (lines 4 + 5)	24,728
8. Fixed Fee (Schedule 2.10 (h))	5,785
9. Total Work Assignment Price (lines 1 + 2 + 3 + 6 + 7)	126,710

SCHEDULE 2.11(e)-1b
LABOR COST SUMMARY
Work Assignment Number D002676-31
Davis-Howland Oil Co. OU-1 Remed.

LABOR CATEGORY AVERAGE SALARY RATE (1997)	IX $56.52	VIII $44.44	VII $39.37	VI $35.25	V $30.62	IV $27.59	III $23.65	II $22.15	I $17.00	WP $15.68	TOTAL
Task 1	0.0	0.0	0.0	11.5	0.0	44.5	17.5	0.0	64.5	0.0	138.0
Task 2	0.0	0.0	0.0	5.0	0.0	84.0	111.0	0.0	207.0	0.0	407.0
Task 3	0.0	0.0	0.0	9.0	0.0	442.0	183.0	0.0	166.0	0.0	800.0
Task 4	0.0	0.0	0.0	3.0	0.0	62.5	16.0	0.0	8.0	0.0	89.5
Subtotal Hours:	0.0	0.0	0.0	28.5	0.0	633.0	327.5	0.0	445.5	0.0	
TOTAL HOURS:	0.0	0.0	0.0	28.5	0.0	633.0	327.5	0.0	445.5	0.0	1,434.5
Total Direct Labor Costs	0.00	0.00	0.00	1,004.63	0.00	17,464.48	7,745.38	0.00	7,573.50	0.00	33,787.99

INDIRECT LABOR COSTS:	48,850.68
SUBTOTAL:	82,638.67
FIXED FEE:	5,784.70
TOTAL BUDGETED LABOR COSTS:	88,423.37

ENGINEER/CONTRACT No.: Galson Corporation
PROJECT NAME: Davis-Howland Oil Co. OU-1 Remed.
WORK ASSIGNMENT No.: D002676-31

DATE PREPARED: 31 Jul 98

SCHEDULE 2.11(e)-b-1
DIRECT ADMINISTRATIVE LABOR HOURS BUDGETED

NSPE LABOR CLASSIFICATION	IX	VIII	VII	VI	V	IV	III	II	I	WP	TOTAL No. OF DIRECT ADMINISTRATIVE LABOR HOURS BUDGETED
Task 1	0.0	0.0	0.0	0.5	0.0	1.0	0.0	0.0	0.0	0.0	1.5
Task 2	0.0	0.0	0.0	0.0	0.0	11.0	0.0	0.0	0.0	0.0	11.0
Task 3	0.0	0.0	0.0	0.0	0.0	8.0	0.0	0.0	0.0	0.0	8.0
Task 4	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	2.5
TOTAL HOURS:	0.0	0.0	0.0	0.5	0.0	22.5	0.0	0.0	0.0	0.0	23.0

Contract/Project administrative hours would include but not necessarily be limited to the following activities:

1. Work Plan Development
   - Conflict of Interest Check
   - Develop of budget schedules and supporting documentation
2. Review work assignment (WA) progress
   - Conduct progress reviews
   - Prepare monthly project report
   - Update WA progress schedule
   - Prepare monthly M/WBE Utilization Report
3. Review work assignment costs
   - Prepare monthly cost control report
   - Cost control reviews
4. CAP Preparation
   - Oversee and prepare monthly CAP
   - Respond to payment issues/disallowances
   - NSPE list updates
   - Equipment Inventory
5. Manage subcontracts
6. Implement and manage program management and staffing plans
7. Conduct Health and Safety Reviews
8. Word processing and graphic artists
9. Report editing

Contract/Project administration hours would NOT include activities such as:

1. QA/Qc reviews
2. Technical oversight by management
3. Develop subcontracts
4. Work plan development
5. Review of deliverables

SCHEDULE 2.11(e)-1c - DIRECT NON-SALARY COSTS
Work Assignment Number D002676-31
Davis-Howland Oil Co. OU-1 Remed.

ITEM	MAXIMUM REIMBURSEMENT RATE ($)	UNIT	ESTIMATED NUMBER OF UNITS	TOTAL ESTIMATED COST ($)
A. Material Costs:				
Telephone	1.00	(at cost)	410	410.00
General PC usage	1.50	(per hr)	8	12.00
Fax	1.00	(per page)	1,575	1,575.00
Overnight shipping	35.00	(at cost)	69	2,415.00
Information purchases	1.00	(at cost)	400	400.00
Photography	1.00	(at cost)	24	24.00
Lg/ print repro (24X36)	1.35	(per page)	1,710	2,308.50
Sample storage	2.00	(per 6-mo)	20	40.00
Disposable Field Items:				
Nylon Rope	0.20	(per ft)	300	60.00
Poly Disch. Tubing	0.20	(per ft)	400	80.00
Decon Chemicals	1.00	(at cost)	5	5.00
Decon D.I. Water	0.12	(per gal.)	10	1.20
Inline water filter	14.50	(each)	12	174.00
Ice for samples	1.00	(at cost)	8	8.00
Stakes/Flagging	3.75	(at cost)	3	11.25
Miscellaneous items	1.00	(at cost)	95	95.00
Carbon Canister	1,255.00	(per canister)	1	1,255.00
Disposable Bailer	15.00	(ea)	13	195.00
City Roch. Hydrant Permit	140.00	(lump sum)	1	140.00
			SUBTOTAL:	9,208.95
B. Travel Costs:				
Personal mileage	0.32	(per mile)	482	151.83
Miscellaneous	1.00	(at cost)	20	20.00
			SUBTOTAL:	171.83
C. Equipment Costs:				
Personal Protective Equipment:				
Level D	9.00	(per day)	18	162.00
Submersible well Pump - Grundfos	335.00	(per week)	1	335.00
Generators - Honda (5,500 watt)	200.00	(per week)	1	200.00
PID - HNu (P1-101)	43.00	(per day)	12	516.00
AMS soil sampler - portable kit	87.00	(per 3 day)	2	174.00
Static well level - Solinst 101	11.00	(per day)	3	33.00
Hydrolab Scout w/ H20G + flowcell	328.00	(per week)	1	328.00
Hermit data logger - in-situ	570.00	(per day)	2	1,140.00
Turbidity meter	50.00	(per day)	7	350.00
RAM-1-MIE	240.00	(per week)	1	240.00
Consumable Equip.	1.00	(@cost)	95	95.00
			SUBTOTAL:	3,573.00
			TOTAL DIRECT NON-SALARY COSTS:	12,953.78

SCHEDULE 2.11(e)-1d3
MAXIMUM REIMBURSEMENT RATE FOR VENDOR RENTED EQUIPMENT
Work Assignment Number D002676-31
Davis-Howland Oil Co. OU-1 Remed.

ITEM	MAXIMUM REIMBURSEMENT RATE ($)*	ESTIMATED USAGE (unit of time)	ESTIMATED RENTAL COST ($) (Col. 2 X 3)
Hermit Data Logger with 4 pressure tranducers from Keck Instruments	570 /day	2	1,140.00
Hoch Water Quality Tester (turbidity meter) from Response Rental	50 /day	2	100.00
Redi-Flo 2 Grundfos Pump from Pine Environmental	335 /wk	1	335.00
Hydrolab Scout Flow Cell from Keck Instruments	328 /wk	1	328.00
Honda 5500 Watt Generator from Durand's Rent-All	200 /wk	1	200.00
MiniRAM MIE PDR 1000 from Response Rental	240 /wk	1	240.00
AMS Manual Soil Sampler from Henrich Rental	87 /3-days	2	174.00
		TOTAL:	2,517.00

* - Reimbursement will be paid at the Maximum Reimbursement rate or the actual rental rate, whichever is less.

SCHEDULE 2.11(e)-1d5
CONSUMABLE SUPPLIES
Work Assignment Number D002676-31
Davis-Howland Oil Co. OU-1 Remed.

ITEM	ESTIMATED QUANTITY	UNIT COST ($)	TOTAL BUDGETED COST (Col. 2 X 3)($)
Inline Water Filters from Pine Environmental	12	$14.50 /ea	174.00
Discharge Tubing for Grundfos Pump from Pine Environmental	400	$0.20 /ft	80.00
Disposable Teflon Bailers from Pine Environmental	13	$15.00 /ea	195.00
Carbon Cannister from Marcor	1	$1,255.00 /ea	1,255.00
		TOTAL:	1,704.00

SCHEDULE 2.11(e)-1f

UNIT PRICE SUBCONTRACTS

Work Assignment Number D002676-31
Davis-Howland Oil Co. OU-1 Remed.

NAME OF SUBCONTRACTOR	SERVICES TO BE PERFORMED	SUBCONTRACT PRICE	MGMT. FEE
1. Nothnagle Drilling	Drilling - Well Installation	$6,318.00	$0.00

ITEM	$ MAX REIMBURSEMENT RATE (Specify Unit)	EST. NO. OF UNITS	TOTAL EST. COST ($)
Shallow Bedrock Monitoring Wells			
1- Level D PPE	$14 /manday	3	$42.00
10- 6.25" HS AUGERS (0 - 40 ft)	$12 /ft	80	$960.00
29- 3 7/8 in. roller bit reaming	$14 /ft	20	$280.00
56- PVC Well Riser (4" sch. 80)	$19 /ft	86	$1,634.00
126- Riser backfill 4" Well set in 6.25" HSA	$8 /ft	84	$672.00
149- drums (water)	25.00	11	$275.00
149- drums (soil)	25.00	4	$100.00
150- move drums	$130 /hr	1	$130.00
170- Decon Pad	$500 /ls	1	$500.00
171- Decontamination	$130 /hr	1	$130.00
191/192- Water Tanker & Steam Cleaner	$125 /day	3	$375.00
Mob/Demob	600.00	1	$600.00
5 7/8 in. rock drilling	$20 /ft	6	$120.00
8 in. flushmount cover	$250 /ea	2	$500.00
		Subcontract Total:	$6,318.00
		Subcontract Management Fee:	$0.00

NOTE: A subcontract management fee of 5% will be allowed on total subcontracts over $10,000 subject to the terms specified in the management fee protocol.

SCHEDULE 2.11(e)-1f

UNIT PRICE SUBCONTRACTS

Work Assignment Number D002676-31
Davis-Howland Oil Co. OU-1 Remed.

NAME OF SUBCONTRACTOR	SERVICES TO BE PERFORMED	SUBCONTRACT PRICE	MGMT. FEE
2. Om Popli	Survey Wells	$850.00	$0.00

ITEM	$ MAX REIMBURSEMENT RATE (Specify Unit)	EST. NO. OF UNITS	TOTAL EST. COST ($)
TASK 2.1 Install Two Bedrock Monitoring Wells			
Survey Wells	$850 /ls	1	$850.00
		Subcontract Total:	$850.00
		Subcontract Management Fee:	$0.00

NOTE: A subcontract management fee of 5% will be allowed on total subcontracts over $10,000 subject to the terms specified in the management fee protocol.

SCHEDULE 2.11(e)-1f

UNIT PRICE SUBCONTRACTS

Work Assignment Number D002676-31
Davis-Howland Oil Co. OU-1 Remed.

NAME OF SUBCONTRACTOR	SERVICES TO BE PERFORMED	SUBCONTRACT PRICE	MGMT. FEE
3. ITS Laboratory	Soil and Groundwater Analytical	$5,460.00	$0.00

ITEM	$ MAX REIMBURSEMENT RATE (Specify Unit)	EST. NO. OF UNITS	TOTAL EST. COST ($)
TASK 2.2 a			
TAL Metals (Soil)	$33.00 /ea	24	$792.00
TCL VOCs (Water)	$120.00 /ea	6	$720.00
Alkalinity	$5.00 /ea	14	$70.00
Sulfate	$15.00 /ea	14	$210.00
Sulfide	$25.00 /ea	14	$350.00
Total organic carbon (TOC)	$20.00 /ea	14	$280.00
Chloride	$15.00 /ea	14	$210.00
VOC/daughter products	$120.00 /ea	14	$1,680.00
Iron (total, dissolved)	$15.00 /ea	14	$210.00
Nitrogen Nitrate Nitrite	$47 /ea	14	$658.00
Phosphorous (total)	$20 /ea	14	$280.00
		SUBTOTAL:	$5,460.00
		SUBTOTAL:	$0.00
		Subcontract Total:	$5,460.00
		Subcontract Management Fee:	$0.00

NOTE: A subcontract management fee of 5% will be allowed on total subcontracts over $10,000 subject to the terms specified in the management fee protocol.

SCHEDULE 2.11(e)-1f

UNIT PRICE SUBCONTRACTS

Work Assignment Number D002676-31
Davis-Howland Oil Co. OU-1 Remed.

NAME OF SUBCONTRACTOR	SERVICES TO BE PERFORMED	SUBCONTRACT PRICE	MGMT. FEE
4. ERD Environmental	Air Sparging Pilot Test	$12,100.00	$605.00

ITEM	$ MAX REIMBURSEMENT RATE (Specify Unit)	EST. NO. OF UNITS	TOTAL EST. COST ($)
TASK 2.2 b Pilot test			
Perform pilot testing	$12,100 /ls	1	$12,100.00
		SUBTOTAL:	$12,100.00
		Subcontract Total:	$12,100.00
		Subcontract Management Fee:	$605.00

NOTE: A subcontract management fee of 5% will be allowed on total subcontracts over $10,000 subject to the terms specified in the management fee protocol.

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CONTRACT No.: D002676
PROJECT NAME: Davis-Howland Oil Co.
WORK ASSIGNMENT No.: D002676-31
TASK No./NAME: Summary
COMPLETE: 0%

MONTHLY COST CONTROL REPORT
SUMMARY OF FISCAL INFORMATION

DATE PREPARED: 31 Jul 98
BILLING PERIOD:
INVOICE No.:
CAP No.:

EXPENDITURE CATEGORY	A COST CLAIMED THIS PERIOD	B PAID TO DATE	C TOTAL DISSALLOWED TO DATE	D TOTAL COSTS PAID TO DATE (A+B)	E ESTIMATED COSTS TO COMPLETION	F ESTIMATED TOTAL WORK ASSIGNMENT PRICE (A+B+E)	G APPROVED BUDGET	H ESTIMATED UNDER/OVER (G-F)
1. Direct Salary Costs:	0.00	0.00	0.00	0.00	33,787.99	33,787.99	33,787.99	0.00
2. Indirect Salary Costs (1.55):	0.00	0.00	0.00	0.00	48,850.68	48,850.68	48,850.68	0.00
3. Subtotal Direct Salary and Indirect Costs:	0.00	0.00	0.00	0.00	82,638.67	82,638.67	82,638.67	0.00
4. Travel:	0.00	0.00	0.00	0.00	171.83	171.83	171.83	0.00
5. Other Non-Salary Costs:								
Material Costs:	0.00	0.00	0.00	0.00	9,208.95	9,208.95	9,208.95	0.00
Equipment Costs:	0.00	0.00	0.00	0.00	3,573.00	3,573.00	3,573.00	0.00
6. Subtotal Direct Non-Salary Costs:	0.00	0.00	0.00	0.00	12,953.78	12,953.78	12,953.78	0.00
7. Subs:								
Subconsultants:								
Subcontractors:								
Nothnagle Drilling	0.00	0.00	0.00	0.00	6,318.00	6,318.00	6,318.00	0.00
Om Popli	0.00	0.00	0.00	0.00	850.00	850.00	850.00	0.00
Intertek Testing Service	0.00	0.00	0.00	0.00	5,460.00	5,460.00	5,460.00	0.00
ERD Environ.	0.00	0.00	0.00	0.00	12,100.00	12,100.00	12,100.00	0.00
8. Total Work Assignment Costs:	0.00	0.00	0.00	0.00	120,320.45	120,320.45	120,320.45	0.00
9. Fees:								
Fixed Fee:	0.00	0.00	0.00	0.00	5,784.70	5,784.70	5,784.70	0.00
Management Fee:	0.00	0.00	0.00	0.00	605.00	605.00	605.00	0.00
10. Total Work Assignment Price:	0.00	0.00	0.00	0.00	126,710.15	126,710.15	126,710.15	0.00

Project Manager (Engineer): _____ **Date:** _____

Galson Corporation

ENGINEER: Galson Corporation
CONTRACT No.: D002676
PROJECT NAME: Davis-Howland Oil Co.
WORK ASSIGNMENT No.: D002676-31
TASK No./NAME: Task 1
COMPLETE: 0%

SCHEDULE 2.11(g)

MONTHLY COST CONTROL REPORT
SUMMARY OF FISCAL INFORMATION

DATE PREPARED: 31 Jul 98
BILLING PERIOD:
INVOICE No.:
CAP No.:

EXPENDITURE CATEGORY	A COST CLAIMED THIS PERIOD	B PAID TO DATE	C TOTAL DISSALLOWED TO DATE	D TOTAL COSTS PAID TO DATE (A+B)	E ESTIMATED COSTS TO COMPLETION	F ESTIMATED TOTAL WORK ASSIGNMENT PRICE (A+B+E)	G APPROVED BUDGET	H ESTIMATED UNDER/OVER (G-F)
1. Direct Salary Costs:	0.00	0.00	0.00	0.00	3,143.51	3,143.51	3,143.51	0.00
2. Indirect Salary Costs (1.55):	0.00	0.00	0.00	0.00	4,544.89	4,544.89	4,544.89	0.00
3. Subtotal Direct Salary and Indirect Costs:	0.00	0.00	0.00	0.00	7,688.40	7,688.40	7,688.40	0.00
4. Travel:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Other Non-Salary Costs:								
Material Costs:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Equipment Costs:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6. Subtotal Direct Non-Salary Costs:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7. Subs:								
Subconsultants:								
Subcontractors:								
8. Total Work Assignment Costs:	0.00	0.00	0.00	0.00	7,688.40	7,688.40	7,688.40	0.00
9. Fees:								
Fixed Fee:	0.00	0.00	0.00	0.00	538.18	538.18	538.18	0.00
Management Fee:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10. Total Work Assignment Price:	0.00	0.00	0.00	0.00	8,226.58	8,226.58	8,226.58	0.00

Project Manager (Engineer): _____ **Date:** _____

ENGINEER: Galson Corporation
CONTRACT No.: D002676
PROJECT NAME: Davis-Howland Oil Co.
WORK ASSIGNMENT No.: D002676-31
TASK No./NAME: Task 2
COMPLETE: 0%

SCHEDULE (g)

MONTHLY COST CONTROL REPORT
SUMMARY OF FISCAL INFORMATION

DATE PREPARED: 31 Jul 98
BILLING PERIOD:
INVOICE No.:
CAP No.:

EXPENDITURE CATEGORY	A COST CLAIMED THIS PERIOD	B PAID TO DATE	C TOTAL DISSALLOWED TO DATE	D TOTAL COSTS PAID TO DATE (A+B)	E ESTIMATED COSTS TO COMPLETION	F ESTIMATED TOTAL WORK ASSIGNMENT PRICE (A+B+E)	G APPROVED BUDGET	H ESTIMATED UNDER/OVER (G-F)
1. Direct Salary Costs:	0.00	0.00	0.00	0.00	8,637.97	8,637.97	8,637.97	0.00
2. Indirect Salary Costs (1.55):	0.00	0.00	0.00	0.00	12,488.78	12,488.78	12,488.78	0.00
3. Subtotal Direct Salary and Indirect Costs:	0.00	0.00	0.00	0.00	21,126.75	21,126.75	21,126.75	0.00
4. Travel:	0.00	0.00	0.00	0.00	81.27	81.27	81.27	0.00
5. Other Non-Salary Costs:								
Material Costs:	0.00	0.00	0.00	0.00	2,845.45	2,845.45	2,845.45	0.00
Equipment Costs:	0.00	0.00	0.00	0.00	3,573.00	3,573.00	3,573.00	0.00
6. Subtotal Direct Non-Salary Costs:	0.00	0.00	0.00	0.00	6,499.72	6,499.72	6,499.72	0.00
7. Subs:								
Subconsultants:								
Subcontractors:								
Nothnagle Drilling	0.00	0.00	0.00	0.00	6,318.00	6,318.00	6,318.00	0.00
Om Popli	0.00	0.00	0.00	0.00	850.00	850.00	850.00	0.00
Intertek Testing Service	0.00	0.00	0.00	0.00	5,460.00	5,460.00	5,460.00	0.00
ERD Environ.	0.00	0.00	0.00	0.00	12,100.00	12,100.00	12,100.00	0.00
8. Total Work Assignment Costs:	0.00	0.00	0.00	0.00	52,354.47	52,354.47	52,354.47	0.00
9. Fees:								
Fixed Fee:	0.00	0.00	0.00	0.00	1,478.88	1,478.88	1,478.88	0.00
Management Fee:	0.00	0.00	0.00	0.00	605.00	605.00	605.00	0.00
10. Total Work Assignment Price:	0.00	0.00	0.00	0.00	54,438.35	54,438.35	54,438.35	0.00

Project Manager (Engineer): _____ **Date:** _____

ENGINEER: Galson Corporation
CONTRACT No.: D002676
PROJECT NAME: Davis-Howland Oil Co.
WORK ASSIGNMENT No.: D002676-31
TASK No./NAME: Task 3
COMPLETE: 0%

SCHEDULE 2.11(g)

MONTHLY COST CONTROL REPORT
SUMMARY OF FISCAL INFORMATION

DATE PREPARED: 31 Jul 98
BILLING PERIOD:
INVOICE No.:
CAP No.:

EXPENDITURE CATEGORY	A COST CLAIMED THIS PERIOD	B PAID TO DATE	C TOTAL DISSALLOWED TO DATE	D TOTAL COSTS PAID TO DATE (A+B)	E ESTIMATED COSTS TO COMPLETION	F ESTIMATED TOTAL WORK ASSIGNMENT PRICE (A+B+E)	G APPROVED BUDGET	H ESTIMATED UNDER/OVER (G-F)
1. Direct Salary Costs:	0.00	0.00	0.00	0.00	19,661.98	19,661.98	19,661.98	0.00
2. Indirect Salary Costs (1.55):	0.00	0.00	0.00	0.00	28,427.30	28,427.30	28,427.30	0.00
3. Subtotal Direct Salary and Indirect Costs:	0.00	0.00	0.00	0.00	48,089.28	48,089.28	48,089.28	0.00
4. Travel:	0.00	0.00	0.00	0.00	63.00	63.00	63.00	0.00
5. Other Non-Salary Costs:								
Material Costs:	0.00	0.00	0.00	0.00	5,693.50	5,693.50	5,693.50	0.00
Equipment Costs:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6. Subtotal Direct Non-Salary Costs:	0.00	0.00	0.00	0.00	5,756.50	5,756.50	5,756.50	0.00
7. Subs:								
Subconsultants:	0.00	0.00		0.00	0.00	0.00	0.00	0.00
Subcontractors:	0.00	0.00		0.00	0.00	0.00	0.00	0.00
8. Total Work Assignment Costs:	0.00	0.00	0.00	0.00	53,845.78	53,845.78	53,845.78	0.00
9. Fees:								
Fixed Fee:	0.00	0.00	0.00	0.00	3,366.25	3,366.25	3,366.25	0.00
Management Fee:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10. Total Work Assignment Price:	0.00	0.00	0.00	0.00	57,212.03	57,212.03	57,212.03	0.00

Project Manager (Engineer): _____ **Date:** _____

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CONTRACT No.: D002676
PROJECT NAME: Davis-Howland Oil Co.
WORK ASSIGNMENT No.: D002676-31
TASK No./NAME: Task 4
COMPLETE: 0%

MONTHLY COST CONTROL REPORT
SUMMARY OF FISCAL INFORMATION

DATE PREPARED: 31 Jul 98
BILLING PERIOD:
INVOICE No.:
CAP No.:

EXPENDITURE CATEGORY	A COST CLAIMED THIS PERIOD	B PAID TO DATE	C TOTAL DISSALLOWED TO DATE	D TOTAL COSTS PAID TO DATE (A+B)	E ESTIMATED COSTS TO COMPLETION	F ESTIMATED TOTAL WORK ASSIGNMENT PRICE (A+B+E)	G APPROVED BUDGET	H ESTIMATED UNDER/OVER (G-F)
1. Direct Salary Costs:	0.00	0.00	0.00	0.00	2,344.53	2,344.53	2,344.53	0.00
2. Indirect Salary Costs (1.55):	0.00	0.00	0.00	0.00	3,389.71	3,389.71	3,389.71	0.00
3. Subtotal Direct Salary and Indirect Costs:	0.00	0.00	0.00	0.00	5,734.24	5,734.24	5,734.24	0.00
4. Travel:	0.00	0.00	0.00	0.00	27.56	27.56	27.56	0.00
5. Other Non-Salary Costs:								
Material Costs:	0.00	0.00	0.00	0.00	670.00	670.00	670.00	0.00
Equipment Costs:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6. Subtotal Direct Non-Salary Costs:	0.00	0.00	0.00	0.00	697.56	697.56	697.56	0.00
7. Subs:								
Subconsultants:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subcontractors:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8. Total Work Assignment Costs:	0.00	0.00	0.00	0.00	6,431.80	6,431.80	6,431.80	0.00
9. Fees:								
Fixed Fee:	0.00	0.00	0.00	0.00	401.39	401.39	401.39	0.00
Management Fee:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10. Total Work Assignment Price:	0.00	0.00	0.00	0.00	6,833.19	6,833.19	6,833.19	0.00

Project Manager (Engineer): _____ **Date:** _____

Galson Corporation

ENGINEER: Galson Corporation
CONTRACT No.: D002676
PROJECT NAME: Davis-Howland Oil Co.
WORK ASSIGN. No.: D002676-31

SCHEDULE 2.11(h)

MONTHLY COST CONTROL REPORT

SUMMARY OF LABOR HOURS

Number of Direct Labor Hours Expended to Date/Estimated Number of Direct Labor Hours to Completion

DATE PREPARED: 31 Jul 98
BILLING PERIOD:
INVOICE No.:

LABOR CLASSIFICATION SALARY RATE	IX		VIII		VII		VI		V		IV		III		II		I		WP		TOTAL NO. OF DIRECT LABOR HRS.	
	EXP.	/EST.	EXP.	/EST.	EXP.	/EST.	EXP.	/EST.	EXP.	/EST.	EXP.	/EST.	EXP.	/EST.	EXP.	/EST.	EXP.	/EST.	EXP.	/EST.	EXP.	/EST.
Task 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.5	0.0	0.0	0.0	44.5	0.0	17.5	0.0	0.0	0.0	64.5	0.0	0.0	0.0	138.0
Task 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	84.0	0.0	111.0	0.0	0.0	0.0	207.0	0.0	0.0	0.0	407.0
Task 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.0	0.0	0.0	0.0	442.0	0.0	183.0	0.0	0.0	0.0	166.0	0.0	0.0	0.0	800.0
Task 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	62.5	0.0	16.0	0.0	0.0	0.0	8.0	0.0	0.0	0.0	89.5
																					0.0	1,434.5
TOTAL HOURS:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.5	0.0	0.0	0.0	633.0	0.0	327.5	0.0	0.0	0.0	445.5	0.0	0.0		1,434.5

NOTES:

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CONTRACT No.: D002676
PROJECT NAME: Davis-Howland Oil Co.
WORK ASSIGN. No.: D002676-31

BILLING PERIOD:
INVOICE No.:

MONTHLY COST CONTROL REPORT

SUMMARY OF LABOR HOURS

Number of Direct Labor Hours Budgeted/Expended Number of Direct Labor Hours

LABOR CLASSIFICATION SALARY RATE	IX		VIII		VII		VI		V		IV		III		II		I		WP		TOTAL NO. OF DIRECT LABOR HRS.	
	BUD	EXP.	BUD	EXP.	BUD	EXP.	BUD	EXP.	BUD	EXP.	BUD	EXP.	BUD	EXP.	BUD	EXP.	BUD	EXP.	BUD	EXP.	BUD	EXP.
Task 1	0.0	0.0	0.0	0.0	0.0	0.0	11.5	0.0	0.0	0.0	44.5	0.0	17.5	0.0	0.0	0.0	64.5	0.0	0.0	0.0	138.0	0.0
Task 2	0.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	84.0	0.0	111.0	0.0	0.0	0.0	207.0	0.0	0.0	0.0	407.0	0.0
Task 3	0.0	0.0	0.0	0.0	0.0	0.0	9.0	0.0	0.0	0.0	442.0	0.0	183.0	0.0	0.0	0.0	166.0	0.0	0.0	0.0	800.0	0.0
Task 4	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	62.5	0.0	16.0	0.0	0.0	0.0	8.0	0.0	0.0	0.0	89.5	0.0
																					1,434.5	0.0
TOTAL HOURS:	0.0	0.0	0.0	0.0	0.0	0.0	28.5	0.0	0.0	0.0	633.0	0.0	327.5	0.0	0.0	0.0	445.5	0.0	0.0	0.0		

NOTES:

ENGINEER: Galson Corporation
CONTRACT No.: D002676
PROJECT NAME: Davis-Howland Oil Co.
WORK ASSIGNMENT No.: D002676-31

SCHEDULE 2.11(g) - SUPPLEMENTAL

COST CONTROL REPORT
SUBCONTRACTOR

DATE PREPARE 31 Jul 98
BILLING PERIOD
INVOICE No.:
CAP No.:

	SUBCONTRACT NAME	A SUBCONTRACT COST CLAIMED THIS APPLICATION INCLUDING RESUBMITTALS	B SUBCONTRACT COST APPROVED FOR PAYMENT ON PREVIOUS APPLICATIONS	C TOTAL SUBCONTRACT COSTS TO DATE (A PLUS B)	D SUBCONTRACT APRROVED BUDGET	E MANAGEMENT FEE BUDGET	F MANAGEMENT FEE PAID	G TOTAL COSTS TO DATE (C PLUS F)
1.	Nothnagle Drilling	0.00	0.00	0.00	6,318.00	0.00	0.00	0.00
2.	Om Popli	0.00	0.00	0.00	850.00	0.00	0.00	0.00
3.	Intertek Testing Service	0.00	0.00	0.00	5,460.00	0.00	0.00	0.00
4.	ERD Environ.	0.00	0.00	0.00	12,100.00	605.00	0.00	0.00
	TOTALS:	0.00	0.00	0.00	24,728.00	605.00	0.00	0.00

Project Manager: _____ **Date:** _____

Notes: (1) Costs listed in columns A, B, C & D do not include any management fee costs.
(2) Management fee is applicable to only properly procured, satisfactorily completed, unit price subcontracts over $10,000.
(3) Total line, column G should equal line 7 (subcontractors), column D of Summary Cost Control Report.

CONTRACT No.: D002676
PROJECT NAME: Davis-Howland Oil Co. RD
WORK ASSIGNMENT No.: D002676-31
TASK No./NAME: Summary
COMPLETE: 0%

MONTHLY COST CONTROL REPORT
SUMMARY OF FISCAL INFORMATION

DATE PREPARED: 04 Aug 98
BILLING PERIOD:
INVOICE No.:
CAP No.:

EXPENDITURE CATEGORY	A COST CLAIMED THIS PERIOD	B PAID TO DATE	C TOTAL DISSALLOWED TO DATE	D TOTAL COSTS PAID TO DATE (A + B)	E ESTIMATED COSTS TO COMPLETION	F ESTIMATED TOTAL WORK ASSIGNMENT PRICE (A + B + E)	G APPROVED BUDGET	H ESTIMATED UNDER/OVER (G-F)
1. Direct Salary Costs:	0.00	0.00	0.00	0.00	4,250.10	4,250.10	4,250.10	0.00
2. Indirect Salary Costs (1.55):	0.00	0.00	0.00	0.00	6,587.66	6,587.66	6,587.66	0.00
3. Subtotal Direct Salary and Indirect Costs:	0.00	0.00	0.00	0.00	10,837.76	10,837.76	10,837.76	0.00
4. Travel:	0.00	0.00	0.00	0.00	99.35	99.35	99.35	0.00
5. Other Non-Salary Costs:								
Material Costs:	0.00	0.00	0.00	0.00	236.00	236.00	236.00	0.00
Equipment Costs:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6. Subtotal Direct Non-Salary Costs:	0.00	0.00	0.00	0.00	335.35	335.35	335.35	0.00
7. Subs:								
Subconsultants:								
Galson/Lozier	0.00	0.00	0.00	0.00	126,710.15	126,710.15	126,710.15	0.00
Subcontractors:								
8. Total Work Assignment Costs:	0.00	0.00	0.00	0.00	137,883.26	137,883.26	137,883.26	0.00
9. Fees:								
Fixed Fee:	0.00	0.00	0.00	0.00	1,083.77	1,083.77	1,083.77	0.00
Management Fee:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10. Total Work Assignment Price:	0.00	0.00	0.00	0.00	138,967.03	138,967.03	138,967.03	0.00

Project Manager (Engineer): _____ **Date:** _____

ENGINEER: Lawler, Matusky & Skelly Engineers LLP
CONTRACT No.: D002676
PROJECT NAME: Davis-Howland Oil Co. RD
WORK ASSIGNMENT No.: D002676-31
TASK No./NAME: Task 1
COMPLETE: 0%

SCHEDULE 2.11(g)

MONTHLY COST CONTROL REPORT
SUMMARY OF FISCAL INFORMATION

DATE PREPARED: 04 Aug 98
BILLING PERIOD:
INVOICE No.:
CAP No.:

EXPENDITURE CATEGORY	A COST CLAIMED THIS PERIOD	B PAID TO DATE	C TOTAL DISSALLOWED TO DATE	D TOTAL COSTS PAID TO DATE (A+B)	E ESTIMATED COSTS TO COMPLETION	F ESTIMATED TOTAL WORK ASSIGNMENT PRICE (A+B+E)	G APPROVED BUDGET	H ESTIMATED UNDER/OVER (G-F)
1. Direct Salary Costs:	0.00	0.00	0.00	0.00	1,332.96	1,332.96	1,332.96	0.00
2. Indirect Salary Costs (1.55):	0.00	0.00	0.00	0.00	2,066.09	2,066.09	2,066.09	0.00
3. Subtotal Direct Salary and Indirect Costs:	0.00	0.00	0.00	0.00	3,399.05	3,399.05	3,399.05	0.00
4. Travel:	0.00	0.00	0.00	0.00	99.35	99.35	99.35	0.00
5. Other Non-Salary Costs:								
Material Costs:	0.00	0.00	0.00	0.00	51.00	51.00	51.00	0.00
Equipment Costs:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6. Subtotal Direct Non-Salary Costs:	0.00	0.00	0.00	0.00	150.35	150.35	150.35	0.00
7. Subs:								
Subconsultants:								
Galson/Lozier	0.00	0.00	0.00	0.00	8,226.58	8,226.58	8,226.58	0.00
Subcontractors:								
8. Total Work Assignment Costs:	0.00	0.00	0.00	0.00	11,775.98	11,775.98	11,775.98	0.00
9. Fees:								
Fixed Fee:	0.00	0.00	0.00	0.00	339.91	339.91	339.91	0.00
Management Fee:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10. Total Work Assignment Price:	0.00	0.00	0.00	0.00	12,115.89	12,115.89	12,115.89	0.00

Project Manager (Engineer): _____ **Date:** _____

ENGINEER: Lawler, Matusky & Skelly Engineers SCHEDULE 2.11(g) PAGE: 3 of 8

CONTRACT No.: D002676 DATE PREPARED: 04 Aug 98

PROJECT NAME: Davis-Howland Oil Co. RD **MONTHLY COST CONTROL REPORT** BILLING PERIOD:

WORK ASSIGNMENT No.: D002676-31 **SUMMARY OF FISCAL INFORMATION** INVOICE No.:

TASK No./NAME: Task 2 CAP No.:

COMPLETE: 0%

EXPENDITURE CATEGORY	A COST CLAIMED THIS PERIOD	B PAID TO DATE	C TOTAL DISSALLOWED TO DATE	D TOTAL COSTS PAID TO DATE (A+B)	E ESTIMATED COSTS TO COMPLETION	F ESTIMATED TOTAL WORK ASSIGNMENT PRICE (A+B+E)	G APPROVED BUDGET	H ESTIMATED UNDER/OVER (G-F)
1. Direct Salary Costs:	0.00	0.00	0.00	0.00	1,346.54	1,346.54	1,346.54	0.00
2. Indirect Salary Costs (1.55):	0.00	0.00	0.00	0.00	2,087.14	2,087.14	2,087.14	0.00
3. Subtotal Direct Salary and Indirect Costs:	0.00	0.00	0.00	0.00	3,433.68	3,433.68	3,433.68	0.00
4. Travel:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Other Non-Salary Costs:								
Material Costs:	0.00	0.00	0.00	0.00	52.00	52.00	52.00	0.00
Equipment Costs:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6. Subtotal Direct Non-Salary Costs:	0.00	0.00	0.00	0.00	52.00	52.00	52.00	0.00
7. Subs:								
Subconsultants:								
Galson/Lozier	0.00	0.00	0.00	0.00	54,438.35	54,438.35	54,438.35	0.00
Subcontractors:								
8. Total Work Assignment Costs:	0.00	0.00	0.00	0.00	57,924.03	57,924.03	57,924.03	0.00
9. Fees:								
Fixed Fee:	0.00	0.00	0.00	0.00	343.37	343.37	343.37	0.00
Management Fee:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10. Total Work Assignment Price:	0.00	0.00	0.00	0.00	58,267.40	58,267.40	58,267.40	0.00

Project Manager (Engineer): _____ **Date:** _____

ENGINEER: Lawler, Matusky & Skelly Engineers
CONTRACT No.: D002676
PROJECT NAME: Davis-Howland Oil Co. RD
WORK ASSIGNMENT No.: D002676-31
TASK No./NAME: Task 3
COMPLETE: 0%

SCHEDULE 2.11(g)

MONTHLY COST CONTROL REPORT
SUMMARY OF FISCAL INFORMATION

DATE PREPARED: 04 Aug 98
BILLING PERIOD:
INVOICE No.:
CAP No.:

EXPENDITURE CATEGORY	A COST CLAIMED THIS PERIOD	B PAID TO DATE	C TOTAL DISSALLOWED TO DATE	D TOTAL COSTS PAID TO DATE (A+B)	E ESTIMATED COSTS TO COMPLETION	F ESTIMATED TOTAL WORK ASSIGNMENT PRICE (A+B+E)	G APPROVED BUDGET	H ESTIMATED UNDER/OVER (G-F)
1. Direct Salary Costs:	0.00	0.00	0.00	0.00	1,256.41	1,256.41	1,256.41	0.00
2. Indirect Salary Costs (1.55):	0.00	0.00	0.00	0.00	1,947.43	1,947.43	1,947.43	0.00
3. Subtotal Direct Salary and Indirect Costs:	0.00	0.00	0.00	0.00	3,203.84	3,203.84	3,203.84	0.00
4. Travel:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Other Non-Salary Costs:								
Material Costs:	0.00	0.00	0.00	0.00	79.00	79.00	79.00	0.00
Equipment Costs:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6. Subtotal Direct Non-Salary Costs:	0.00	0.00	0.00	0.00	79.00	79.00	79.00	0.00
7. Subs:								
Subconsultants:								
Galson/Lozier	0.00	0.00	0.00	0.00	57,212.03	57,212.03	57,212.03	0.00
Subcontractors:								
8. Total Work Assignment Costs:	0.00	0.00	0.00	0.00	60,494.87	60,494.87	60,494.87	0.00
9. Fees:								
Fixed Fee:	0.00	0.00	0.00	0.00	320.38	320.38	320.38	0.00
Management Fee:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10. Total Work Assignment Price:	0.00	0.00	0.00	0.00	60,815.25	60,815.25	60,815.25	0.00

Project Manager (Engineer): _____ **Date:** _____

CONTRACT No.: D002676
PROJECT NAME: Davis-Howland Oil Co. RD
WORK ASSIGNMENT No.: D002676-31
TASK No./NAME: Task 4
COMPLETE: 0%

MONTHLY COST CONTROL REPORT
SUMMARY OF FISCAL INFORMATION

DATE PREPARED: 04 Aug 98
BILLING PERIOD:
INVOICE No.:
CAP No.:

EXPENDITURE CATEGORY	A COST CLAIMED THIS PERIOD	B PAID TO DATE	C TOTAL DISSALLOWED TO DATE	D TOTAL COSTS PAID TO DATE (A+B)	E ESTIMATED COSTS TO COMPLETION	F ESTIMATED TOTAL WORK ASSIGNMENT PRICE (A+B+E)	G APPROVED BUDGET	H ESTIMATED UNDER/OVER (G-F)
1. Direct Salary Costs:	0.00	0.00	0.00	0.00	314.19	314.19	314.19	0.00
2. Indirect Salary Costs (1.55):	0.00	0.00	0.00	0.00	487.00	487.00	487.00	0.00
3. Subtotal Direct Salary and Indirect Costs:	0.00	0.00	0.00	0.00	801.19	801.19	801.19	0.00
4. Travel:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Other Non-Salary Costs:								
Material Costs:	0.00	0.00	0.00	0.00	54.00	54.00	54.00	0.00
Equipment Costs:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6. Subtotal Direct Non-Salary Costs:	0.00	0.00	0.00	0.00	54.00	54.00	54.00	0.00
7. Subs:								
Subconsultants:								
Galson/Lozier	0.00	0.00	0.00	0.00	6,833.19	6,833.19	6,833.19	0.00
Subcontractors:								
8. Total Work Assignment Costs:	0.00	0.00	0.00	0.00	7,688.38	7,688.38	7,688.38	0.00
9. Fees:								
Fixed Fee:	0.00	0.00	0.00	0.00	80.11	80.11	80.11	0.00
Management Fee:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10. Total Work Assignment Price:	0.00	0.00	0.00	0.00	7,768.49	7,768.49	7,768.49	0.00

Project Manager (Engineer): _____ **Date:** _____

ENGINEER: Lawler, Matusky & Skelly Engineers LLP
CONTRACT No.: D002676
PROJECT NAME: Davis-Howland Oil Co. RD
WORK ASSIGN. No.: D002676-31

SCHEDULE 2.11(h)

MONTHLY COST CONTROL REPORT

SUMMARY OF LABOR HOURS

Number of Direct Labor Hours Expended to Date/Estimated Number of Direct Labor Hours to Completion

DATE PREPARED: 04 Aug 98
BILLING PERIOD:
INVOICE No.:

LABOR CLASSIFICATION SALARY RATE	IX		VIII		VII		VI		V		IV		III		II		I		WP		TOTAL NO. OF DIRECT LABOR HRS.	
	EXP.	/EST.	EXP.	/EST.	EXP.	/EST.	EXP.	/EST.	EXP.	/EST.	EXP.	/EST.	EXP.	/EST.	EXP.	/EST.	EXP.	/EST.	EXP.	/EST.	EXP.	/EST.
Task 1	0.0	0.0	0.0	0.0	0.0	18.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.0	0.0	0.0	0.0	48.0
Task 2	0.0	1.0	0.0	0.0	0.0	8.0	0.0	0.0	0.0	24.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0	37.0
Task 3	0.0	2.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.0	0.0	0.0	5.0	0.0	0.0	0.0	41.0
Task 4	0.0	0.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	9.0
																					0.0	135.0
TOTAL HOURS:	0.0	3.0	0.0	0.0	0.0	42.0	0.0	0.0	0.0	24.0	0.0	0.0	0.0	24.0	0.0	0.0	0.0	42.0	0.0	0.0		135.0

NOTES:

ENGINEER: Lawler, Matusky & Skelly Engineers LLP
CONTRACT No.: D002676
PROJECT NAME: Davis-Howland Oil Co. RD
WORK ASSIGN. No.: D002676-31

SCHEDULE 2.11(h)

MONTHLY COST CONTROL REPORT

SUMMARY OF LABOR HOURS

Number of Direct Labor Hours Budgeted/Expended Number of Direct Labor Hours

DATE PREPARED: 04 Aug 98
BILLING PERIOD:
INVOICE No.:

LABOR CLASSIFICATION SALARY RATE	IX		VIII		VII		VI		V		IV		III		II		I		WP $12.66		TOTAL NO. OF DIRECT LABOR HRS.	
	BUD	EXP.	BUD	EXP.	BUD	EXP.	BUD	EXP.	BUD	EXP.	BUD	EXP.	BUD	EXP.	BUD	EXP.	BUD	EXP.	BUD	EXP.	BUD	EXP.
Task 1	0.0	0.0	0.0	0.0	18.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.0	0.0	0.0	0.0	48.0	0.0
Task 2	1.0	0.0	0.0	0.0	8.0	0.0	0.0	0.0	24.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0	37.0	0.0
Task 3	2.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	41.0	0.0
Task 4	0.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	9.0	0.0
																					135.0	0.0
TOTAL HOURS:	3.0	0.0	0.0	0.0	42.0	0.0	0.0	0.0	24.0	0.0	0.0	0.0	24.0	0.0	0.0	0.0	42.0	0.0	0.0	0.0		

NOTES:

LABOR HOURS AND COSTS
TASK SUMMARY
Davis-Howland Oil Co. RD

NSPE/ASCE LABOR CLASS	1998 HOURLY RATE ($)	TASK 1: 1998 RATES	TASK 2: 1998 RATES	TASK 3: 1998 RATES	TASK 4: 1998 RATES	TOTAL HOURS	SUBTOTAL ($)
IX	63.86	0.00	1.00	2.00	0.00	3.00	191.00
VIII	49.09	0.00	0.00	0.00	0.00	0.00	0.00
VII	43.07	18.00	8.00	10.00	6.00	42.00	1,808.00
VI	40.35	0.00	0.00	0.00	0.00	0.00	0.00
V	35.99	0.00	24.00	0.00	0.00	24.00	863.00
IV	28.15	0.00	0.00	0.00	0.00	0.00	0.00
III	25.21	0.00	0.00	24.00	0.00	24.00	605.00
II	24.51	0.00	0.00	0.00	0.00	0.00	0.00
I	18.59	30.00	4.00	5.00	3.00	42.00	780.00
WP	16.55	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL UNITS:		48.00	37.00	41.00	9.00	135.00	
DIRECT SALARY COSTS ($):		1,332.96	1,346.54	1,256.41	314.19		4,250.10
INDIRECT SALARY COSTS ($):	**1.55**	2,066.09	2,087.14	1,947.43	487.00		6,587.66
SUBTOTAL ($):		3,399.05	3,433.68	3,203.84	801.19		10,837.76
FIXED FEE ($):	**0.10**	339.91	343.37	320.38	80.11		1,083.77
MATERIAL COSTS ($):		51.00	52.00	79.00	54.00		236.00
TRAVEL COSTS ($):		99.35	0.00	0.00	0.00		99.35
FIELD EQUIPMENT ($):		0.00	0.00	0.00	0.00		0.00
SUBS ($):		8,226.58	54,438.35	57,212.03	6,833.19		126,710.15
MGMT FEE ($):	**0.05**	0.00	0.00	0.00	0.00		0.00
TOTAL ($):		12,115.89	58,267.40	60,815.25	7,768.49		138,967.03

LABOR HOURS AND COSTS
TASK 1: BACKGROUND REVIEW AND WORK PLAN
Davis-Howland Oil Co. RD

NSPE/ASCE LABOR CLASS	HOURLY RATE ($)	1.1 BACKGROUND REVIEW AND SITE VISIT	1.2 SCOPING MEETING AND RD WORK PLAN	1.3 TASK MANAGEMENT	TOTAL HOURS	SUBTOTAL ($)
IX	63.86	0.0	0.0	0.0	0.0	0.00
VIII	49.09	0.0	0.0	0.0	0.0	0.00
VII	43.07	0.0	16.0	2.0	18.0	775.26
VI	40.35	0.0	0.0	0.0	0.0	0.00
V	35.99	0.0	0.0	0.0	0.0	0.00
IV	28.15	0.0	0.0	0.0	0.0	0.00
III	25.21	0.0	0.0	0.0	0.0	0.00
II	24.51	0.0	0.0	0.0	0.0	0.00
I	18.59	0.0	25.0	5.0	30.0	557.70
WP	16.55	0.0	0.0	0.0	0.0	0.00
TOTAL UNITS:		0.0	41.0	7.0	48.0	
DIRECT SALARY COSTS ($):		0.00	1,153.87	179.09		1,332.96
INDIRECT SALARY COSTS ($):	1.55:	0.00	1,788.50	277.59		2,066.09
SUBTOTAL ($):		0.00	2,942.37	456.68		3,399.05
FIXED FEE ($):	0.10:	0.00	294.24	45.67		339.91
MATERIAL COSTS ($):		0.00	51.00	0.00		51.00
TRAVEL COSTS ($):		0.00	99.35	0.00		99.35
FIELD EQUIPMENT ($):		0.00	0.00	0.00		0.00
SUBS ($):		870.73	7,237.51	118.34		8,226.58
MGMT FEE ($):	0.05:	0.00	0.00	0.00		0.00
TOTAL ($):		870.73	10,624.47	620.69		12,115.89

MATERIAL COSTS

TASK 1: BACKGROUND REVIEW AND WORK PLAN

Davis-Howland Oil Co. RD

ITEM	RATE BASE	ESTIMATED $ PER UNIT	1.1 BACKGROUND REVIEW AND SITE VISIT	1.2 SCOPING MEETING AND RD WORK PLAN	1.3 TASK MANAGEMENT	TOTAL ($)
Telephone	(at cost)	1.00	0	10	0	10.00
Reproduction	(per page	0.07	0	500	0	35.00
General PC usage	(per hr)	1.50	0	4	0	6.00
	TOTAL UNITS:		0	514	0	
	TASK TOTAL ($):		0.00	51.00	0.00	51.00

TRAVEL COSTS

TASK 1: BACKGROUND REVIEW AND WORK PLAN

Davis-Howland Oil Co. RD

ITEM	RATE BASE	ESTIMATED $ PER UNIT	1.1 BACKGROUND REVIEW AND SITE VISIT	1.2 SCOPING MEETING AND RD WORK PLAN	1.3 TASK MANAGEMENT	TOTAL ($)
Personal mileage	(per mile)	0.315	0	290	0	91.35
Tolls	(at cost)	1.00	0	8	0	8.00
	TOTAL UNITS:		0	298	0	
	TASK TOTAL ($):		0.00	99.35	0.00	99.35

SUBCONSULTANTS/SUBCONTRACTORS COSTS
TASK 1: BACKGROUND REVIEW AND WORK PLAN
Davis-Howland Oil Co. RD

ITEM	1.1 BACKGROUND REVIEW AND SITE VISIT	1.2 SCOPING MEETING AND RID WORK PLAN	1.3 TASK MANAGEMENT	TOTAL ($)
Subconsultants:				
Lozier/Galson	870.73	7,237.51	118.34	8,226.58
Subcontractors:				
SUBTOTAL:	0.00	0.00	0.00	0.00
TOTAL:	870.73	7,237.51	118.34	8,226.58

LABOR HOURS AND COSTS

TASK 2: PRE-DESIGN INVESTIGATION

Davis-Howland Oil Co. RD

NSPE/ASCE LABOR CLASS	HOURLY RATE ($)	2.1 INSTALL BEDROCK WELLS	2.2A ENVIRONMENTAL SAMPLING AND PUMP TEST	2.2B IPILOT TESTS	2.3 DATA LETTER REPORT	2.4 TASK MANAGEMENT	TOTAL HOURS	SUBTOTAL ($)
IX	63.86	0.0	0.0	0.0	1.0	0.0	1.0	63.86
VIII	49.09	0.0	0.0	0.0	0.0	0.0	0.0	0.00
VII	43.07	0.0	0.0	0.0	4.0	4.0	8.0	344.56
VI	40.35	0.0	0.0	0.0	0.0	0.0	0.0	0.00
V	35.99	0.0	4.0	0.0	20.0	0.0	24.0	863.76
IV	28.15	0.0	0.0	0.0	0.0	0.0	0.0	0.00
III	25.21	0.0	0.0	0.0	0.0	0.0	0.0	0.00
II	24.51	0.0	0.0	0.0	0.0	0.0	0.0	0.00
I	18.59	0.0	0.0	0.0	0.0	4.0	4.0	74.36
WP	16.55	0.0	0.0	0.0	0.0	0.0	0.0	0.00
TOTAL UNITS:		0.0	4.0	0.0	25.0	8.0	37.0	
DIRECT SALARY COSTS ($):		0.00	143.96	0.00	955.94	246.64		1,346.54
INDIRECT SALARY COSTS ($):	1.55:	0.00	223.14	0.00	1,481.71	382.29		2,087.14
SUBTOTAL ($):		0.00	367.10	0.00	2,437.65	628.93		3,433.68
FIXED FEE ($):	0.10:	0.00	36.71	0.00	243.77	62.89		343.37
MATERIAL COSTS ($):		0.00	0.00	0.00	12.00	40.00		52.00
TRAVEL COSTS ($):		0.00	0.00	0.00	0.00	0.00		0.00
FIELD EQUIPMENT ($):		0.00	0.00	0.00	0.00	0.00		0.00
SUBS ($):		12,826.91	18,155.13	14,455.40	8,206.67	794.24		54,438.35
MGMT FEE ($):	0.05:	0.00	0.00	0.00	0.00	0.00		0.00
TOTAL ($):		12,826.91	18,558.94	14,455.40	10,900.09	1,526.06		58,267.40

MATERIAL COSTS

TASK 2: PRE-DESIGN INVESTIGATION

Davis-Howland Oil Co. RD

ITEM	RATE BASE	ESTIMATED $ PER UNIT	2.1 INSTALL BEDROCK WELLS	2.2A ENVIRONMENTAL SAMPLING AND PUMP TEST	2.2B IPILOT TESTS	2.3 DATA LETTER REPORT	2.4 TASK MANAGEMENT	TOTAL ($)
Telephone	(at cost)	1.00	0	0	0	5	2	7.00
Reproduction	(per page)	0.07	0	0	0	100	500	42.00
General PC usage	(per hr)	1.50	0	0	0	0	2	3.00
	TOTAL UNITS:		0	0	0	105	504	
	TASK TOTAL ($):		0.00	0.00	0.00	12.00	40.00	52.00

SUBCONSULTANTS/SUBCONTRACTORS COSTS

TASK 2: PRE-DESIGN INVESTIGATION

Davis-Howland Oil Co. RD

ITEM	2.1 INSTALL BEDROCK WELLS	2.2A ENVIRONMENTAL SAMPLING AND PUMP TEST	2.2B PILOT TESTS	2.3 DATA LETTER REPORT	2.4 TASK MANAGEMENT	TOTAL ($)
Subconsultants:						
Lozier/Galson	12,826.91	18,155.13	14,455.40	8,206.67	794.24	54,438.35
SUBTOTAL:	12,826.91	18,155.13	14,455.40	8,206.67	794.24	54,438.35
Subcontractors:						
SUBTOTAL:	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL:	12,826.91	18,155.13	14,455.40	8,206.67	794.24	54,438.35

LABOR HOURS AND COSTS

TASK 3: PLANS AND SPECIFICATIONS

Davis-Howland Oil Co. RD

NSPE/ASCE LABOR CLASS	HOURLY RATE ($) 1996	3.1 PRELIMINARY DESIGN	3.2 INTERMEDIATE DESIGN	3.3 PRE-FINAL AND FINAL DESIGN	3.4 PROJECT COST ESTIMATE	3.5 TASK MANAGEMENT	TOTAL HOURS	SUBTOTAL ($)
IX	63.86	0.0	0.0	1.0	1.0	0.0	2.0	127.72
VIII	49.09	0.0	0.0	0.0	0.0	0.0	0.0	0.00
VII	43.07	0.0	2.0	2.0	2.0	4.0	10.0	430.70
VI	40.35	0.0	0.0	0.0	0.0	0.0	0.0	0.00
V	35.99	0.0	0.0	0.0	0.0	0.0	0.0	0.00
IV	28.15	0.0	0.0	0.0	0.0	0.0	0.0	0.00
III	25.21	0.0	8.0	8.0	8.0	0.0	24.0	605.04
II	24.51	0.0	0.0	0.0	0.0	0.0	0.0	0.00
I	18.59	0.0	0.0	0.0	0.0	5.0	5.0	92.95
WP	16.55	0.0	0.0	0.0	0.0	0.0	0.0	0.00
TOTAL UNITS:		0.0	10.0	11.0	11.0	9.0	41.0	
DIRECT SALARY COSTS ($):		0.00	287.82	351.68	351.68	265.23		1,256.41
INDIRECT SALARY COSTS ($):	1.55	0.00	446.12	545.10	545.10	411.11		1,947.43
SUBTOTAL ($):		0.00	733.94	896.78	896.78	676.34		3,203.84
FIXED FEE ($):	0.10	0.00	73.39	89.68	89.68	67.63		320.38
MATERIAL COSTS ($):		0.00	12.00	12.00	12.00	43.00		79.00
TRAVEL COSTS ($):		0.00	0.00	0.00	0.00	0.00		0.00
FIELD EQUIPMENT ($):		0.00	0.00	0.00	0.00	0.00		0.00
SUBS ($):		22,688.15	4,807.75	24,790.64	4,129.36	796.13		57,212.03
MGMT FEE ($):	0.05	0.00	0.00	0.00	0.00	0.00		0.00
TOTAL ($):		22,688.15	5,627.08	25,789.10	5,127.82	1,583.10		60,815.25

MATERIAL COSTS

TASK 3: PLANS AND SPECIFICATIONS

Davis-Howland Oil Co. RD

ITEM	RATE BASE	ESTIMATED $ PER UNIT	3.1 PRELIMINARY DESIGN	3.2 INTERMEDIATE DESIGN	3.3 PRE-FINAL AND FINAL DESIGN	3.4 PROJECT COST ESTIMATE	3.5 TASK MANAGEMENT	TOTAL ($)
Telephone	(at cost)	1.00	0	5	5	5	5	20.00
Reproduction	(per page)	0.07	0	100	100	100	500	56.00
General PC usage	(per hr)	1.50	0	0	0	0	2	3.00
	TOTAL UNITS:		0	105	105	105	507	
	TASK TOTAL ($):		0.00	12.00	12.00	12.00	43.00	79.00

SUBCONSULTANTS/SUBCONTRACTORS COSTS

TASK 3: PLANS AND SPECIFICATIONS

Davis-Howland Oil Co. RD

ITEM		3.1 PRELIMINARY DESIGN	3.2 INTERMEDIATE DESIGN	3.3 PRE-FINAL AND FINAL DESIGN	3.4 PROJECT COST ESTIMATE	3.5 TASK MANAGEMENT	TOTAL ($)
Subconsultants:							
Lozier/Galson		22,688.15	4,807.75	24,790.64	4,129.36	796.13	57,212.03
	SUBTOTAL:	22,688.15	4,807.75	24,790.64	4,129.36	796.13	57,212.03
Subcontractors:							
	SUBTOTAL:	0.00	0.00	0.00	0.00	0.00	0.00
	TOTAL:	22,688.15	4,807.75	24,790.64	4,129.36	796.13	57,212.03

LABOR HOURS AND COSTS

TASK 4: PRE-AWARD SERVICES

Davis-Howland Oil Co. RD

NSPE/ASCE LABOR CLASS	HOURLY RATE ($)	4.1 PREBID CONFERENCE	4.2 ADDENDA	4.3 BID REVIEWS	4.4 TASK MANAGEMENT	TOTAL HOURS	SUBTOTAL ($)
IX	63.86	0.0	0.0	0.0	0.0	0	0.00
VIII	49.09	0.0	0.0	0.0	0.0	0	0.00
VII	43.07	1.0	1.0	1.0	3.0	6	258.42
VI	40.35	0.0	0.0	0.0	0.0	0	0.00
V	35.99	0.0	0.0	0.0	0.0	0	0.00
IV	28.15	0.0	0.0	0.0	0.0	0	0.00
III	25.21	0.0	0.0	0.0	0.0	0	0.00
II	24.51	0.0	0.0	0.0	0.0	0	0.00
I	18.59	0.0	0.0	0.0	3.0	3	55.77
WP	16.55	0.0	0.0	0.0	0.0	0	0.00
TOTAL UNITS:		1	1	1	6	9	
DIRECT SALARY COSTS ($):		43.07	43.07	43.07	184.98		314.19
INDIRECT SALARY COSTS ($):	1.55	66.76	66.76	66.76	286.72		487.00
SUBTOTAL ($):		109.83	109.83	109.83	471.70		801.19
FIXED FEE ($):	0.10	10.98	10.98	10.98	47.17		80.11
MATERIAL COSTS ($):		4.50	4.50	4.50	40.50		54.00
TRAVEL COSTS ($):		0.00	0.00	0.00	0.00		0.00
FIELD EQUIPMENT ($):		0.00	0.00	0.00	0.00		0.00
SUBS ($):		1,345.01	3,723.51	1,584.15	180.52		6,833.19
MGMT FEE ($):	0.05	0.00	0.00	0.00	0.00		0.00
TOTAL ($):		1,470.32	3,848.82	1,709.46	739.89		7,768.49

MATERIAL COSTS
TASK 4: PRE-AWARD SERVICES
Davis-Howland Oil Co. RD

ITEM	RATE BASE	ESTIMATED $ PER UNIT	4.1 PREBID CONFERENCE	4.2 ADDENDA	4.3 BID REVIEWS	4.4 TASK MANAGEMENT	TOTAL ($)
Telephone	(at cost)	1.00	1	1	1	4	7.00
Reproduction	(per page)	0.07	50	50	50	500	45.50
General PC usage	(per hr)	1.50	0	0	0	1	1.50
	TOTAL UNITS:		51	51	51	505	
	TASK TOTAL ($):		4.50	4.50	4.50	40.50	54.00

SUBCONSULTANTS/SUBCONTRACTORS COSTS

TASK 4: PRE-AWARD SERVICES

Davis-Howland Oil Co. RD

ITEM		4.1 PREBID CONFERENCE	4.2 ADDENDA	4.3 BID REVIEWS	4.4 TASK MANAGEMENT	TOTAL ($)
Subconsultants:						
Lozier/Galson		1,345.01	3,723.51	1,584.15	180.52	6,833.19
	SUBTOTAL:	1,345.01	3,723.51	1,584.15	180.52	6,833.19
Subcontractors:						
	SUBTOTAL:	0.00	0.00	0.00	0.00	0.00
	TOTAL:	1,345.01	3,723.51	1,584.15	180.52	6,833.19

LABOR HOURS AND COSTS
TASK SUMMARY
Davis-Howland Oil Co. D002676-31

NSPE/ASCE LABOR CLASS	1998 HOURLY RATE ($)	TASK 1: 1998 RATES	TASK 2: 1998 RATES	TASK 3: 1998 RATES	TASK 4: 1998 RATES	TOTAL HOURS	SUBTOTAL ($)
VI	35.25	11.50	5.00	9.00	3.00	28.50	1,004.63
V	30.62	0.00	0.00	0.00	0.00	0.00	0.00
IV	27.59	44.50	84.00	442.00	62.50	633.00	17,464.48
III	23.65	17.50	111.00	183.00	16.00	327.50	7,745.38
II	22.15	0.00	0.00	0.00	0.00	0.00	0.00
I	17.00	64.50	207.00	166.00	8.00	445.50	7,573.50
TOTAL UNITS:		138.00	407.00	800.00	89.50	1,434.50	
DIRECT SALARY COSTS ($):		3,143.51	8,637.97	19,661.98	2,344.53		33,787.99
INDIRECT SALARY							
1.4458		4,544.89	12,488.78	28,427.30	3,389.71		48,850.68
SUBTOTAL ($):		7,688.40	21,126.75	48,089.28	5,734.24		82,638.67
0.07		538.18	1,478.88	3,366.25	401.39		5,784.70
MATERIAL COSTS ($):		0.00	2,845.45	5,693.50	670.00		9,208.95
TRAVEL COSTS ($):		0.00	81.27	63.00	27.56		171.83
FIELD EQUIPMENT ($):		0.00	3,573.00	0.00	0.00		3,573.00
SUBS ($):		0.00	24,728.00	0.00	0.00		24,728.00
0.05		0.00	605.00	0.00	0.00		605.00
TOTAL ($):		8,226.58	54,438.35	57,212.03	6,833.19		126,710.15

LABOR HOURS AND COSTS

TASK 1: SCOPING

Davis-Howland Oil Co. D002676-31

NSPE/ASCE LABOR CLASS	HOURLY RATE ($)	1.1 Background Review & Site Visit	1.2 Scoping mtg. & Remedial Design Work Plan	1.3 TASK MANAGEMENT	TOTAL HOURS	SUBTOTAL ($)
VI	35.25	1.0	10.0	0.5	11.5	405.38
V	30.62	0.0	0.0	0.0	0.0	0.00
IV	27.59	3.0	40.5	1.0	44.5	1,227.76
III	23.65	8.0	9.5	0.0	17.5	413.88
II	22.15	0.0	0.0	0.0	0.0	0.00
I	17.00	1.5	63.0	0.0	64.5	1,096.50
TOTAL UNITS:		13.5	123.0	1.5	138.0	
DIRECT SALARY COSTS ($):		332.72	2,765.57	45.22		3,143.51
INDIRECT SALARY COSTS ($):	1.4458:	481.05	3,998.46	65.38		4,544.89
SUBTOTAL ($):		813.77	6,764.03	110.60		7,688.40
FIXED FEE ($):	0.07:	56.96	473.48	7.74		538.18
MATERIAL COSTS ($):		0.00	0.00	0.00		0.00
TRAVEL COSTS ($):		0.00	0.00	0.00		0.00
FIELD EQUIPMENT ($):		0.00	0.00	0.00		0.00
SUBS ($):		0.00	0.00	0.00		0.00
MGMT FEE ($):	0.05:	0.00	0.00	0.00		0.00
TOTAL ($):		870.73	7,237.51	118.34		8,226.58

LABOR HOURS AND COSTS
TASK 2: PRE-DESIGN INVESTIGATIONS
Davis-Howland Oil Co. D002676-31

NSPE/ASCE LABOR CLASS	HOURLY RATE ($)	2.1 INSTALL TWO BEDROCK MONITORING WELLS	2.2 A ENVIRON. SAMPLING & PUMP TEST	2.2 B PILOT TESTS	2.3 DATA SUMMARY & LETTER REPORT	2.4 TASK MANAGEMENT	TOTAL HOURS	SUBTOTAL ($)
VI	35.25	0.5	1.0	0.5	3.0	0.0	5.0	176.25
V	30.62	0.0	0.0	0.0	0.0	0.0	0.0	0.00
IV	27.59	9.0	20.0	12.0	32.0	11.0	84.0	2,317.56
III	23.65	35.0	45.0	6.0	25.0	0.0	111.0	2,625.15
II	22.15	0.0	0.0	0.0	0.0	0.0	0.0	0.00
I	17.00	45.0	72.0	8.0	82.0	0.0	207.0	3,519.00
TOTAL UNITS:		89.5	138.0	26.5	142.0	11.0	407.0	
DIRECT SALARY COSTS ($):		1,858.69	2,875.30	626.61	2,973.88	303.49		8,637.97
INDIRECT SALARY COSTS ($):	**1.4458:**	2,687.29	4,157.11	905.95	4,299.64	438.79		12,488.78
SUBTOTAL ($):		4,545.98	7,032.41	1,532.56	7,273.52	742.28		21,126.75
FIXED FEE ($):	**0.07:**	318.22	492.27	107.28	509.15	51.96		1,478.88
MATERIAL COSTS ($):		236.25	2,100.20	85.00	424.00	0.00		2,845.45
TRAVEL COSTS ($):		26.46	47.25	7.56	0.00	0.00		81.27
FIELD EQUIPMENT ($):		532.00	3,023.00	18.00	0.00	0.00		3,573.00
SUBS ($):		7,168.00	5,460.00	12,100.00	0.00	0.00		24,728.00
MGMT FEE ($):	**0.05:**	0.00	0.00	605.00	0.00	0.00		605.00
TOTAL ($):		12,826.91	18,155.13	14,455.40	8,206.67	794.24		54,438.35

MATERIAL COSTS
TASK 2: PRE-DESIGN INVESTIGATIONS
Davis-Howland Oil Co. D002676-31

ITEM	RATE BASE	ESTIMATED $ PER UNIT	2.1 INSTALL TWO BEDROCK MONITORING WELLS	2.2 A ENVIRON. SAMPLING & PUMP TEST	2.2 B PILOT TESTS	2.3 DATA SUMMARY & LETTER REPORT	2.4 TASK MANAGEMENT	TOTAL ($)
Telephone	(at cost)	1.00	35	40	25	0	0	100.00
General PC usage	(per hr)	1.50	0	8	0	0	0	12.00
Fax	(per page)	1.00	0	0	0	300	0	300.00
Overnight shipping	(at cost)	35.00	0	6	1	2	0	315.00
Lg/ print repro (24X36)	(per page)	1.35	0	0	0	40	0	54.00
Sample storage	(per 6-mo)	2.00	0	20	0	0	0	40.00
Disposable Field Items:								
Nylon Rope	(per ft)	0.20	0	300	0	0	0	60.00
Poly Disch. Tubing	(per ft)	0.20	0	400	0	0	0	80.00
Decon Chemicals	(at cost)	1.00	0	5	0	0	0	5.00
Decon D.I. Water	(per gal.)	0.12	0	10	0	0	0	1.20
Inline water filter	(each)	14.50	0	12	0	0	0	174.00
Ice for samples	(at cost)	1.00	0	8	0	0	0	8.00
Stakes/Flagging	(at cost)	3.75	3	0	0	0	0	11.25
Miscellaneous items	(at cost)	1.00	35	35	25	0	0	95.00
Carbon Canister	(per canister)	1,255.00	0	1	0	0	0	1,255.00
Disposable Bailer	(ea)	15.00	1	12	0	0	0	195.00
City Roch. Hydrant Permit	(lump sum)	140.00	1	0	0	0	0	140.00
	TOTAL UNITS:		75	857	51	342	0	
	TASK TOTAL ($):		236.25	2,100.20	85.00	424.00	0.00	2,845.45

TRAVEL COSTS

TASK 2: PRE-DESIGN INVESTIGATIONS

Davis-Howland Oil Co. D002676-31

ITEM	RATE BASE	ESTIMATED $ PER UNIT	2.1 INSTALL TWO BEDROCK MONITORING WELLS	2.2 A ENVIRON. SAMPLING & PUMP TEST	2.2 B PILOT TESTS	2.3 DATA SUMMARY & LETTER REPORT	2.4 TASK MANAGEMENT	TOTAL ($)
Personal mileage	(per mile)	0.315	84	150	24	0	0	81.27
	TOTAL UNITS:		84	150	24	0	0	
	TASK TOTAL ($):		26.46	47.25	7.56	0.00	0.00	81.27

FIELD EQUIPMENT COSTS

TASK 2: PRE-DESIGN INVESTIGATIONS

Davis-Howland Oil Co. D002676-31

ITEM	RATE BASE	ESTIMATED $ PER UNIT	2.1 INSTALL TWO BEDROCK MONITORING WELLS	2.2 A ENVIRON. SAMPLING & PUMP TEST	2.2 B PILOT TESTS	2.3 DATA SUMMARY & LETTER REPORT	2.4 TASK MANAGEMENT	TOTAL ($)
Personal Protective Equipment:								
Level D	(per day)	9	2	14	2	0	0	162.00
Submersible well Pump - Grundfos	(per week)	335	0	1	0	0	0	335.00
Generators - Honda (5,500 watt)	(per week)	200	0	1	0	0	0	200.00
PID - HNu (P1-101)	(per day)	43	3	9	0	0	0	516.00
AMS soil sampler - portable kit	(per 3 day)	87	0	2	0	0	0	174.00
Static well level - Solinst 101	(per day)	11	0	3	0	0	0	33.00
Hydrolab Scout w/ H20G + flowcell	(per week)	328	0	1	0	0	0	328.00
Hermit data logger - in-situ	(per day)	570	0	2	0	0	0	1140.00
Turbidity meter	(per day)	50	2	5	0	0	0	350.00
RAM-1-MIE	(per week)	240	1	0	0	0	0	240.00
Consumable Equip.	(@cost)	1	45	50	0	0	0	95.00
	SUBTOTAL:		385.00	1440.00	0.00	0.00	0.00	
	TOTAL UNITS:		53	87	2	0	0	
	TASK TOTALS ($):		532.00	3,023.00	18.00	0.00	0.00	3573.00

SUBCONSULTANTS/SUBCONTRACTORS COSTS

TASK 2: PRE-DESIGN INVESTIGATIONS

Davis-Howland Oil Co. D002676-31

ITEM	2.1 INSTALL TWO BEDROCK MONITORING WELLS	2.2 A ENVIRON. SAMPLING & PUMP TEST	2.2 B PILOT TESTS	2.3 DATA SUMMARY & LETTER REPORT	2.5 SAMPLING	2.6 REPORT	2.4 TASK MANAGEMENT	TOTAL ($)
Subconsultants:								
SUBTOTAL:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subcontractors:								
Nothnagle Drilling	6,318.00	0.00	0.00	0.00	0.00	0.00	0.00	6,318.00
Om Popli	850.00	0.00	0.00	0.00	0.00	0.00	0.00	850.00
Intertek Testing Services (ITS)	0.00	5,460.00	0.00	0.00	0.00	0.00	0.00	5,460.00
ERD Environ.	0.00	0.00	12,100.00	0.00	0.00	0.00	0.00	12,100.00
SUBTOTAL:	7,168.00	5,460.00	12,100.00	0.00	0.00	0.00	0.00	24,728.00
TOTAL:	7,168.00	5,460.00	12,100.00	0.00	0.00	0.00	0.00	24,728.00

LABOR HOURS AND COSTS

TASK 3: PLANS AND SPECIFICATIONS

Davis-Howland Oil Co. D002676-31

NSPE/ASCE LABOR CLASS	HOURLY RATE ($) 1996	3.1 PRELIMINARY DESIGN	3.2 INTERMEDIATE DESIGNA DN LETTER REPORT	3.3 PRE-FINAL & FINAL DESIGN	3.4 PROJECT COST ESTIMATE	3.5 TASK MANAGEMENT	TOTAL HOURS	SUBTOTAL ($)
VI	35.25	6.0	1.0	2.0	0.0	0.0	9.0	317.25
V	30.62	0.0	0.0	0.0	0.0	0.0	0.0	0.00
IV	27.59	180.0	43.0	160.0	51.0	8.0	442.0	12,194.78
III	23.65	81.0	0.0	102.0	0.0	0.0	183.0	4,327.95
II	22.15	0.0	0.0	0.0	0.0	0.0	0.0	0.00
I	17.00	64.0	22.0	80.0	0.0	0.0	166.0	2,822.00
TOTAL UNITS:		331.0	66.0	344.0	51.0	8.0	800.0	
DIRECT SALARY COSTS ($):		8,181.35	1,595.62	8,257.20	1,407.09	220.72		19,661.98
INDIRECT SALARY COSTS ($):	1.4458	11,828.60	2,306.95	11,938.26	2,034.37	319.12		28,427.30
SUBTOTAL ($):		20,009.95	3,902.57	20,195.46	3,441.46	539.84		48,089.28
FIXED FEE ($):	0.07	1,400.70	273.18	1,413.68	240.90	37.79		3,366.25
MATERIAL COSTS ($):		1,246.00	632.00	3,150.00	447.00	218.50		5,693.50
TRAVEL COSTS ($):		31.50	0.00	31.50	0.00	0.00		63.00
FIELD EQUIPMENT ($):		0.00	0.00	0.00	0.00	0.00		0.00
SUBS ($):		0.00	0.00	0.00	0.00	0.00		0.00
MGMT FEE ($):	0.05	0.00	0.00	0.00	0.00	0.00		0.00
TOTAL ($):		22,688.15	4,807.75	24,790.64	4,129.36	796.13		57,212.03

MATERIAL COSTS

TASK 3: PLANS AND SPECIFICATIONS

Davis-Howland Oil Co. D002676-31

ITEM	RATE BASE	ESTIMATED $ PER UNIT	3.1 PRELIMINARY DESIGN	3.2 INTERMEDIATE DESIGNA DN LETTER REPORT	3.3 PRE-FINAL & FINAL DESIGN	3.4 PROJECT COST ESTIMATE	3.5 TASK MANAGEMENT	TOTAL ($)
Telephone	(at cost)	1.00	60	20	60	0	60	200.00
Fax	(per page)	1.00	500	100	500	100	75	1,275.00
Overnight shipping	(at cost)	35.00	10	10	20	2	2	1,540.00
Information purchases	(at cost)	1.00	150	0	0	250	0	400.00
Photography	(at cost)	1.00	24	0	0	0	0	24.00
Lg/ print repro (24X36)	(per page)	1.35	120	120	1,400	20	10	2,254.50
	TOTAL UNITS:		864	250	1,980	372	147	
	TASK TOTAL ($):		1,246.00	632.00	3,150.00	447.00	218.50	5,693.50

TRAVEL COSTS

TASK 3: PLANS AND SPECIFICATIONS

Davis-Howland Oil Co. D002676-31

ITEM	RATE BASE	ESTIMATED $ PER UNIT	3.1 PRELIMINARY DESIGN	3.2 INTERMEDIATE DESIGNA DN LETTER REPORT	3.3 PRE-FINAL & FINAL DESIGN	3.4 PROJECT COST ESTIMATE	3.5 TASK MANAGEMENT	TOTAL ($)
Personal mileage (per mile)		0.315	100	0	100	0	0	63.00
TOTAL UNITS:			100	0	100	0	0	
TASK TOTAL ($):			31.50	0.00	31.50		0.00	63.00

LABOR HOURS AND COSTS
TASK 4: PRE-AWARD SERVICES
Davis-Howland Oil Co. D002676-31

NSPE/ASCE LABOR CLASS	HOURLY RATE ($)	4.1 Prebid Conference	4.2 Addenda	4.3 Bid Review	4.4 Task Management	TOTAL HOURS	SUBTOTAL ($)
VI	35.25	0.0	1.0	2.0	0.0	3	105.75
V	30.62	0.0	0.0	0.0	0.0	0	0.00
IV	27.59	17.0	25.0	18.0	2.5	63	1,724.38
Iii	23.65	0.0	16.0	0.0	0.0	16	378.40
II	22.15	0.0	0.0	0.0	0.0	0	0.00
I	17.00	0.0	8.0	0.0	0.0	8	136.00
TOTAL UNITS:		17.0	50.0	20.0	2.5	90	
DIRECT SALARY COSTS ($):		469.03	1,239.40	567.12	68.98		2,344.53
INDIRECT SALARY COSTS ($):	**1.4458**	678.12	1,791.92	819.94	99.73		3,389.71
SUBTOTAL ($):		1,147.15	3,031.32	1,387.06	168.71		5,734.24
FIXED FEE ($):	**0.07**	80.30	212.19	97.09	11.81		401.39
MATERIAL COSTS ($):		90.00	480.00	100.00	0.00		670.00
TRAVEL COSTS ($):		27.56	0.00	0.00	0.00		27.56
FIELD EQUIPMENT ($):		0.00	0.00	0.00	0.00		0.00
SUBS ($):		0.00	0.00	0.00	0.00		0.00
MGMT FEE ($):	**0.05**	0.00	0.00	0.00	0.00		0.00
TOTAL ($):		1,345.01	3,723.51	1,584.15	180.52		6,833.19

MATERIAL COSTS

TASK 4: PRE-AWARD SERVICES

Davis-Howland Oil Co. D002676-31

ITEM	RATE BASE	ESTIMATED $ PER UNIT	4.1 Prebid Conference	4.2 Addenda	4.3 Bid Review	4.4 Task Management	TOTAL ($)
Telephone	(at cost)	1.00	20	60	30	0	110.00
Overnight shipping	(at cost)	35.00	2	12	2	0	560.00
	TOTAL UNITS:		22	72	32	0	
	TASK TOTAL ($):		90.00	480.00	100.00	0.00	670.00

TRAVEL COSTS
TASK 4: PRE-AWARD SERVICES
Davis-Howland Oil Co. D002676-31

ITEM		RATE BASE	ESTIMATED $ PER UNIT	4.1 Prebid Conference	4.2 Addenda	4.3 Bid Review	4.4 Task Management	TOTAL ($)
Personal mileage	(per mile)		0.32	24	0	0	0	7.56
Miscellaneous	(at cost)		1.00	20	0	0	0	20.00
		TOTAL UNITS:		44	0	0	0	
		TASK TOTAL ($):		27.56	0.00	0.00	0.00	27.56

APPENDIX A

HEALTH AND SAFETY PLAN

HEALTH AND SAFETY PLAN
REMEDIAL DESIGN PROJECT
PRE-REMEDIAL DESIGN INVESTIGATION ACTIVITIES

DAVIS-HOWLAND OIL CORPORATION SITE
Monroe County

Site I.D. No. 8-28-088

Work Assignment No. D002676-31

Prepared For

NEW YORK STATE
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF HAZARDOUS WASTE REMEDIATION

22 July 1998

GALSON
360 Linden Oaks
Rochester, New York 14625

TABLE OF CONTENTS

TABLES

ATTACHMENTS

SITE SAFETY PLAN

A. GENERAL INFORMATION

SITE: DAVIS-HOWLAND OIL CORP. PROJECT NO.: 986265.TSK1.WST

LOCATION: ROCHESTER, NEW YORK

PREPARED BY: PAUL MICCICHE GALSON DATE: JULY 22, 1998

REVIEWED BY: EDWARD MAIKISH, P.E. LMS DATE:

OBJECTIVES: Excavate soils contaminated with metals; install air sparging, vapor extracting and vapor phase treatment systems for removing semi-volatile organic and volatile organic compounds from Operable Unit No. 01. Install 2 bedrock monitoring wells to define southern extent of groundwater plume. A limited pump test to assess the interconnection between bedrock wells, and between bedrock and overburden wells. A long-term monitoring plan will assess the effectiveness of the remedial action. A fence will be installed around the work area to protect equipment.

PROPOSED PROJECT DATE(S): July 1998 to Fall 2003

BACKGROUND REVIEW PRELIMINARY: X COMPLETE:

DOCUMENT/SUMMARY: PRELIMINARY: X COMPLETE:

OVERALL HAZARD: SERIOUS ___ MODERATE ____ LOW X UNKNOWN

B. SITE/MATERIAL CHARACTERISTICS

MATERIAL TYPE(S): LIQUID X SOLID X SLUDGE _ GAS X

CHARACTERISTIC(S): CORROSIVE ___ IGNITABLE X RADIOACTIVE__
VOLATILE X TOXIC X REACTIVE X
UNKNOWN X OTHER (NAME):

SITE DESCRIPTION: The site has been used as a petroleum packaging and solvent blending area.

STATUS (active, inactive, unknown): Active

HISTORY: The site has reportedly contained industrial commercial chemical products operations since 1942. Operations have significantly declined since 1994. Two (2) phases of a Remedial Investigation/Feasibility Study have been completed and a preferred remedial alternative (Air Sparging with Soil Vapor Extraction) has been selected to remediate Operable Unit No. 01.

C. HAZARD EVALUATION

Based on previous survey data, a potential exists for personnel exposure at the site. Particulate matter may be dispersed into the air during soil excavation and remediation activities. Vinyl Chloride was the most serious chemical hazard discovered at the site. This chemical has been identified as a carcinogen.

D. SITE SAFETY WORK PLAN

PERIMETER ESTABLISHMENT:

MAP/SKETCH ATTACHED? Yes, see Attachment D
SITE SECURED? Yes
PERIMETER IDENTIFIED? Yes
ZONE(S) OF CONTAMINATION IDENTIFIED? No

PERIMETER PROTECTION:

LEVEL OF PROTECTION: D (with C equipment available on-site)

SURVEILLANCE EQUIPMENT AND MATERIALS: Photoionization detector, (11.7 eV probe), Draeger air monitoring kit with tubes for vinyl chloride, and H_2S, combustible gas, and particulate monitors will be stationed on site.

DECONTAMINATION PROCEDURES: Small hand-held sampling equipment will be cleaned in a 30 gallon drum half filled with water. A cleaning brush dedicated to the 30 gallon drum will be kept in the labeled, sealed drum when not being used. All dirt, and gross contamination will be cleaned off of the equipment at this stage. Water may be added to the drum as it evaporates. Using the dedicated drum will minimize the amount of contaminated water being generated on the site. If organic material such as heavy oils or tar is encountered, a decision must be made to discard the sampling tool, and use methanol (methyl alcohol) or steam cleaning to remove the contamination. A solution of alconox and water stored in a dish pan with a dedicated brush will

be used for the second step of cleaning. A nitric acid solution prepared by diluting concentrated nitric, (pour acid into the water), is used to remove films and metals, followed by distilled water wash. In the event the tools cannot dry for inspection before use, methanol may be used to dry up water left on the tool.

Larger equipment such as drilling augers and split spoons will be cleaned in a dedicated decontamination area, lined with plastic. Steam cleaning may be used to minimize water use, as long as the decontamination worker is protected against exposure to the hot steam vapors. A separate station for washing hands, boots, and personnel equipment will be established. Personnel equipment will be held on-site until sampling results become available, at which time it will be appropriately disposed.

All decontamination stations must be monitored with photoionization detectors and Dreager tubes. An allowance for background readings must be made for methanol if it is used. See sampling plan for identification of sample and decontamination blanks. Decontamination solutions should be analyzed periodically for Heath and Safety precautions and disposal criteria.

SPECIAL EQUIPMENT, FACILITIES, OR PROCEDURES: NONE

PREMISES ENTRY PROCEDURES: Contact New York State Department of Environmental Conservation (NYSDEC)

MEMBER (MAJOR)	RESPONSIBILITY
Project Manager Team Leader (Field) Site Safety Officer	Each of the positions listed is responsible for acting as the facilitator of Health and Safety Plan. If more than one of the persons in these positions is on site at the same time, only one person will be designated as the facilitator.

WORK LIMITATIONS (time of day, etc.): Daylight hours, with occasional night time tasks performed as necessary (maintenance of equipment, etc.)

INVESTIGATION-DERIVED MATERIAL DISPOSAL: All soils and purge water will be collected in 55-gallon drums. The drums will be sampled and the analytical laboratory results will be used to determine final disposition. Drill cuttings will be screened with an HNu to determine final disposal criteria.

E. EMERGENCY INFORMATION

LOCAL RESOURCES

1. POLICE:	Rochester City Police Dept.	911
2. FIRE DEPARTMENT:	Rochester City Fire Dept.	911
3. HOSPITAL EMERGENCY ROOM.:	Genesee Hospital 224 Alexander St. Rochester, NY 14607	911 or 716-263-6000
4. MONROE COUNTY DEPT. OF HEALTH:	Joseph Albert Rick Elliott	(716) 274-6904 (716) 276-6067

SITE RESOURCES

WATER SUPPLY: City of Rochester fire hydrant (to be arranged by Galson)

TELEPHONE: Galson to supply cellular telephone for use by Galson personnel while onsite. Subcontractors will supply their own cellular telephones.

EMERGENCY CONTACTS

POSITION	PERSONNEL	PHONE
GALSON SAFETY DIRECTOR	Paul Micciche	(716) 381-2210
CLIENT CONTACT	Ed Maikish, LMS	(914) 735-8300
NYSDEC	Swapan Grupta, P.E.	(518) 457-9279
NYS DEPARTMENT OF HEALTH	Dave Napier	(716) 423-8071
AFTER HRS. SPILL FEDERAL AGENCY		(607) 324-457-9279

F. EMERGENCY ROUTES

DIRECTIONS TO GENESEE HOSPITAL: Take Anderson Avenue NW to Goodman Street. Take a left on Goodman to Park Avenue. Take a right on Park Avenue to Alexander Street. Take a left on Alexander Street to Genesee Hospital, 224 Alexander Street. (See Attachment F for map).

1.0 INTRODUCTION

This Health and Safety Program (H&SP) was developed to protect field personnel from the hazards encountered during remediation activities. It is developed as a result of review of previous investigation information, applicable government regulations and guidelines, and consultation with health and safety experts.

This H&SP is intended to comply with the Occupational Safety and Health Administration (OSHA) 29 Code of Federal Regulations (CFR) Part 1910.120 and Part 1926.65 Hazardous Waste Operations and Emergency Response Standards and applicable NYS Health Statutes including a community air monitoring program. Previous reports including those associated with the RI/FS were also reviewed.

1.1 Safety Considerations For Investigations

This section describes the administrative policies and procedures applicable to this investigation.

Although the degree and type of hazard encountered by field teams will depend on the type of field work and the detail of the field activity (e.g., soil excavation or bedrock well installation), certain administrative policies and procedures must be followed. These will include the use of personnel with OSHA 1910.120 training; specific criteria for field team organization and size; site characterization to establish hazard level; proper selection, use, and maintenance of personnel protective equipment; and basic safety procedures.

1.2 Health Surveillance Program

The Health Surveillance Program at Galson is designed to monitor employees working at sites that pose the possibility of exposure to toxic materials. The program provides for an initial (baseline) health evaluation and periodic follow-up examinations.

The program is administered by Galson in consultation with a Board certified physician. Galson in consultation with a Board certified physician, (Dr. Speer, Riverfront Medical, Rochester, New York) will be responsible for establishing the specific medical testing program and for establishing and administering procedures to the program. Examinations must be conducted or evaluated by a Board-certified medical physician. Examination results and the physician's evaluation are submitted to Galson for review.

1.2.1 Medical Examinations, Contents and Frequency

Participation in the Health Surveillance Program is mandatory for all employees involved in hazardous waste site investigations requiring on-site work. The first, or baseline examination, will be given to each new employee. The examination consists of a medical examination designed to screen for evidence of adverse effects of occupational exposure, particularly exposure to toxic substances. The examination is not a direct substitute for "general" check-ups or other periodic examinations designed to monitor or promote general health.

The physical consists of a general visual examination of the outer body and reflexes, blood testing utilizing a Smith-Cline profile 60 for hazardous substances, PFT, EKG, chest x-ray upon physician discretion, occult in stool, and vision and hearing tests.

1.2.2 Medical History

A medical history survey will be completed by all employees to document current symptoms, review of systems (including reproductive history and relevant aspects of behavioral history), hospitalizations, immunizations, medications, family history of significant diseases, allergies, use of alcohol and drugs, smoking history, and previous compensation and disability claims. Review of the history will include a systematic inventory of past or present disorders of major organ systems. Particular attention will be given to previous episodes of possible heart, cardiorespiratory, and skin disorders that would preclude wearing burdensome protective clothing and respirators. Renal disorders; back disorders; previous malignancies (including skin); premalignant conditions and reproductive history (especially reproductive failures such as infertility, miscarriages, stillbirths, small-for dates, prematurely, neonatal deaths, birth defects, and genetic disorders), will be reviewed for possible conflicts with exposure to the hazardous materials and conditions encountered during field work.

1.2.3 Occupational History

An occupational history will be recorded to identify a chronological account of jobs held, including dates, names of company, type of industry, toxic exposures, and known adverse health effects.

1.2.4 Physical Examinations

Each individual will receive a physical examination, which will include general appearance, vital signs, height and weight, skin, head, eyes, ears, nose and throat, the hearing and vision, thyroid gland, lymph nodes, chest and respiration, heart, abdomen, extremities [including muscles and joint, hernias (ventral, inguinal, and femoral)], vertebral column, and rectal examination with stool testing for occult blood.

1.2.5 Basic Laboratory Tests

Each individual will receive a basic group of blood tests to evaluate blood-forming, kidney, liver, and endocrine/metabolic function. Other laboratory tests include: a routine urinalysis, electrocardiogram, chest x-ray, pulmonary function, and vision and hearing tests.

1.2.6 Employment Criteria

The following criteria for hazardous waste investigation team personnel are recommended for individuals selected for arduous duty positions:

Vision -- Binocular vision is required and must be at least 20/40 (Snellen) in one eye and 20/20 in the other, with or without corrective lenses. Near vision must be sufficient to read printed material the size of typewritten characters. Normal depth perception, accommodation, and field of vision are required, as is the ability to distinguish basic colors.

Hearing -- Applicant must have no hearing loss in either ear that is more than 30 decibels at 500, 1,000, or 2,000 Hertz range.

Respiratory System -- Any chronic disease or condition affecting the respiratory system that would impair the performance of duties is disqualifying; e.g., conditions that result in reduced pulmonary function, shortness of breath, or painful respiration.

Cardiovascular System -- The following conditions are disqualifying:

a. Organic heart disease (compensated or not)
b. Hypertension with repeated readings that exceed 150 systolic and 90 diastolic without medication
c. Symptomatic peripheral vascular disease and severe varicose veins

Gastrointestinal System -- Chronic symptomatic disabling diseases or conditions of the genitourinary tract are disqualifying.

Endocrine System -- An uncontrolled systematic metabolic disease is disqualifying.

Genitourinary Disorders -- Chronic, symptomatic diseases or conditions of the genitourinary tract are disqualifying.

Extremities and Spine -- Any deformity or disease that would interfere with range of motion or dexterity or that is severe enough to affect adversely the performance of position duties disqualifying.

Nervous System -- Applicants must possess emotional and mental stability. Applicants with a history of epilepsy or convulsive disorder must have been seizure-free for the past two years without medication. Neurological disorders with resulting decreased neurological or muscular function are disqualifying.

Miscellaneous -- Although not mentioned specifically above, any other disease or condition that interferes with the full performance of duties is also grounds for medical rejection.

Annual and Exit Examinations

Each individual at Galson who is exposed to work involving hazardous sites received an annual medical examination similar to the pre-study examination with the exception of the chest x-ray which is taken based on the advice of the physician and/or medical consultants. In this way, irregularities or trends can be easily detected and evaluated. Upon termination of employment or leaving the program, each employee who worked at hazardous sites is required to receive an exit examination.

Post-Exposure Examinations

Following accidental exposure to hazardous materials, a post-exposure examination may be required. The examination must be approved by the Health and Safety Director. Post-exposure examinations include tests performed in the annual exam; in addition, other tests oriented towards collecting data regarding known or suspected contaminants involved in the exposure incident will be performed. In most cases, tests that monitor tissue damage after an exposure will be performed three to four months following the exposure to ensure that any effects which have a latency period will be detected.

If, after an examination, the physiological data are observed to be outside normal and acceptable ranges, the physician in charge of the examination, in consultation with Galson's Health and Safety Director, must determine whether the individual must be removed from work assignments in the field and what additional treatment, if any, is warranted.

1.2.7 Medical Records

Copies of medical records for medical examinations are maintained by Galson and the clinic which performed the examination. Employees may request, in writing, a copy of their medical records from Galson. The records must be kept on file for at least 30 years after employment to satisfy OSHA regulations.

1.2.8 Confidentiality

Medical records will be held strictly confidential. Medical records will be kept in a secure file, located at Galson's Rochester office, in accordance with OSHA's rule on Access to Employee Exposure and Medical Records (20 CFR 1919 p.35270). In a medical emergency Galson may release these records to an emergency medical facility.

2.0 FIELD TEAM ORGANIZATION

A field team must be organized to efficiently and safely carry out the objectives of the project. These objectives may include such activities as sampling of hazardous materials, monitoring well installation, soil excavation and air sparging, vapor extraction, and, vapor treatment activities. The team will typically include individuals with many different technical skills, such as chemists, geologists, and engineers. In addition to performing its task objectives, the team must provide for its own safety to prevent injury or exposure to hazardous materials. This can be accomplished by assignment of specific roles and responsibilities to members of the field team and by assuring that the proper team size is used to effectively accomplish specific objectives.

2.1 Field Investigation Team Members

There are a number of roles which are required for the safe and competent operation of a field investigation team. The roles which are necessary at every site where a field team will be working are: Project Manager, Project Health and Safety Officer, and Field Site Coordinator and Technician. Additional roles, such as Command Post Supervisor, Personnel Decontamination Station Operator and an Emergency Response Team, are added to the field team when the scope, magnitude, or hazard of the investigation justifies the need for them. A team member may take on more than one role, but the roles must be clearly assigned and must cover all those required, rather than describe one team organization for all the different types of field investigations. Guidelines are presented here for assignment of responsibilities to team members to ensure safety and establish the team size.

2.1.1 Training Requirements

All persons entering the site including workers, agency (s), and emergency response personnel must complete the initial 40 hours training; and three days supervised field experience and refresher training as defined by 29 CFR 1910. 120 or 1926.65. This training includes the seven basic elements listed in regulation. Supervisors and managers of workers on the site must have three days of supervised field training or 24 hours of training and one day of field training if approved by Galson's Health and Safety Director. Training certifications must be presented or submitted by any individual entering the site.

2.1.2 Project Manager

The Project Manager is responsible for the overall effectiveness of remedial action activities. The specific responsibilities of the Project Manager include preparing and organizing all project work assignments, briefing team personnel on specific duties, obtaining permission for site access form the owner or responsible party, completing reports and maintaining the evidentiary file, complying with chain-of-custody procedures, and coordinating with government representatives and subcontractors.

2.1.3 Field Team Leader

The Field Team Leader is accountable for the organization, operation, and safety of the field team. This role may be filled by the Project Manager. The Field Team Leader is responsible for proper field operations, completion of the objectives of the site work plan, compliance with document control procedures, proper field documentation of activities and operating procedures, and determining the level of personnel protection necessary to ensure the health and safety of the field team. If subcontractors or outside observers are present, the Field Team Leader must enforce the health and safety procedures.

2.1.4 Site Safety Officer

The Site Safety Officer has primary responsibility for all safety procedures and operations on-site. This role may be filled by the Field Team Leader. The Site Safety Officer is responsible for carrying out the site safety plan; upgrading or downgrading, if necessary, the level of personal protection based upon observations and changing circumstances during the field investigation; enforcing the buddy system (personnel working in pairs); posting and briefing of the field team on the approved safety plan which outlines locations, routes, and telephone numbers of the closest medical facilities; posting other emergency telephone numbers, such as the fire and police department and Health and Safety Director; notifying local public emergency personnel; verifying that team members have met the health and safety requirements for field assignment; controlling site entry and exit at the personnel decontamination station; and monitoring the work party for signs of stress such as changes in complexion, coordination, demeanor, or speech patterns through visual observation. During adverse weather conditions, the Site Safety Officer will implement special precautions to guard against heat stress or cold exposure. The Site Safety Officer has the authority to halt any operation that threatens the health or safety of the team.

The Site Safety Officer will also be responsible for conducting a preliminary health and safety meeting with all on-site personnel prior to the start of field activities. Additional meetings will be held whenever new field personnel come on-site or when field conditions or field activities change.

The following individuals are likely to serve as the site safety officer: Paul Micciche and Kevin McGovern. Other Galson personnel may be required to serve in this capacity on an as-needed basis, depending on staff availability and the actual tasks which are being performed. The qualification of the site safety officer include completion of the 40 hour training requirements of 29 CFR 1910.120 or 29 CFR 1926.65, three days supervised site experience and annual refresher 8 hour training. Also required is previous field experience as site safety officer. Two days of site specific training conducted by a site safety officer may be substituted for the previous field experience listed above.

2.1.5 Equipment Specialist

The Equipment Specialist is responsible for obtaining, inspecting, and maintaining all equipment in proper order. This requires specialized training in maintenance of equipment, such as self-contained breathing apparatus. The Equipment Specialist is responsible for preparing all sampling equipment. Any of the field investigation team members or work party may act as the Equipment Specialist.

2.1.6 Work Party

The work party is ultimately responsible for the safe and successful completion of the work assignment. The members of the work party share many active and important functions which are necessary to fulfill the objectives of the investigation. These include setting up the personnel decontamination station (if required as part of an upgrade from Level D PPE to higher levels of personal protection), performing site hazard characterization, taking photographs, collecting samples of various media, decontamination sample containers, packaging and shipping the samples in accordance with chain-of-custody procedures, and decontamination the entire work party prior to leaving the site.

2.2 Field Investigation Team Size

The size of an investigation team is determined by the hazard level of investigation, the level of protection employed, the investigation, objectives, and the site characteristics and type. The team must be large enough to ensure safety, but not so excessively large as to sacrifice economy.

A minimum of a two-person team will in general be used at the premises to collect samples where extensive personal decontamination is not required and where the likelihood of emergency rescue is minimal. The two-person team is also suitable when Level C protection is required. In the instance that Level B protection is required a minimum of a three-person team would be necessary. At this site, a determination has been made that Level D will be appropriate for the field personnel entering the site to establish security, set up decontamination and work stations. Initially, higher levels of protection, Level C or higher, may be required for soil excavation, bedrock well installation, or soils and water sampling. Levels of protection will be determined by ambient air monitoring.

3.0 SELECTION, USE AND MAINTENANCE OF PERSONAL PROTECTIVE EQUIPMENT

Proper selection, use, and maintenance of respiratory protective equipment and other personal protective equipment is extremely important in protecting the health and safety of field investigation personnel. An inadequate level of protection may result in unnecessary exposure to toxic chemicals or other hazards. An excessively high level of protection may encumber field personnel unnecessarily and result in decreased efficiency, fatigue, and other hazards. Improper use or maintenance of protective equipment exposes field personnel to unnecessary risks.

If conditions require higher levels of protection, Section 3.2, and Table 1 outline the Level C and/or B protective clothing and respiratory protection upgrade requirements.

3.1 Protective Clothing

Protective clothing must be worn by all personnel during field investigations to prevent skin exposure and to minimize the spread of contamination. Drilling operations in saturated zones will require protective clothing. Protective clothing may include, but is not limited to, chemical-resistant pants and jackets or coveralls, disposable coveralls, steel-toe and shank boots, protective gloves, hard hats, face shields or chemical safety glasses. Once adequate protective clothing is chosen, employees must also note that alertness is a significant safety factor. Since protective clothing is cumbersome, it hastens the on-set of fatigue and heat exhaustion, it can decrease alertness, and it limits stay-time.

Appropriate protective clothing requirements for Levels B, C and D are presented in Table 2.

TABLE 1

PROTECTIVE CLOTHING AND RESPIRATORY PROTECTION

Personal Protection

Level B

1. Supplied airline respirator with escape air bottle, or self contained breathing apparatus (SCBA).
2. Chemical resistant coveralls, such as Saranex, Chemrel, or polylaminate tyvek with splash gear.
3. Chemical resistant outer gloves such as butyl, PVC, or nitrile in addition to cotton or leather work gloves as needed. Outer gloves will be taped to the tyvek wear.
4. Latex inner gloves.
5. Safety boots with disposable chemical resistant or washable outer boots. Outer boots will be taped to the tyvek wear.
6. Hard hat.

Level C

1. Full face respirator with organic vapor/HEPA cartridges.
2. Chemical resistant coveralls, such as Saranex, Chemrel, or polylaminate tyvek with splash gear.
3. Chemical resistant outer gloves such as butyl, PVC, or nitrile in addition to cotton or leather gloves as needed. Outer gloves will be taped to the tyvek wear.
4. Latex inner gloves.
5. Safety boots with disposable chemical resistant or washable outer boots. Outer boots will be taped to the tyvek wear.
6. Hard hat.

Level D

1. Nitrile gloves for handling soil and/or water in addition to cotton or leather work gloves as needed.
2. Safety glasses or goggles.
3. Safety boots.
4. Coated Tyvek coveralls for saturated zone drilling.
5. Hard hat.

3.2 Respiratory Protection

All respirators will meet the criteria for National Institute for Occupational Safety and Health/Mine Safety and Health Act approval. Based on the PEL/TLV levels of the constituents known to have been used on-site and other respiratory hazards such as dust, levels D, C, or B may be appropriate. Action levels, based on readings obtained in the field on an HNu device are given below and are also summarized in Table 2:

Level D protection is appropriate for ambient conditions in which no surfaces or soils will be disturbed and little chance of exposure to unknowns or suspected or confirmed carcinogens (e.g., vinyl chloride, etc.) will occur. Also, Level D is sufficient if there are no readings on the HNu above background levels in the breathing zone or any readings for specific contaminants. Where unknowns may be present such as listed in the paragraph above, readings above background will initiate careful evaluation from an upwind location by Site Safety Officer. If there are excursions above 5 ppm, work will be halted and evaluated from an upwind position. If it is suspected that methane is present, a Drager tube for methane will be used.

Level C protection with a full-face respirator and organic vapor/HEPA cartridges (unless otherwise designated) is appropriate when activities being conducted will not release significant unknowns or carcinogens and also in ambient conditions where the sustained HNu readings are not above background.

Due to the presence of vinyl chloride in soil and groundwater samples, Level C protection is required during the initial drilling or soil excavation operations for personnel that will conduct air monitoring or whose breathing zone may be contaminated with vinyl chloride. Site personnel conducting air monitoring must continue at Level C until mechanisms that disturb unsampled soil layers halt (the maximum depth of the well is reached) or HNu readings indicate ambient concentrations at or below background levels. This protocol for protection of site personnel whose breathing zone is in the immediate area of the borehole via Level C respiratory protection must be followed each time a well is started, and be applied during sampling, construction and well development.

TABLE 2
Action Levels and Responses

Instrument	Action Level	Response
HNU/OVA	<5 ppm above background non-methane vapor	No action required
HNU/OVA	>5 ppm above background, sustained for more than 3 minutes non-methane vapor	Monitor for vinyl chloride (detector tubes) Don Level C respirators with HEPA and organic cartridge
HNU/OVA	>1500 ppm	Don Level B protection
HNU/OVA	>50 ppm above background at perimeter	Suspend work activities and notify Project Health and Safety Officer. Perimeter air monitoring at 15 minute intervals
Vinyl chloride 0.5/a detector tubes	ND-0.5 ppm	Continue monitoring hourly as long as OVA > 5 ppm
Vinyl chloride 0.5/a detector tubes	>1 ppm	Suspend work activities and notify Project Health and Safety Officer
Vinyl chloride 0.5/a detector tubes	>5 ppm	Don level B protection. Measure vinyl chloride every 30 minutes.
Combustible Gas Meter with Oxygen Sensor	>20% of LEL	Suspend work activities and notify Health and Safety Officer. Allow area to ventilate, reevaluate for continuing work activities.

4.0 BASIC SAFETY PRACTICE

Field personnel will observe basic safety practices which will include, but not be limited to, the following:

- Work in pairs at all times;
- Eating and smoking are prohibited on-site, but drinking of water or other soft drinks for fluid replenishment will be encouraged using the greatest care to avoid potential contamination. A water station will be established onsite;
- Contact lenses shall not be worn;
- Avoid contact with contaminated or potentially contaminated objects and materials;
- Do not climb over obstacles;
- Wear proper head, foot, eye, and body protection;
- Follow OSHA guidelines and regulations at a minimum for all site activities;
- As new hazards are encountered, stop work activities to evaluate the situation;
- Take precautions to minimize heat stress;
- Beards or facial hair that interfere with respirator fit will preclude admission to the hot zone when respiratory protection is required;
- All equipment must be decontamination or discarded upon exit from the exclusion zone;
- All personnel exiting an exclusion zone must go through decontamination procedures; and,
- Site Safety Officer shall discuss safety matters with all site personnel daily. Personnel will participate in a safety "tailgate" session each morning, and also sign an attendance form indicating same.

4.1 Confined Space Procedures

Confined space procedures will be performed for any space that meets the OSHA criteria as a confined space. A confined space pre-entry checklist must be completed. If vapors or fluid discharges occur in the confined spaces, then a Permit Required Confined Space procedure must be used. Galson's Health and Safety Director must be contacted in advance of the entry in order to prepare instruments and plans.

5.0 SITE SAFETY PLAN

A written Site Safety Plan has been prepared for the Davis-Howland site. The purpose of the plan is to provide information about the site being investigated and evaluate the potential hazards which may be present. The plan is developed to protect the field personnel and to prepare for emergency action. Any contractor implementing elements of this work plan is obligated to comply, at a minimum, with the provisions of this Site Safety Plan.

A standard five-part form is used for the Site Safety Plan. The first part provides general information, including the name and location of the site and the objective(s) of the investigation. The second part provides information on the site and materials characteristics, including a description of the facility and its history. The third part of the form is a hazard evaluation, which assesses the potential hazards to inspection personnel, based on available information. The fourth part of the form is the work plan itself. It establishes the work area, the personal protection (level of protection and equipment) to be used, decontamination procedures, premises entry procedures, the site entry team members and their responsibilities, and work limitations. The last part of the form provides emergency information, including emergency contacts and resources, and emergency routes to hospitals or other facilities.

The Site Safety Plan contains specific information describing the safety precautions and procedures to be used and justification for them. The hazard evaluation is a key part of the form, since the plan must be developed on the basis of the evaluation of known or potential hazards. If hazard information (e.g., possibility of explosive or toxic atmospheres) is not available, the safety plan must include a procedure for obtaining the necessary information or for protecting personnel from unknown but potential hazards.

5.1 Reporting Incidents Involving Personal Injury or Exposure to Hazardous Materials

All incidents involving personal injury or exposure to potentially hazardous materials during any field activity must be documented and reported immediately to the Site Safety Officer. A standardized incident report, included as Attachment I, is used for this purpose.

It is important to report all exposures and injuries, even though the incident is not considered serious or no adverse health effects or symptoms are apparent at the time. Often exposure to a toxic agent may have delayed or latent effects which may only be detected by specific diagnostic tests. Documenting an exposure may aid in identifying the cause of symptoms or changes in health status indicators (diagnostic blood tests or pulmonary function, for example) at a later time. Likewise, an injury, such as an eye injury caused by dust particles, may result in delayed damage to the eye.

5.2 Site-Specific Safety Plan

The Site-Specific Safety Plan for the Davis-Howland Operable Unit No. 1 site is detailed in Table 1. The safety plan provides information on site/materials characteristics, hazards, work plan, investigation-derived material disposal plan and emergency/contingency information.

The presence of carcinogens, such as vinyl chloride, in the soil and groundwater requires performance of air monitoring during the initial phase of any operation that will disturb soils or groundwater that may release the carcinogens. Level C protection must be used by a site worker who must conduct air monitoring at the breathing zone during drilling and sampling. During the initial contact of drilling equipment with the ground surface, no site workers may be within 35 feet of the location without wearing Level C PPE. An exclusion zone will be set up for each event that will disturb soils. Air sampling will be conducted frequently enough in order to allow for an evaluation of possible downgrading of PPE to level D for personnel within the 35 foot exclusion zone.

Establishment of the exclusion zone in some cases will require coordination with Rochester City DPW, specifically those cases where city streets are incorporated into the exclusion zone.

Site workers responsible for air, soil or water sampling, or excavating soils must be protected with Level C equipment. This includes Level C respiratory equipment, tyvek or chemical resistant coveralls, hard had, safety shoes and gloves secured with tape.

Site workers that conduct the air monitoring will be protected by Level C equipment unless air sampling indicates ambient levels at or below background concentrations.

Drager tubes, such as Part No. 67 28061 for vinyl chloride or equivalent, will be used for testing in addition to photoionization vapor detection.

Personnel will be prepared to seal off a well or an exposed surface of resident soils if air monitoring reveals that the community may be impacted (see Section 5.3).

The following procedure is to be used after air monitoring has initially been completed and no hazards have been identified:

- If the concentration of non-methane vapors at the breathing zone in the work area exceeds five ppm over background levels for more than three minutes, personnel will don air purifying respirators with HEPA and organic vapor cartridges.
- If the concentration rises above five ppm over background concentrations, the work crew will attempt to reduce this level or consider a higher level of protection.
- Vinyl chloride concentration measurements will be obtained whenever the concentration of non-methane organic vapors exceeds three ppm over background concentrations for one minute, or twice a day, whichever is greater. If the concentration of vinyl chloride exceeds one to five ppm, personnel will don a higher level of protection and measure the vinyl chloride concentration in the air every half

hour. If the concentration of vinyl chloride remains below one ppm for two hours, the work crew can down grade to a lower protection level. If the concentration exceeds one ppm Level B will not be used.

If HNu readings exceed 50 ppm above background, perimeter air monitoring will be performed at 15 minute intervals. Site activity will be terminated if organic vapors exceed five ppm above background at the perimeter until vapor emissions can be controlled.

A combustible gas indicator calibrated for methane will be used to monitor the work zone for explosion hazards whenever combustible gasses are known or suspected to be present. If 20% of the lower explosive limit (LEL) for methane is exceeded, the work crew will stop work, permit the area to vent, and when the levels of flammable gases are reduced to non-detectable in breathing zones and 5% of the applicable LEL, the area will be re-evaluated for safety and venting concerns before work is started.

If the downwind particulate level exceeds the upwind particulate concentrations excavation will be halted. Alternative (or revised) methods which utilize dust suppression techniques will be employed.

Prior to fieldwork an HNu will be used to monitor ambient air at the perimeter of the site. At this time, the wind direction and instrument reading will be recorded. Additional monitoring will be implemented in the event established action levels are triggered at the work location.

5.3 Community Air Monitoring Plan

Provide real time air monitoring for volatile compounds and particulate levels at the perimeter of the work area. The plant will include the following:

- Volatile organic compounds will be monitored at the downwind perimeter of the work area at a frequency of once every 30 minutes while drilling for construction of bedrock wells is occurring. If total organic vapor levels exceed five ppm above background, work activities will be halted and monitoring continued under the provisions of a Vapor Emission Response Plan. All HNu readings will be recorded and be available for state (DEC & DOH) personnel to review.

- Airborne particulates will be periodically monitored upwind, downwind and within the work area by the Galson field representative. If the downwind particulate level is 150 micrograms per cubic meter of air (ug/m^3) greater than the upwind particulate level, then dust suppression techniques must be employed. All readings must be recorded and be available for State (DEC & DOH) personnel to review.

5.3.1. Vapor Emission Response Plan

If the ambient air concentration of organic vapors exceeds 5 ppm above background at the perimeter of the work area, activities will be halted and monitoring continued. If the organic

vapor level decreases below five ppm above background, work activities can resume but more frequent intervals of monitoring, as directed by the Safety Officer, must be conducted. If the organic vapor levels are greater than five ppm over background, but less than 25 ppm over background at the perimeter of the work area, activities can resume provided:

- The vinyl chloride level is less than 0.5 ppm at the perimeter of the area.
- The organic vapor level 200 ft. downwind of the work area or half the distance to the nearest residential or commercial structure, whichever is less, is below five ppm over background, and
- More frequent intervals of monitoring, as directed by the Safety Officer, are conducted.

The location for each of these monitoring points will be field determined for each site activity, and will incorporate real time wind/weather conditions.

If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shut down. When this occurs, downwind air monitoring as directed by the Safety Officer will be implemented to ensure that vapor emission does not impact the nearest residential or commercial structure at levels exceeding those specified in the Major Vapor Emission Section.

If any organic levels greater than five ppm over background are identified 200 feet downwind from the work area or half the distance to the nearest residential or commercial property, whichever is less, all work activities must be halted.

If, following cessation of work activities, or as the result of an emergency, organic levels persist above five ppm above background 200 feet downwind or half the distance to the nearest residential or commercial property from the work area, then the air quality must be monitored within 20 feet of the perimeter of the nearest residential or commercial structure (20 Foot Zone).

If efforts to abate the emission source are unsuccessful and if organic vapor levels are approaching five ppm above background for more than 30 minutes in the 20 Foot Zone, then the Major Vapor Emission Response Plan shall automatically be placed into effect. The Major Vapor Emission Response Plan shall however be immediately placed into effect if organic vapor levels are greater than 10 ppm above background.

5.3.2. Major Vapor Emission Response Plan

Upon activation, the following activities will be undertaken:

1. All Emergency Response Contacts listed in the Health and Safety Plan of the Work Plan will be contacted.
2. The local police authorities will immediately be contacted by the Site Safety Officer and advised of the situation.

3. Frequent air monitoring will be conducted at 30 minute intervals within the 20 foot zone. If two successive reading below action levels are measured, air monitoring may be halted or modified by the Site Safety Officer.

5.4 General Health and Safety Information

All potential hazards associated with an investigation cannot be fully addressed. This H&SP takes into consideration those items which are unique to this study. Additionally, general health and safety information is included in Attachments A, B and C for heat stress, decontamination and first aid procedures, respectively.

6.0 CONTINGENCY PLAN

The objective of the contingency plan is to minimize hazards to human health and the environment from fires, explosions or any unplanned releases of hazardous materials into the air, soil, or surface water than may occur during the investigation. In the event that a fire, spill or other emergency situation develops, the site safety officer will be responsible for coordinating all emergency response measures. This person has the authority to commit all resources necessary to carry out the contingency plan. All structures which are located within 5000 feet of the site will be evaluated in terms of potential for the presence of the public. Methods for notification of the public within this radius will be determined and listed in the contingency plan.

6.1 Implementation of Contingency Plan

In case of an emergency situation, the site safety officer has full authority to make the decision concerning the implementation of the contingency plan. Depending on severity, the following potential emergencies might call for the implementation of the contingency plan at site.

- A life threatening injury
- An injury that requires professional medical services for transportation to the hospital (ambulance)
- Entrapment of workers or equipment in a confined space
- A continuous release of a volatile contaminant at concentrations above the PEL
- Electrical, power line, gas or water line emergencies
- Release or discovery of significant amounts of hazardous substances
- An event that may expose the public to contamination

Meeting or Congregation Area

The Site Safety Officer will identify an area for congregation for instances of an emergency or a release of chemical agents that would require all workers to leave the site for either safety purposes or to provide aid. The area will generally be located away from sources of contamination or potential contamination. The location should be on the site or near the perimeter, so that the area is accessible to all workers. This will ensure that contamination spread by workers may be confined close to decontamination stations and thus remain on the site. In the event that no alternate updated conjugation site is listed, the corner of Anderson Avenue and Norwood Streets will serve as such.

Spills - With the exception of samples to be collected for laboratory analysis and well development/purge water, no water will be collected. Therefore, large spills are not likely to occur. Spills of small quantities of material will be allowed to percolate back into the soil on the premises.

Fire - Due to the nature of the affected media and the concentrations of contaminants detected, the likelihood that a fire will occur is low. However, if a fire does occur, the area will be evacuated and the Fire Department will be notified immediately.

Explosion - Due to the nature of the affected media and the concentrations of contaminants detected, there is only a small likelihood that an explosion will occur. A combustible gas indicator will be used to monitor for explosive levels whenever an ignition source is present in the work area. Water will be kept on site during drilling to backfill boring in the event explosive levels are reached.

6.2 Emergency Response Procedures

In the event of a non-acute emergency, the procedures listed below will be followed:

1. Any employee discovering or causing a non-acute emergency situation must immediately contact the emergency coordinator.
2. The emergency coordinator in conjunction with the Team Leader will assess the situation and contact the appropriate personnel to respond to the emergency situation.
3. The emergency coordinator in conjunction with the Team Leader will take all necessary measures to contain the hazard and to prevent its spread to the immediate environment and adjacent areas. A decision regarding the need to contact the public will be made.
4. Safety measures will be taken to ensure maximum protection of emergency personnel and will include use of appropriate protection equipment.
5. All non-emergency personnel will be removed from the area until any hazard associated with the emergency has been contained and controlled.
6. Following containment and control of the emergency, the emergency coordinator will assess the situation to determine if all contaminated materials generated by the emergency personnel have been collected and disposed of on the premises.
7. The emergency coordinator in conjunction with the Team Leader will ensure that all emergency equipment is restored to full operational status by the emergency personnel.
8. The emergency coordinator in conjunction with the Team Leader will investigate the cause of the emergency and will take steps to prevent the recurrence of such an incident.
9. The emergency coordinator will notify the participating PRPs and the DEC and other government agencies as may be required by law.

If necessary, the emergency coordinator will submit a written report of the incident to the participating PRPs and to the DEC.

[1] Non-acute emergency is a situation where the outcome of a situation is not life threatening, minor accidents, slips or falls, low concentration (chronic) chemical exposure NOT IDLH CHEMICAL. An example of a non-acute emergency is a situation where a response to an occurrence or event does not have to be performed in a rapid manner, say within a half hour period, in order to adequately deal with the occurrence.

Attachment A
Heat Stress Considerations

When the working environment temperature exceeds 75 degrees Fahrenheit (°F) and personnel are wearing personal protective equipment, heat stress can become a significant physical hazard unless prevention and heat stress monitoring programs are implemented. Lozier's program will ensure that personnel have access to rest periods and drinking water as necessary and the work/rest cycles are implemented as outlined in the following sections.

For individuals wearing permeable clothing (e.g., standard cotton or synthetic work clothes), following recommendations for monitoring requirements and suggested work/rest schedules in the current American Conference of Governmental Industrial Hygienists' (ACGIH) Threshold Limit Values for heat stress. If the actual work clothing differs from the ACGIH standard ensemble in insulation value and/or wind and vapor permeability, change the monitoring requirements and work/rest schedules accordingly.

For individuals wearing semipermeable or impermeable encapsulating ensembles, the ACGIH standard cannot be used. For these situations, personnel will be monitored when the temperature in the work area is above 75°F.

To monitor personnel, ONE or all of the following measurements will be made at the discretion of the SSO:

1. Heart rate - Count the radial pulse during a 30-second period as early as possible in the rest period.

   - If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by 1/3 and keep the rest period the same.

   - If the heart rate still exceeds 110 beats per minute at the next rest period, shorten the following work cycle by 1/3.

2. Oral temperature - Use a clinical thermometer (three minutes under the tongue) or similar device to measure the oral temperature at the end of the work period (before drinking).

   - If oral temperature exceeds 99.6°F (37.6°C), shorten the next work cycle by 1/3 without changing the rest period.

   - If oral temperature still exceeds 99.5°F (37.6°C) at the beginning of the next rest period, shorten the following work cycle by 1/3.

   - Do not permit personnel to wear a semipermeable or impermeable garment when his/her oral temperature exceeds 100.6°F (38.1°C).

Initially, the frequency of physiological monitoring depends on the air temperature adjusted for solar radiation and the level of physical work. The length of the work cycle will be governed by the frequency of the required physiological monitoring.

Proper training and preventive measures will help avert serious illness and loss of work productivity. Preventing heat stress is particularly important because once

someone suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heat injuries. To avoid heat stress, management will take the following steps:

1. Adjust work schedules:

   - Modify work/rest schedules according to monitoring requirements.
   - Mandate work slow downs as needed.
   - Rotate personnel, alternate job functions to minimize over-stress or over-exertion at one task.
   - Add additional personnel to work teams.

2. Provide shelter or shaded areas to protect personnel during rest periods.

3. Maintain body fluids at normal levels. This is necessary to ensure that the cardiovascular system functions adequately. Daily fluid intake must equal approximateiy the amount of water lost in sweat i.e., 8 fluid ounces (0.23 liters) of water must be ingested for approximately every 8 ounces (0.23 kilograms) of weight lost. The normal thirst mechanism is not sensitive enough to ensure that enough water will be drunk to replace lost sweat. When heavy sweating occurs, encourage the individuals to drink more. The following strategies may be useful:

   - Maintain water temperature at 50° to 60°F (10° to .6°C).
   - Provide small disposable cups that hold approximately 4 ounces (0.1 liter).
   - Have personnel drink 16 ounces (0.5 liters) of fluid (preferably water or dilute drinks) before beginning work.
   - Urge personnel to drink a cup or two every 15 to 20 minutes, or at each monitoring break. A total of 1 to 1.6 gallons (4 to 6 liters) of fluid per day are recommended, but more may be necessary to maintain body weight.

4. Train personnel to recognize and treat heat stress. As part of training, identify the signs and symptoms of heat stress.

   The signs and symptoms of heat stress are as follows:

   1. Heat rash may result from continuous exposure to heat or humid air.
   2. Heat cramps are caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include:

      - Muscle spasms

3. Heat exhaustion occurs from increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include:

- Pale, cool, moist skin
- Heavy sweating
- Dizziness
- Nausea
- Fainting

4. Heat stroke is the most serious form of heat stress. Temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury and death occur. Competent medical help must be obtained. Signs and symptoms are:

- Red, hot, usually dry skin
- Lack of or reduced perspiration
- Nausea
- Dizziness and confusion
- Strong, rapid pulse
- Coma

Attachment B
Decontamination Procedures

In general, everything that enters the exclusion zone must either be decontaminated or properly discarded upon exit from the exclusion zone. All personnel, including visitors, must enter and exit the hot zone through the Decontamination (DECON) area. Prior to demobilization, contaminated equipment will be decontaminated before it is moved into the clean zone. Any material that is generated by DECON procedures will be stored in a designated area in the exclusion zone until disposal arrangements are made.

Handling Potentially Contaminated Soils and Water

Field investigations and sampling activities can result in the generation of contaminated materials. The potentially contaminated materials that will be generated include decontamination rinse water, development water, purge water and drill cuttings. All equipment decontamination will be accomplished on the premises in a clean staging area where decontaminated equipment can be properly stored. All development and purge water will be collected individual 55 gallon drums. Sample results for each well will be used to evaluate proper disposal for each drum. Drill cuttings will be left at each boring location if the Hnu readings indicate that levels do not exceed 5 ppm above background. If the Hnu readings are in excess of 5 ppm the cuttings will be containerized in labeled 55-gallon drums (individual drums will be used for different boring locations) for storage until final disposition.

Following DECON and prior to exit from the hot zone, the project engineer or designated alternate shall be responsible for insuring that the equipment has been sufficiently decontaminated.

The DECON procedure applies to personnel at this site wearing Level B or Level C protection. These are the minimum acceptable requirements:

Station 1: Equipment Drop

Deposit equipment used on-site (tools, sampling devices and monitoring instruments, radios, etc.) on plastic drop cloths. These items must be decontaminated or discarded as waste prior to removal from the exclusion zone.

Station 2: Outer Boot and Outer Glove Wash and Rinse

Scrub outer boots, outer gloves and/or splash suit with DECON solution or detergent water. Rinse off using water.

Station 3: Outer Boot and Glove Removal

Remove outer boots and gloves. If outer boots are disposable, deposit in container with plastic liner. If non-disposable, store in a clean dry place.

Station 4: Tank Change

If an individual leaves the exclusion zone to change an air tank, this will be done as [illegible] The air tank is exchanged, new outer gloves

and boot covers donned, joints taped, and the individual returns to the hot zone.

Station 5: Outer Garment Removal

If applicable, remove the SCBA back pack and remain on air as long as possible. Remove the chemical resistant outer garments and deposit them in a container lined with plastic. Decontaminate or dispose of splash suits as necessary.

Station 6: Respiratory Protection Removal

Remove hard-hat, face-piece, and if applicable deposit the SCBA on a clean surface. APR cartridges will be discarded as appropriate. Wash and rinse respirator at least daily. Wipe off and store respiratory gear in a clean, dry location.

Station 7: Inner Glove Removal

Remove inner gloves. Deposit in a container for disposal.

Station 8: Field Wash

Thoroughly wash hands and face with soap and water. Shower as soon as possible.

Attachment C
First Aid Information

BITES

Animal Bites

Thoroughly wash the wound with soap and water. Flush the area with running water and apply a sterile dressing. Immobilize affected part until the victim has been attended by a physician. See that the animal is kept alive and in quarantine. Obtain name and address of the owner of the animal.

Insect Bites

Remove "stinger" if present. Keep affected part down below the level of the heart. Apply ice bag. For minor bites and stings apply soothing lotions, such as calamine.

BURNS AND SCALDS

Minor Burns

DO NOT APPLY VASELINE OR GREASE OF ANY KIND. Apply cold water application until pain subsides. Cover with a dry, sterile gauze dressing. Do not break blisters or remove tissue. Seek medical attention.

Severe Burns

Do not remove adhered particles of clothing. Do not apply ointment, grease or Vaseline. Cover burns with thick sterile dressings. Keep burned feet or legs elevated. Seek medical attention immediately.

Chemical Burns

Wash away the chemical soaked clothing with large amounts of water. Remove victims chemical soaked clothing. If chemical is dry like lime, brush away before flushing. Apply sterile dressing and seek medical attention.

CRAMPS

Symptoms

Cramps in muscles of abdomen and extremities. Heat exhaustion may also be present.

Treatment

Same as for heat exhaustion.

FROSTBITE

Symptoms

Just before frostbite occurs skin may be flushed, then change to white or grayish-yellow. Pain may be felt early then subsides. Blisters may appear. Affected part feels very cold and numb.

Treatment

Bring victim indoors, cover the frozen area, provide extra clothing and blankets. Rewarm frozen area quickly by immersion in warm water...NOT HOT WATER. DO NOT RUB THE PART. Seek medical attention immediately.

HEAT EXHAUSTION caused by exposure to heat either sun or indoors.

Symptoms

Near normal body temperature. Skin is pale and clammy. Profuse sweating, tiredness, weakness, headache, perhaps cramps, nausea, dizziness, and possible fainting.

Treatment

Keep in lying position and raise victims feet. Loosen clothing, apply cool wet cloths. If conscious, give sips of salt water (1 teaspoon of salt per glass) over a period of one hour. If vomiting occurs, discontinue the salt water. Seek medical attention immediately.

SUNSTROKE

Symptoms

Body temperature is high (106 degrees F or higher). Skin is hot, red and dry. Pulse is rapid and strong. Victim may be unconscious.

Treatment

Keep victim in lying position with head elevated. Remove clothing and repeatedly sponge the bare skin with cool water or rubbing alcohol. Seek medical attention immediately.

CUTS

Apply pressure with sterile gauze dressing, and elevate the area until bleeding stops. Apply a bandage and seek medical attention.

EYES

Foreign Objects

Keep the victim from rubbing his eye. Flush the eye with water. If flushing fails to remove the object apply a dry, protective dressing and consult a physician.

Chemicals

Flood the eye thoroughly with water for 15 minutes. Cover the eye with a dry pad and seek medical attention.

FAINTING

Keep the victim lying down. Loosen tight clothing. If victim vomits, roll him onto his side or turn his head to the side; if necessary wipe out his mouth. Maintain an open airway. Bathe face gently with cool water. Unless recovery is prompt, seek medical attention.

FRACTURES

Deformity of an injured part usually means a fracture. If fracture is suspected, splint the part. DO NOT ATTEMPT TO MOVE INJURED PERSON: seek medial attention immediately.

POISONING

Call 911 for instruction or immediate care. If victim becomes unconscious, keep the airway open. If breathing stops give artificial respiration by mouth to mouth breathing. Call an emergency (911) squad as soon as possible.

POISON IVY

Remove contaminated clothing; wash all exposed areas thoroughly with soap and water followed by rubbing alcohol. If rash is mild, apply calamine or other soothing skin lotion. If a sever reaction occurs, seek medical attention.

PUNCTURE WOUNDS

If puncture wound is deeper than skin surface, seek medical attention. Serious infection can arise unless proper treatment is received.

SPRAINS

Elevate injured part and apply ice bag or cold packs. DO NOT SOAK IN HOT WATER. If pain and swelling persist, seek medical attention.

UNCONSCIOUSNESS

Never attempt to give anything by mouth. Keep victim lying flat, maintain open airway. If victim is not breathing provide artificial respiration by mouth to mouth breathing and call an emergency squad as soon as possible.

ATTACHMENT D

SITE MAP-LOCATION FIGURE 1 AND FIGURE 2

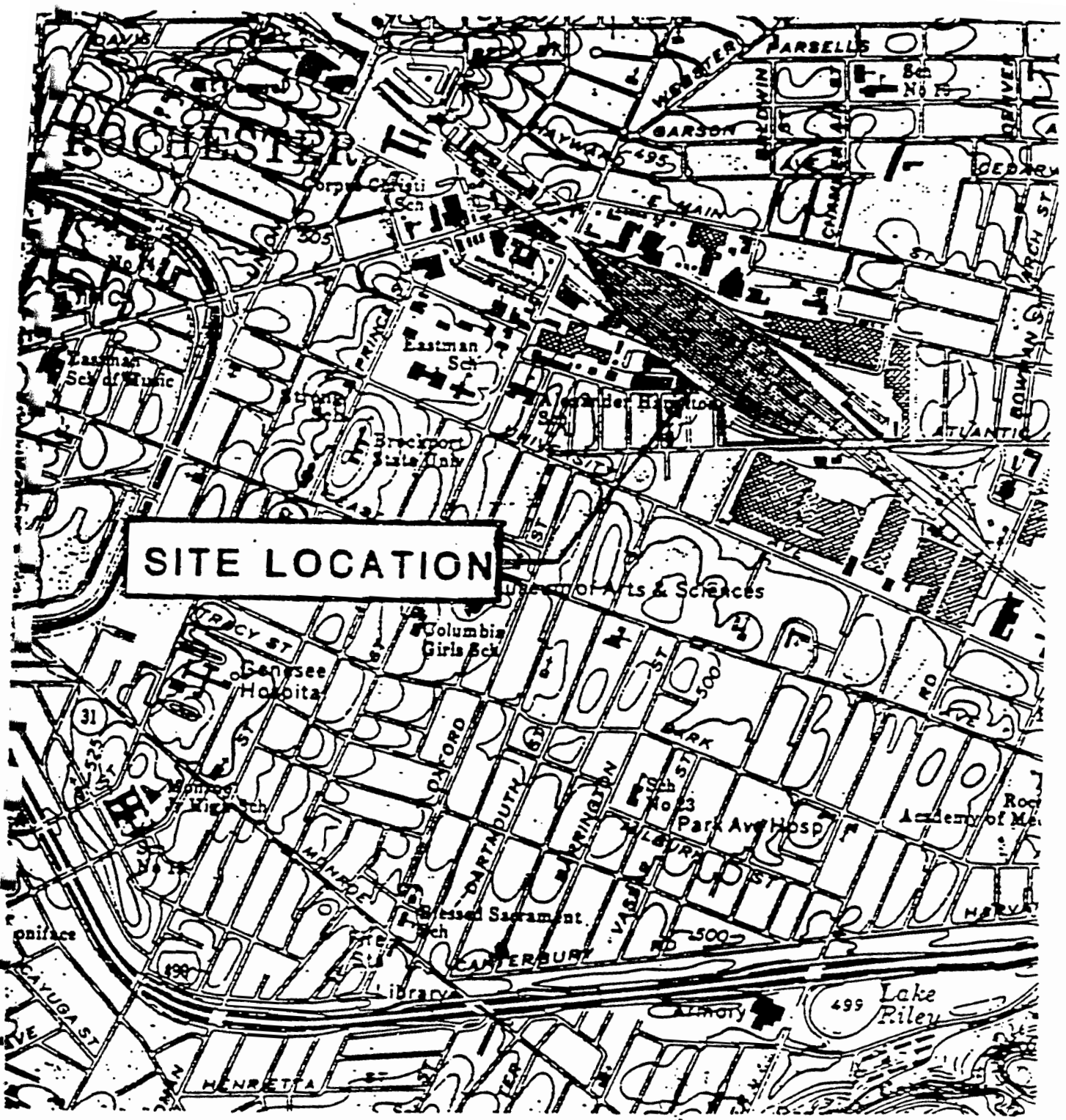


FIGURE 1

NOT TO SCALE

GALSON

TITLE: LOCATION MAP		DATE: 1/95
		BY: DSS
REFERENCE: U.S. GEOLOGICAL SURVEY ROCHESTER EAST QUADRANGLE		FILE NO: 2240-003

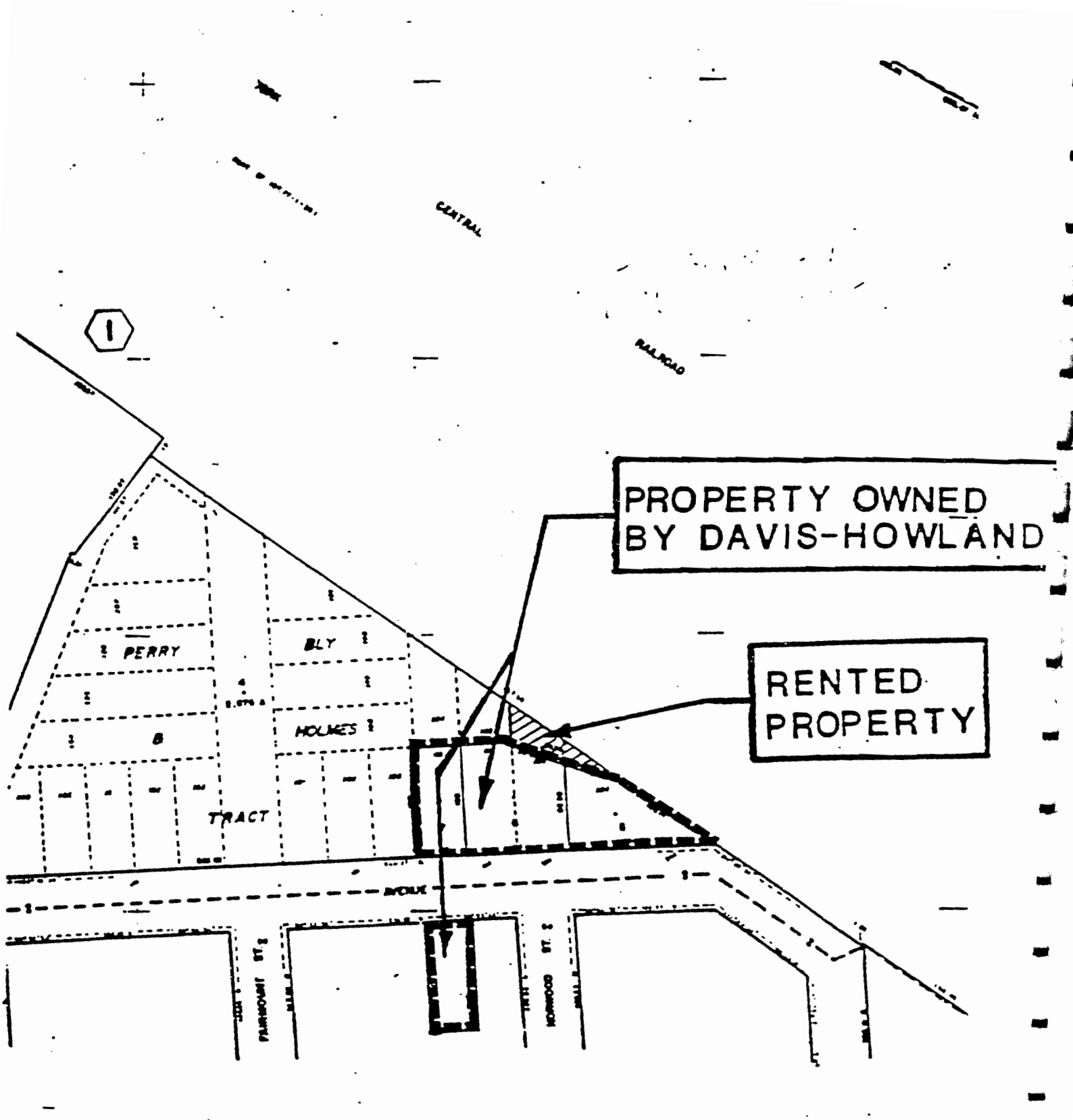


FIGURE 2

NOT TO SCALE

GALSON

TITLE	TAX MAP	DATE 1/95
		BY DSS
REFERENCE	MONROE COUNTY TAX MAP # 106.840-01-005, -006, -007 & # 121.280-02-004	FILE NO 2240-00

ATTACHMENT E

CONFINED SPACE PRE-ENTRY CHECKLIST

Confined Space Pre-Entry Check List

Safety Procedure.

A confined space is defined as having limited or restricted means of entry or exit, is large enough for an employee to enter and perform assigned work and is not designated for continuous occupancy by the employee. This check list must be filled out whenever the job site meets this criteria.

		Yes	No
1.	Did your survey of the surrounding area show it to be free of hazards such as drifting vapors from tanks, piping or sewers?	( )	( )
2.	Does your knowledge of industrial or other discharges indicate this area is likely to remain free of dangerous air contaminants while occupied?	( )	( )
3.	Are you certified in operation of the gas monitor to be used?	( )	( )
4.	Has a gas monitor calibration been performed this shift on the gas monitor to be used?	( )	( )
5.	Did you test the atmosphere of the confined space prior to entry?	( )	( )
6.	Did the atmosphere check as acceptable (no Alarms given)?	( )	( )
7.	Will the atmosphere be continuously monitored while the space is occupied.	( )	( )

List the contact rescue below.

Notice: If any of the above questions are answered "no" do not enter. Contact the Project Manager.

Job Location: _____

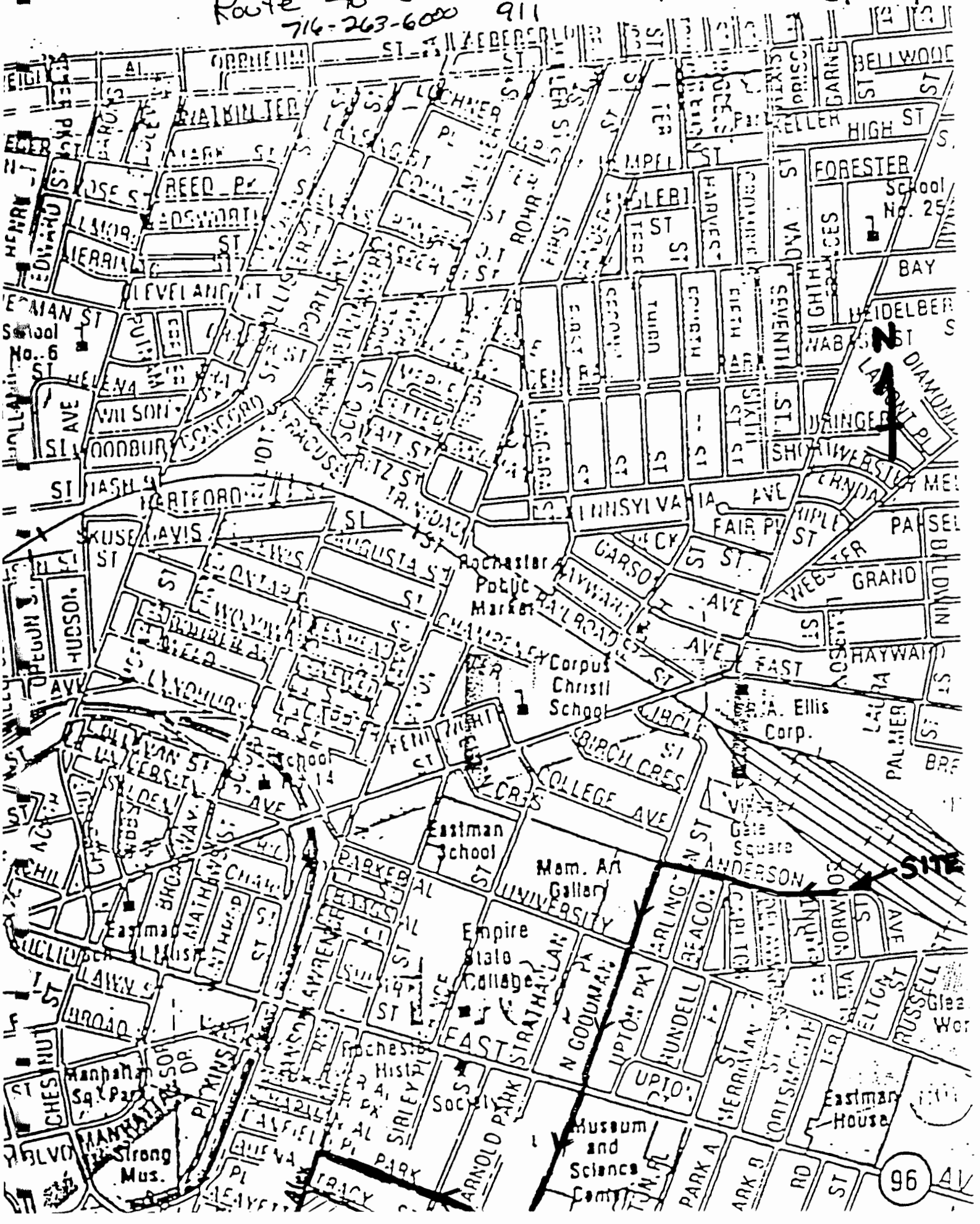
Signature: _____

Date: _____

[1722bal 1/26/94]

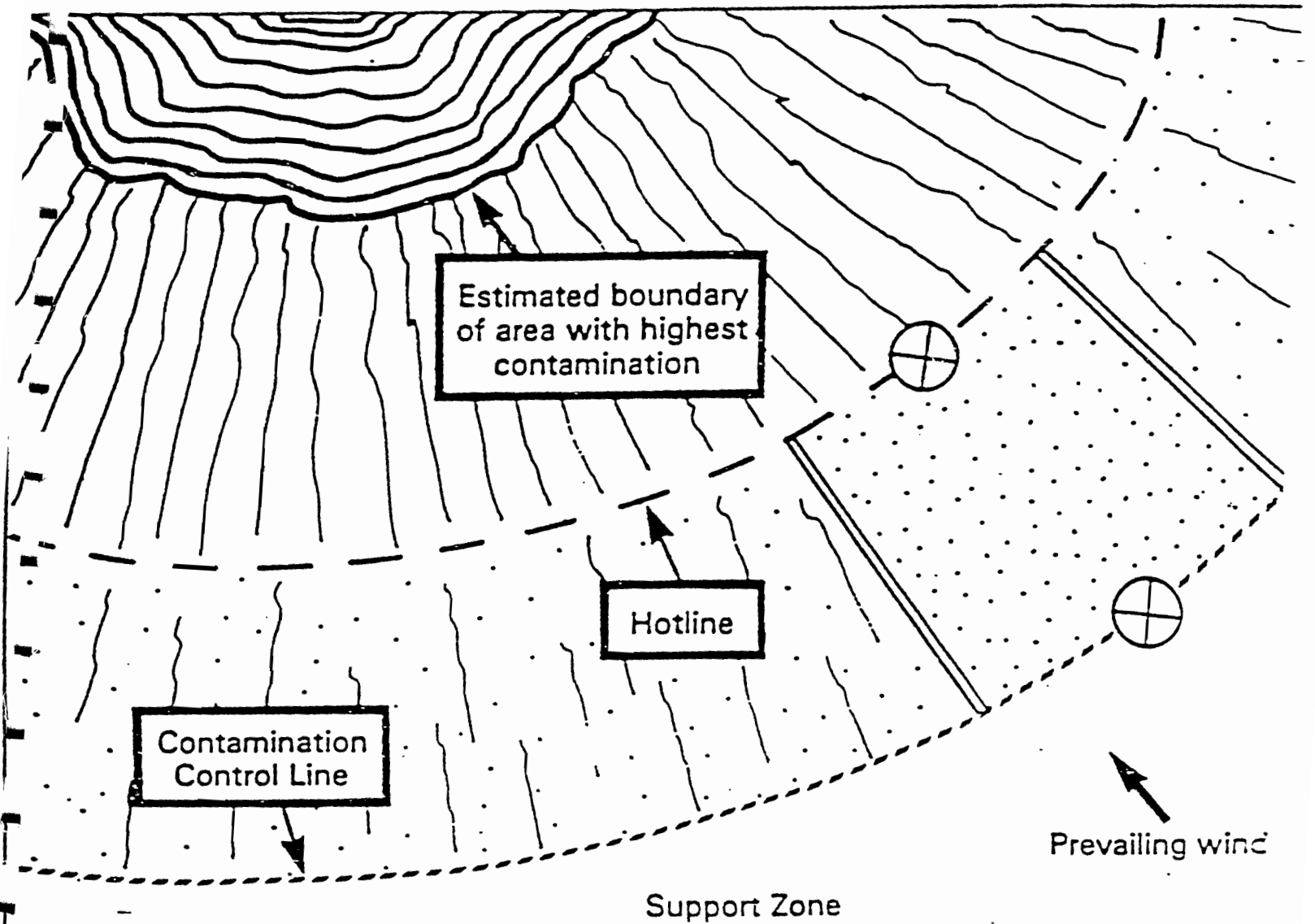
ATTACHMENT F
ROUTE TO GENESEE HOSPITAL

Route to Genesee Hospital 224 Alexander Street
716-263-6000 911



ATTACHMENT G
WORK ZONE, SUPPORT ZONE, EXCLUSION ZONES

ATTACHMENT G



Access Control Points.

Contamination Reduction Corridor.

Contamination Reduction Zone (CRZ).

ATTACHMENT H

CHEMICALS FOUND OR USED AT DAVIS-HOWLAND SITE

Attachment H
Chemicals Found or Used at Davis-Howland Site

COMPOUND	SYNONYMS	ACGIH TLV (ppm)	NIOSH IDLH (ppm)	OSHA PEL (ppm)	NIOSH IDLM (ppm)	LEL % in air	UEL % in air	FLASH POINT (°F)	AUTOIG TEMP. (°F)	VP (mm @ 68°F)	VD	IP (eV)	SOLU-BIL (%)	ODOR THRESH (ppm)	RESP. PROT.	TOXIC EFFECTS
Vinyl Chloride	Chloroethene, mono-chloroethylene,	5		1		3.8	22	17.6	882	2,530	2.15		0.7		B	A-1 carcin. Irrit. via inhal.& routes & to skin, eyes & mucous membranes.
Methane dichloride	Dichloromethane, methylene chloride	50		500		-	-	-	1,139	355	2.93		1.3	25	C	A skin, eye irritant.
Acetone	2-propanone	750		750		2.6	12.8	0	869	184	2.00		100		C	A skin, eye irritant.
1,1-Dichloroethene	Vinylidene chloride	5		1		7.3	16.0	32	1,058	497	3.34		0.02		C	Mutagen, carcinogen.
1,1-Dichloroethane	Ethylidene dichloride	100		100		5.8	-	22	856	184	3.44		5.03	-	C	-
1,1,1-Trichloroethane	Methyl chloroform	350		350		-	-	none	-	96	4.6		0.13		C	Gastrointestinal, CNS effects.
Trichloroethene	Ethylene trichloride	50				12.5	90	89.6	788		4.53				C	Strong skin, eye irrt. Carcin.
Toluene	Methylbenzene	50		100		1.27	7	40	896	22	3.18		0.06		C	A skin, eye irritant.
Ethylbenzene		100		100		1.2	6.8	59	810	7	3.66		0.018		C	
Xylene	Dimethylbenzene	100		100		1.1	7	77	986	6	3.66		0.02		C	
Phenol	Hydroxybenzene,	5		-		-	-	175	1,319	0.2	3.24		3.66		C	Skin, eye irrit. Acute CNS poison via skin contact.
2-Methylphenol	o-Cresol	-		5		1.4	-	178	1,110	0.1	3.73		2.51		C	
4-Methylphenol	p-Cresol	-		5		1.1	-	202	1,038	0.1	3.73		-		C	
2,4-Dimethylphenol		-		-											C	
Naphthalene	Moth balls	-		10		0.9	5.9	174	1,053	0.13	4.42		0.34		C	
2-Methylnaphthalene		-		-		-	-	-	-	-	-		-		C	
Acenaphthene		-		-		-	-	-	-	-	-		-		C	
Phenanthrene		-		-		-	-	-	-	-	-		-		C	
Fluoranthene		-		-		-	-	-	-	-	-		-		C	
Pyrene		-		-		-	-	-	-	-	-		-		C	
Chromium (dissolved)		-		-		-	-	-	-	-	-		-		C	
											-		-		C	

APPENDIX B

THERESA A. BEDDOE, CPG
Regional Client Services Manager

Education

Post Graduate (Ph.D.) work in Hydrogeology, 1984-1985, University of Arizona
M.S., Geological Sciences, Virginia Polytechnic Institute and State University
B.S., Geology, Rensselaer Polytechnic Institute

Certifications

Certified Professional Geologist, American Institute of Professional Geologists, No. 7598, April 17, 1989.

Areas of Special Competence

Site Investigations
Environmental Site Assessments
Environmental Impact Studies
Well Hydraulics
Hydrogeochemistry
Hydrogeologic Modeling
Studies in Karst Terrains
Geophysical Techniques
Solid/Hazardous Waste Facility Permitting

Professional Organizations

Technical Association of the Pulp and Paper Industry
American Water Resources Association
American Geophysical Union

Experience

Ms. Beddoe has served as project manager and assistant project manager for projects involving contamination of sites with hazardous materials. Additionally, she has served as project manager for numerous solid waste site investigations and permitting efforts. Ms. Beddoe has also managed projects involving the development of new sources of water or expanding existing well field capacity for various municipal and commercial clients. She has provided services to developers of both consolidated and unconsolidated mineral resources. Ms. Beddoe has provided numerous investigations of underground storage tank installations, and her services have been sought for many project feasibility studies.

HAZARDOUS WASTE SITE INVESTIGATIONS

As project manager/assistant project manager, Ms. Beddoe has developed project-specific field investigations programs, overseeing sampling of target media, enforcing safety and personal protective measures, and ensuring that appropriate quality assurance protocols are met.

Apple Valley Shopping Center Superfund Site: Project and site manager for a federal Superfund Emergency Removal Action at a Dutchess County site contaminated with chlorinated hydrocarbons. Provided expert testimony in a suit of the potentially responsible parties by the property owner. The project concerned contamination emanating from a shopping center from the vicinity of a dry cleaner which had contaminated wells in an adjacent subdivision and threatened a public water supply

well field. The Emergency Removal Action required placing granular activated carbon treatment systems on the residential wells, and installing two low-profile air strippers, the first such application to provide drinking water, to treat the water supply for the shopping center and pretreat the supply for the two most contaminated houses. The project is under USEPA oversight.

Torrey Landfill Remediation Project: Project manager for the construction of the final remediation of a state inactive hazardous waste site located in Yates County. The remediation included the construction of a geomembrane/geocomposite cap system, leachate collection and storage, and a groundwater interception well system. The site had reportedly received industrial waste from various sources, and threatened to contaminate various area wells. The project involved NYSDEC oversight and funding.

Dynaburg Distributing: Project manager for the remediation of a City of Rochester property used as a distributorship for trichloroethene and tetrachloroethene. Contamination had spread widely to involve several city blocks. The technical challenge involved the fact that the site was underlain by relatively tight tills. The site was being addressed under the Voluntary Cleanup Program with NYSDEC oversight.

Grasslands Road: Project manager for the characterization of contamination at a site in Westchester County which had been used for chemical and radionuclide research and development, including dry cleaning research, and presently used in medical research. The site was contaminated with a variety of volatile organic compounds and metals. The site was being entered into the Voluntary Cleanup Program of the NYSDEC when the client sold his interest in the property.

Waverly Plaza: Project and site manager for the characterization of contamination related to a dry cleaning operation at a shopping mall in Suffolk County. Extensive soil gas survey and soil and groundwater sampling were conducted. The site was sensitive because it overlay a sand aquifer.

SOLID WASTE SITE INVESTIGATIONS

In her capacity as project manager, Ms. Beddoe has completed site characterization and assessment of the impact of existing facilities, developed closure plans, managed permitting of transfer stations and landfills, and assisted communities in obtaining public funding. In addition, she has supported the development and permitting of new industrial waste landfills with site characterization, environmental impact statements, representation at SEQRA public meetings, negotiations with regulatory agencies, and preparation of permit documents.

PAUL J. MICCICHE, PG
Project Manager

Education	Graduate (M.S.) work in Hydrogeology, 1986-1988 Western Michigan University B.S. Geology, State University of New York College at Brockport
Registrations	Registered Professional Geologist - Pennsylvania, No. PG-002835-G, October 13, 1995; also registered in Wisconsin.
Areas of Special Competence	Project Management Site Investigations Groundwater Monitoring Environmental Site Assessments, Phases I and II Underground Storage Tank Closures/Upgrades Spill Prevention, Control, and Countermeasure Plans Soil Vapor Investigations Regulatory Compliance
Experience	Mr. Micciche has served as project manager of numerous projects related to Phase I and II ESAs, underground storage tank (UST) management, I investigations and upgrade projects, and characterization and remediation of hazardous waste sites. Mr. Micciche has also been responsible for design, implementation and management of large scale soil vapor investigations. Supervised project teams, utilized project scheduling and financial management software to provide clients with deliverables on schedule and within budget. Mr. Micciche is experienced in RCRA and CERCLA investigation techniques applied at industrial sites and military installations. Provided field supervision for numerous multi-phase ESAs for industrial clients throughout the United States.
Notable Projects	Managed a multi-phase soil vapor investigation for International Paper Company in compliance with NYSDEC Order on Consent Terms. Participated in Work Plan negotiations with NYSDEC and NYSDOH as consultant to International Paper. Performed Phase I and II ESAs for eight (8) Xerox Corporation facilities, and Wilmorite commercial development sites located throughout the United States. Manager for database sorting and reporting project in support of a Phase I RCRA Facility Investigation for Eastman Kodak Company. Provided field quality control/management for an OXY Chemical project in Niagara Falls, New York, involving the installation of a leachate/DNAPL barrier wall at the S-Area Landfill site. Wrote RCRA Corrective Action

wall at the S-Area Landfill site. Wrote RCRA Corrective Action Sampling Work Plans for SWMUs and consolidated SWMU descriptions/histories developed during investigations within Kodak Park. Managed work group and generated Work Plan for a USACE Rapid Response remediation project at the Seneca Army Depot in Romulus, NY. Participated in environmental compliance audits addressing UST regulations, air emission permit compliance, OSHA and other safety issues, RCRA and CERCLA issues at several facilities for a major transportation authority in western New York State.

Professional Organizations New York State Council of Professional Geologists, Buffalo Association of Professional Geologists, and Air & Waste Management Association

DEREK C. ANDERSON, PE
Project Engineer

Education	B.S., Civil Engineering, Rose-Hulman Institute of Technology, 1987
Certifications	OSHA 40-Hour Hazardous Waste Site Operation NYSDOL Certified Asbestos Inspector NYSDOL Certified Asbestos Designer
Professional Organizations	American Society of Civil Engineers ASCE Newsletter Editor Town of Webster Parks & Recreation Advisory Board Member

Experience

GALSON ENGINEERS
Rochester, NY
Mr. Anderson is responsible for project design and coordination, preparation of plans and specifications, writing reports, developing cost estimates, maintaining client contact, construction administration, and tracking project budgets.

Environmental projects include asbestos inspections, environmental site assessments, landfill design, and hazardous waste site evaluation and remediation. Also, he wrote Lozier Architects and Engineers' environmental audit standard operating procedure (SOP).

His experience in municipal projects includes a water treatment plant encompassing watermain and zebra mussel control system design. Also included was the design of an in-ground reservoir with a flexible membrane liner and floating cover.

He designed PVC and ductile iron piping systems for a watermain. He evaluated soil conditions to determine the need for corrosion control. His experience with pumping stations includes the design of above- and below-ground facilities. One design compared a hydropneumatic tank, sized to reduce pump cycle time, to a continuously running jockey pump.

Mr. Anderson designed and prepared plans and specifications for a 2.0 MGDD water treatment plant to replace an aging facility. During design, he coordinated the work of other departments. During construction, he reviewed shop drawings and attended progress meetings. The design used packaged water treatment units and a pre-engineered building as cost savings measures.

During a project for the City of Auburn, Mr. Anderson conducted a study of Owasco Lake to determine the maximum amount of water that can be

continuously withdrawn without failure during a drought. The study included review of historical lake discharge, lake elevation, raw water withdrawal, and effluent discharge data to find the drought-of-record and its corresponding safe yield.

Other municipal projects include stormwater runoff studies, stream flow studies, design of a regional stormwater detention facility with outlet control structure and dam, residential and commercial site development, and multiple backflow preventer designs.

His experience with backflow preventers includes the evaluation and design of installations for various commercial and industrial clients. The design process included preparing and submitting reports for review and approval by local water providers and health departments.

He designed a 5.0 MG, in-ground reservoir with flexible membrane liner and floating cover. His responsibilities included coordinating plans, specifications, cost estimates and shop drawing review. The design included the comparison of different bulk storage and lining systems.

Working with the U.S. Geologic Survey, Mr. Anderson studied the East Branch Allen Creek drainage basin to develop drainage improvement options for the basin. Based on the results of the study, he prepared plans and specifications for a regional stormwater management facility. Design of the facility included preparing draft and final environmental impact statements and an engineering design report on dam construction. The reports were submitted to the New York State Department of Environmental Conservation for review and approval.

RICHARD S. PARMELEE, IHIT
Industrial Hygienist

Education

M.S., Environmental and Occupational Health Sciences, City University of New York, Hunter College, 1995
B.S., Biology, State University of New York, College at Oswego

Certifications

Industrial Hygienist in Training (IHIT), American Board of Industrial Hygiene
Accredited AHERA Asbestos Inspector/Management Planner
Certified New York State Asbestos Inspector, Management Planner, Project Monitor and Air Sampling Technician
Certified New York City Asbestos Investigator
Certified CPR and First Aid, American Red Cross
Hazardous Waste Site Operations, Level "C" Site Health and Safety Supervisor

Areas of Special Competence

Comprehensive Industrial Hygiene Monitoring and Exposure Assessments
Indoor Air Quality Investigations
Asbestos Hazard Assessment Surveys and Management Plan Preparation
Abatement Monitoring, Regulatory Compliance, Sample Analysis
Lead Based Paint Hazard Assessments
Health and Safety Planning, Training and Audits

Professional Organizations

American Industrial Hygiene Association, National, Western and Metro New York Sections

Experience

Industrial Hygiene Monitoring

Projects involve sampling for a variety of airborne contaminants, including various solvents, metals, total and respirable dust, silica; conducting noise surveys to determine compliance with OSHA Permissible Exposure Limits (PELs) and community noise regulations; heat stress monitoring. Projects also include conducting interviews with affected employees to determine their job responsibilities, observing employee activities throughout their workshift, work place observation to correlate exposures with job function, interpreting analytical data and preparing reports discussing sampling results and recommending corrective actions. Projects were performed in a variety of industrial settings, utility operations, manufacturing settings, offices, schools, hazardous waste sites, landfills and ambient outdoor locations.

Indoor Air Quality Investigation (IAQ)

Projects involve a review of the operation and control of the ventilation system and assessment of its adequacy; conducting interviews with employees to isolate specific complaints associated with the buildings air quality; examination of the use and layout of floor space to identify patterns of air movement with respect to potential generators and receptors of indoor air contaminants; measurement throughout the facility for typical IAQ indicators, including temperature, humidity, total particulates, volatile organic compounds, carbon dioxide, carbon monoxide, sulfur dioxide and oxides of nitrogen; and preparation of reports summarizing findings of the evaluations, and corrective recommendation. Studies performed in a variety of facilities, including multi-floor office buildings, schools, health care facilities and banks.

Asbestos Surveys, Hazard Assessments, Management Planning

Project Manager and lead inspector for school asbestos inspections throughout the Metropolitan New York Area. Projects involved the inspection of a variety of facilities, ranging from single room day care centers to multi-floor/multi-structure school facilities and office buildings for asbestos; assessing the condition of the materials; determining the appropriate response action based upon the use and occupancy of the facility; preparation of cost estimates and development of management plans in accordance with AHERA protocols. Facilities inspected totaled more than 2.5 million square feet.

Asbestos Abatement Monitoring

Projects involved the supervision of the asbestos abatement contractors during asbestos removal in a variety of facilities. Responsibilities included ensuring contractor compliance with project specifications and any applicable regulations. Accomplished by performing daily inspections of the work area and air sampling.

Lead Based Paint Survey/Assessment

Projects involved the survey and assessment of day care centers and transportation facilities throughout the New York City area for the presence of lead based paint on building components. Procedures used were in accordance with procedures outlined by the New York City Department of Health, and guidelines published by the U.S. Department of Housing and Urban Development (HUD). Included was the collection of paint chip, air, dust, water and soil samples, interpretation of X-ray Fluorescence (XRF) sample data, and preparation of survey and assessment reports.

Health and Safety Planning, Training and Audits

Mr. Parmelee was responsible for implementing corporate health and safety policies in his previous employers Metropolitan New York Regional offices. Duties included monitoring and providing regional training: maintaining and reviewing monthly exposure/injury logs, regional training and medical records; conducting incident investigations; scheduling and authorizing physical examinations; reviewing and approving project health and safety plans; conducting safety audits; functioning as safety coordinator on a variety of project sites; coordinating bi-monthly safety committee meetings.

KEVIN J. MCGOVERN
Field Geologist

Education

B.S., Geology, State University of New York College at Fredonia, 1992

Certifications

OSHA 40 Hour Health and Safety Training Course for Hazardous Waste Operations with Annual Refreshers

Professional Experience

Prior to joining Galson, Mr. McGovern coordinated and supervised underground bulk petroleum storage tank removal projects, assisted with the preparation of site specific health and safety plans and work plans, performed scheduled monitoring and maintenance of groundwater treatment systems and free product recovery systems, delineated contaminated soil via field screening and proper soil sampling on listed sites, conducted air monitoring at several remediation projects as part of approved site health and safety plans, prepared reports (with CADD drawings) on behalf of clients and supervised upgrades in office computer hardware.

Notable Projects

SOIL DELINEATION AND REMEDIATION

Kolb Soil Remediation: Mr. McGovern has supervised and documented the delineation and staging of petroleum contaminated soil at the Kolb Residence in Rochester, New York.

Syracuse Supply Co.: Mr. McGovern has supervised, documented and submitted a report of the removal of approximately 4,000 tons of petroleum contaminated soil from the Syracuse Supply Co. Ainsley Drive facility in Syracuse, New York to a permitted landfill.

GROUNDWATER REMEDIATION AND MONITORING

Yates County, Torrey Landfill Final Remediation Project: Mr. McGovern has supervised and documented the installation and abandonment of several monitoring wells at the Yates County, Torrey Landfill in Dresden, New York.

Town of Wheatland Highway Garage: Mr. McGovern has performed groundwater sampling, including chain-of-custody, sample preservation and transportation of samples for the Town of Wheatland Highway Garage in Wheatland, New York.

New York State Office of General Services: Mr. McGovern has performed groundwater sampling, including chain-of-custody, sample preservation and transportation of samples for the Groveland Correctional Facility in Sonyea, New York.

Northeast Environmental Services: At the hazardous waste treatment, storage and disposal facility operated by Northeast Environmental Services, Inc., in Wampsville, New York, Mr. McGovern performed groundwater sampling, including chain-of-custody, sample preservation and transportation of samples, supervised monitoring well installations, assisted in the installation of the site's vapor extraction system, conducted pumping tests and temperature verification to assist in evaluating the site's aquifers. In addition he performed scheduled monitoring and maintenance on the site's groundwater treatment system and conducted air monitoring and inspection of the site's tank room and tank room manifold system as part of the site's operating permit. Mr. McGovern prepared monthly, quarterly and annual reports (with CADD drawings) and submitted them to the New York State Department of Environmental Conservation on behalf of the site. Also, Mr. McGovern designed (with CADD assistance), supervised and implemented modifications to the site's groundwater treatment system.

APPENDIX C

SAMPLING PROTOCOL TO OBTAIN NATURAL ATTENUATION DATA AT DOVER AIR FORCE BASE

1.0 Introduction

This document provides the objectives and procedures for sampling groundwater during the Remediation Technologies Development Forum (RTDF) Chlorinated Solvents Subgroup pilot program. A statement of work for this subgroup—defining the anticipated contributions of participants in the study of co-metabolic bioventing, accelerated anaerobic, and intrinsic bioremediation of chlorinated solvents at two different geographic locations—has been established. The statement of work discusses the need for groundwater sampling in connection with the intrinsic and accelerated anaerobic remediation studies, the specific requirements of which are detailed in Section 2.0 (Objectives).

This document is intended to serve as

- A guide for conducting groundwater sampling during the program.
- Documentation for the subgroup laboratory personnel to understand the source of water used in their experiments.
- Reference for reviewers and future practitioners of these technologies.

This protocol has been developed because of the potential adverse effects of commonly employed groundwater sampling methodology on the quality of bioremediation data. Naturally occurring contaminant biodegradation can result in dramatic non-equilibrium with the atmosphere. The intent of this document is to describe a sampling methodology for use in the RTDF program to minimize the effects of sampling on groundwater collection and characterization. This protocol has drawn heavily from a proposed "minimal aeration method" prepared for the American Petroleum Institute and the New Jersey Department of Environmental Protection (NJDEP) *Field Sampling Procedures Manual* (1992).

2.0 Objectives

In gathering groundwater samples for the bioremediation subgroup's work, the following objectives should be met:

- Regularly and consistently collect representative groundwater samples for analysis of contaminant levels, geochemical conditions, biological, and water-quality parameters to characterize subsurface conditions in the saturated zone.
- Assess the presence of and potential for bioremediation of chlorinated solvents.
- Gather representative bulk groundwater samples for laboratory experimentation (e.g., microcosms and column studies, adsorption-desorption testing, and microbial counts).
- Provide consistent data of the highest quality appropriate for the program's research and development activities.
- Provide a template for future sampling efforts in bioremediation work.

3.0 Sampling Procedure

3.1 Presampling Review

Prior to sampling, the following items must be addressed:

- Review the well list to verify sampling sequence, number of samples from each well, and quantity of water for each sample.
- Review container, labeling, and preservative requirements for each sample.
- Review the packaging material and container requirements.
- Ensure that shipping arrangements have been made in advance.
- Review the location map for each well and check each well's construction details (i.e., diameter, total depth, depth to screen, screen length).
- Have prepared field sampling logs with well details in advance.
- Review decontamination procedures, materials, and containers.
- Review the requirements for field and trip blanks.
- Review the equipment checklist (see Appendix A).

3.2 Prepurging Procedures

Prior to purging standing water from a well, the following procedures should be conducted:

- Review the specific well log and prepare the field sampling log in advance of the purging activities.
  - Decontaminate bladder pump.
  - Replace discharge tubing.
  - Calibrate field parameters (e.g., pH, Eh, specific conductance, dissolved oxygen, Hnu).
  - Decontaminate water-level indicator probe and tape.
  - Unlock the monitoring well and measure vapor concentrations in accordance with the site-specific Health and Safety Plan.
  - Measure depth to water.
  - Evaluate whether the water table surface is above or within the screened interval.
  - Calculate the volume of well water and borehole filter sand pack pore space (borehole volume).
  - Install pump into the well slowly to minimize aeration, placing the pump intake midway in the screened interval or at least 1 foot below the water level.
  - Take precautions to prevent the exhaust from contaminating the samples if gasoline- or diesel-powered generators or compressors are used to operate the pump.
  - Configure the discharge tubing with a gate valve and three-way valve, with discharge directed through the three-way valve and flow cell and into a calibrated decontaminated bucket (see Figure 1)

The following information should be recorded on the sampling log for each monitoring well before purging:

- Date, time, and weather conditions
- Well number and well permit number
- Photoionization detector (PID) or flame ionization detector (FID) reading taken from the well immediately after cap removal
- pH, Eh, dissolved oxygen, temperature, and specific conductivity
- Total depth of well from the top of inner casing or surveyor's mark, if present

- Depth from the top of inner casing to the top of screen
- Depth from the top of inner casing to water
- Estimated water volume in well

The following information should be recorded on the sampling log for each monitoring well after purging:

- Start and end time for purging
- Purge method
- Purge rate(s)
- Total volume purged
- pH, Eh, dissolved oxygen, temperature, and specific conductivity (during and after purging)
- Sampling method

Any comments concerning field observations during the groundwater sampling event (i.e., slow recharge, turbidity, odor, sheen, PID or FID readings) should also be reported.

3.3 Monitoring Well Purging Procedure

The monitoring well is purged to remove the standing water column and induce groundwater flow from the surrounding formation into the well. With the minimal drawdown low-flow aeration method, the objective is to accomplish this without introducing air into the groundwater that flows into the well. Pumping at a rate (less than 1 liter per minute) that does not lower the level in the well more than 10 percent of the screen length will prevent air from being introduced into the groundwater. The purging rate should be controlled, as needed, using the pump's variable speed flow controller and/or the gate valve in the discharge line. Water-level measurements should be collected frequently during purging to ensure that the water level has not dropped lower than desired. The pump rate for purging will be determined by the drawdown in water level. Wells can be pumped at a rate in excess of 1 liter per minute as long as the drawdown does not exceed 10 percent of the screen length in the water level. Monitoring wells should be purged until the field parameters have stabilized to within the ranges presented in Table 1.

The minimal drawdown low-flow aeration method is specified as an alternative to the conventional "three well volume" purging protocol. Purging until the parameters in Table 1 have stabilized is a technically sound method for obtaining groundwater samples that are representative of formation groundwater. While sampling under this protocol, the removal of three well volumes prior to sampling may be unnecessary. If the indicator parameters stabilize before that volume has been purged, it is acceptable to begin sampling. If the indicator parameters fail to stabilize in accordance with Table 1, sampling should commence after three well volumes are removed. At least one well volume must be purged before sampling can begin. During purging it is permissible to by-pass the flow cell until the groundwater has cleared.

3.4 Field Indicator Parameter Measurement

During purging, dissolved oxygen, electrical conductance, pH, Eh, and temperature should be measured continuously using the flow cell.

Indicator parameters and water-level measurements should be recorded in a field notebook or on sampling logs at approximately ¼ well volume increments. Purging is complete after the parameters have stabilized to within the ranges presented in Table 1, or when a minimum of one well volume has been removed.

3.5 Groundwater Sample Collection

When purging is complete, aliquots should be collected for the analytical parameters listed in Table 2. To ensure the most consistent, comparable results, individual samples/measurements from all wells should be collected in the same order. The order used under this protocol is based on the approximate order of susceptibility to artificial aeration and is as follows: volatile organic constituents, total organic carbon (TOC), methane, iron, sulfide, alkalinity, and sulfate.

The pumping rate should be reduced to 100 milliliters per minute (ml/min) during sample collection. The flow cell may be disconnected during sampling. The discharge should be directed toward the inside wall of the jar to minimize volatilization and should be filled to

overflowing. The discharge should be filtered before the ferrous iron sample jar is filled using an in-line 0.45-micron filter. (Filtration is recommended to eliminate bias introduced with particulates; in-line filtration is recommended to prevent artificial aeration of the sample.)

If additional samples are collected for dissolved oxygen analysis using field kits (i.e., Hach or Winkler), the sample jar should be submerged into the bottom of the large container. The container should be filled to overflowing and the sample jar should be allowed to fill without aeration.

The samples should be preserved and analyzed as described in the Project Sampling and Analysis Plan.

3.6 Pump Decontamination

The submersible pumps used to evacuate and sample groundwater in the well casing must be cleaned and flushed prior to and between each use. This cleaning process consists of an external laboratory-grade glassware detergent wash and tap-water rinse, or steam cleaning of pump casing, hose and cables, followed by a 10-gallon flush of potable water through the pump. Flushing can be accomplished using a clean plastic overpack drum or a plastic garbage can filled with potable water. Flushing must be followed by a distilled and deionized rinse of the outside of the pump.

4.0 Calibration Procedures

The following is a description of the calibration procedures developed after the first round of sampling at Dover AFB, Dover, DE. These procedures are to be followed during all subsequent groundwater sampling events.

1. The Purge Saver Meter will be calibrated before operations begin in the morning and checked for accuracy in the middle of the day and again at the end of the day. If the meter does not display the desired results during the check, it will then be recalibrated. Calibration will be done in accordance with the Purge Saver user's guide.

2. The dissolved oxygen probe will be calibrated in the following manner. Dissolved oxygen (DO) will be checked under conditions of 100 percent humidity as described in the user's guide. This will be considered the high end check. DO will also be checked under conditions of 0 percent oxygen—low end check. An air-tight sample bag will be attached to the probe and then filled with nitrogen gas. The nitrogen will displace the oxygen and the meter should display zero percent oxygen. If the instrument fails to display the appropriate response for either procedure, it will then be recalibrated and rechecked.
3. Redox probe will be calibrated in accordance with the user's guide. Following calibration the redox will be checked with a reference solution to ensure the meter is functioning properly.
4. The pH probe will be calibrated to buffer solutions of 4, 7, and 10 in accordance to the user guide.
5. The conductivity probe will be calibrated with four conductivity standards as specified in the user's guide.
6. If the instrument displays unreasonable results for any of the parameters during operations, the purging process will stop and the meter will be recalibrated.

5.0 References

CH2M Hill. April 3, 1995. *Standard Operating Procedure—Groundwater Sampling for Intrinsic Bioremediation Characterizations.*

New Jersey Department of Environmental Protection. May 1992. *Field Sampling Procedures Manual.*

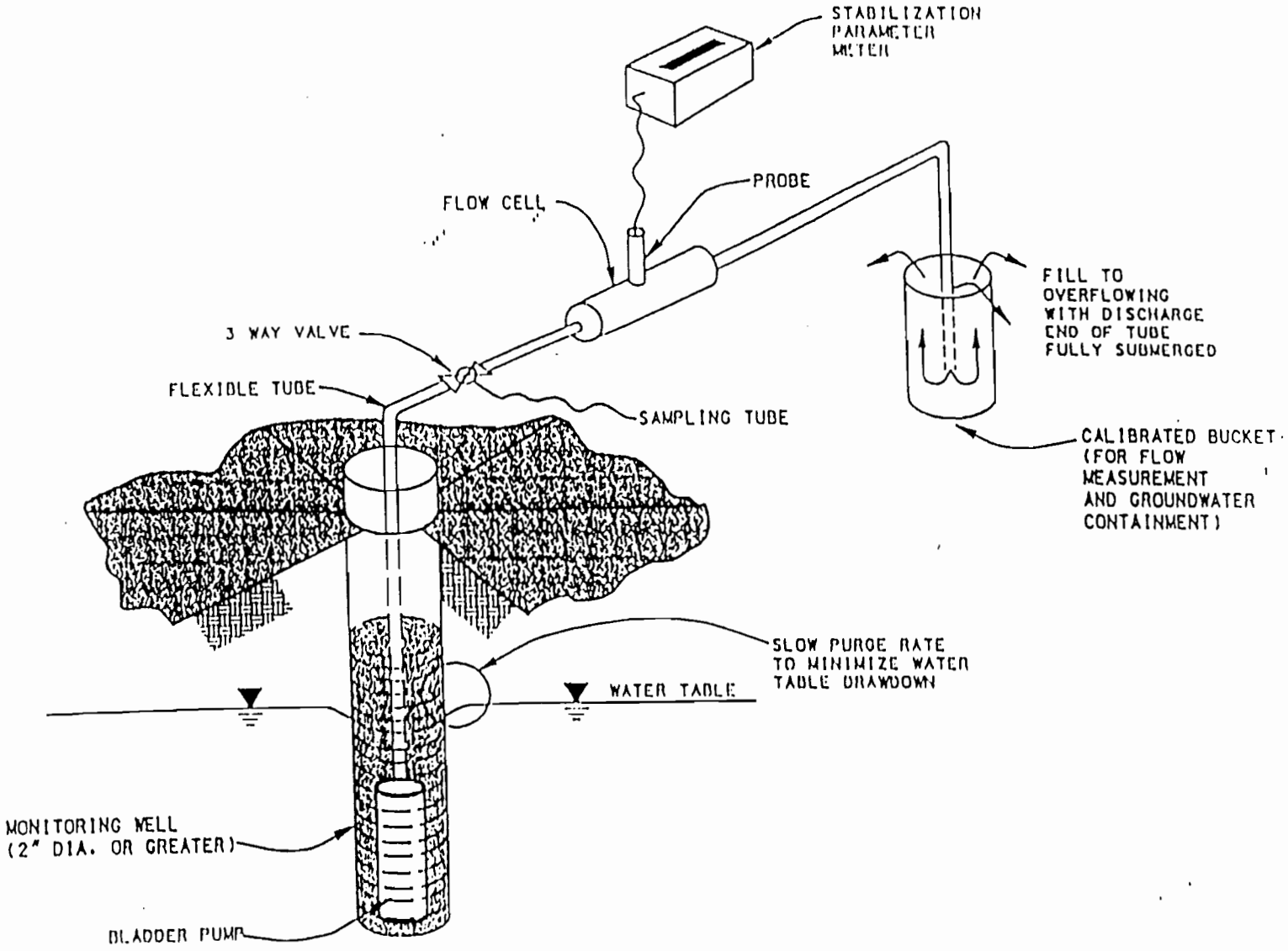
Remediation Technologies Development Forum. *Statement of Work for Joint R&D Agreement Concerning Bioremediation of Chlorinated Solvents.* The Remediation Technologies Development Forum Chlorinated Solvents Bioremediation Subgroup.

DESCRIPTION OF ANALYTICAL PARAMETERS
USED TO ASSESS INTRINSIC BIOREMEDIATION

Parameter	Description
Alkalinity	Provides an indication of the buffering capacity of the water and the amount of carbon dioxide dissolved in the water. Increases due to biodegradation of organic compounds.
pH	Microbial activity tends to be reduced outside of a pH range of 5 to 9, and many anaerobic bacteria are particularly sensitive to pH extremes.
Temperature	Affects rates of microbial metabolism. Slower biodegradation occurs at lower temperatures.
Dissolved oxygen	Highest energy-yielding electron acceptor for biodegradation of organic constituents. < 10 ppm.
Redox potential	A measure of the oxidation-reduction potential of the environment. Ranges from +500 mV for aerobic conditions to -300 mV for methanogenic conditions.
Sulfate	Used as an electron acceptor in biodegradation of organic constituents. Reduced to form sulfide.
Sulfide	Microbially reduced form of sulfate. Indicates reduced conditions
Methane	Indicator of anaerobic conditions and of methanogenic bacteria. Produced by the microbial reduction of carbon dioxide. Solubility limit 25 to 40 ppm.
Ethane/ethene	Metabolic end product of reductive dehalogenation of halogenated ethenes and ethanes.
Total organic carbon (TOC)	A measure of the total concentration of organic material in water that may be available for biological degradation.
Chloride	May be useful as an indication of biological dechlorination and as a conservative tracer.
VOC daughter products	Provides a measure of the type and quantity of parent and biogenic daughter products.
Iron (total, dissolved)	A product of bacterial iron reduction. Only the reduced form (ferrous) is soluble. The oxidized form (ferric) is used as an electron acceptor.
Nitrogen	An essential nutrient of microbial growth and biodegradation.
Nitrate	Used as an electron acceptor. Consumed next after oxygen.
Nitrite	Product of nitrate reduction. Produced only under anaerobic conditions. Rarely observed.
Phosphorus	Essential nutrient for microbial growth and biodegradation.

FIGURE 1

SCHEMATIC OF MINIMAL AERATION SAMPLE COLLECTION METHOD



3188A3.DGN

Table 1

CRITERIA FOR STABILIZATION OF INDICATOR PARAMETERS DURING PURGING

Field Parameter	Stabilization Criterion
Dissolved oxygen	Not applicable
Electrical conductivity	3% full scale range
pH	0.10 pH unit
Temperature	0.2°C
Eh	Not applicable

mg/l = Milligrams per liter

APPENDIX D

ASTM – D1586

Designation: D 1586 – 84

Standard Method for PENETRATION TEST AND SPLIT-BARREL SAMPLING OF SOILS[1]

This standard is issued under the fixed designation D 1586; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This method has been approved for use by agencies of the Department of Defense and for listing in the DOD Index of Specifications and Standards.

1. Scope

1.1 This method describes the procedure, generally known as the Standard Penetration Test (SPT), for driving a split-barrel sampler to obtain a representative soil sample and a measure of the resistance of the soil to penetration of the sampler.

1.2 *This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety problems associated with its use. It is the responsibility of whoever uses this standard to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* For a specific precautionary statement, see 5.4.1.

1.3 The values stated in inch-pound units are to be regarded as the standard.

2. Applicable Documents

2.1 *ASTM Standards:*

D 2487 Test Method for Classification of Soils for Engineering Purposes[2]

D 2488 Practice for Description and Identification of Soils (Visual-Manual Procedure)[2]

D 4220 Practices for Preserving and Transporting Soil Samples[2]

3. Descriptions of Terms Specific to This Standard

3.1 *anvil*—that portion of the drive-weight assembly which the hammer strikes and through which the hammer energy passes into the drill rods.

3.2 *cathead*—the rotating drum or windlass in the rope-cathead lift system around which the operator wraps a rope to lift and drop the hammer by successively tightening and loosening the rope turns around the drum.

3.3 *drill rods*—rods used to transmit downward force and torque to the drill bit while drilling a borehole.

3.4 *drive-weight assembly*—a device consisting of the hammer, hammer fall guide, the anvil, and any hammer drop system.

3.5 *hammer*—that portion of the drive-weight assembly consisting of the 140 ± 2 lb (63.5 ± 1 kg) impact weight which is successively lifted and dropped to provide the energy that accomplishes the sampling and penetration.

3.6 *hammer drop system*—that portion of the drive-weight assembly by which the operator accomplishes the lifting and dropping of the hammer to produce the blow.

3.7 *hammer fall guide*—that part of the drive-weight assembly used to guide the fall of the hammer.

3.8 *N-value*—the blowcount representation of the penetration resistance of the soil. The *N*-value, reported in blows per foot, equals the sum of the number of blows required to drive the sampler over the depth interval of 6 to 18 in. (150 to 450 mm) (see 7.3).

3.9 ΔN—the number of blows obtained from each of the 6-in. (150-mm) intervals of sampler penetration (see 7.3).

3.10 *number of rope turns*—the total contact angle between the rope and the cathead at the beginning of the operator's rope slackening to drop the hammer, divided by 360° (see Fig. 1).

3.11 *sampling rods*—rods that connect the drive-weight assembly to the sampler. Drill rods are often used for this purpose.

3.12 *SPT*—abbreviation for Standard Penetration Test, a term by which engineers commonly refer to this method.

[1] This method is under the jurisdiction of ASTM Committee D-18 on Soil and Rock and is the direct responsibility of Subcommittee D18.02 on Sampling and Related Field Testing for Soil Investigations.

Current edition approved Sept. 11, 1984. Published November 1984. Originally published as D 1586 – 58 T. Last previous edition D 1586 – 67 (1974).

[2] *Annual Book of ASTM Standards*, Vol 04.08.

4. Significance and Use

4.1 This method provides a soil sample for identification purposes and for laboratory tests appropriate for soil obtained from a sampler that may produce large shear strain disturbance in the sample.

4.2 This method is used extensively in a great variety of geotechnical exploration projects. Many local correlations and widely published correlations which relate SPT blowcount, or *N*-value, and the engineering behavior of earthworks and foundations are available.

5. Apparatus

5.1 *Drilling Equipment*—Any drilling equipment that provides at the time of sampling a suitably clean open hole before insertion of the sampler and ensures that the penetration test is performed on undisturbed soil shall be acceptable. The following pieces of equipment have proven to be suitable for advancing a borehole in some subsurface conditions.

5.1.1 *Drag, Chopping, and Fishtail Bits*, less than 6.5 in. (162 mm) and greater than 2.2 in. (56 mm) in diameter may be used in conjuction with open-hole rotary drilling or casing-advancement drilling methods. To avoid disturbance of the underlying soil, bottom discharge bits are not permitted; only side discharge bits are permitted.

5.1.2 *Roller-Cone Bits*, less than 6.5 in. (162 mm) and greater than 2.2 in. (56 mm) in diameter may be used in conjunction with open-hole rotary drilling or casing-advancement drilling methods if the drilling fluid discharge is deflected.

5.1.3 *Hollow-Stem Continuous Flight Augers*, with or without a center bit assembly, may be used to drill the boring. The inside diameter of the hollow-stem augers shall be less than 6.5 in. (162 mm) and greater than 2.2 in. (56 mm).

5.1.4 *Solid, Continuous Flight, Bucket and Hand Augers*, less than 6.5 in. (162 mm) and greater than 2.2 in. (56 mm) in diameter may be used if the soil on the side of the boring does not cave onto the sampler or sampling rods during sampling.

5.2 *Sampling Rods*—Flush-joint steel drill rods shall be used to connect the split-barrel sampler to the drive-weight assembly. The sampling rod shall have a stiffness (moment of inertia) equal to or greater than that of parallel wall "A" rod (a steel rod which has an outside diameter of 1⅜ in. (41.2 mm) and an inside diameter of 1⅛ in. (28.5 mm).

NOTE 1—Recent research and comparative testing indicates the type rod used, with stiffness ranging from "A" size rod to "N" size rod, will usually have a negligible effect on the *N*-values to depths of at least 100 ft (30 m).

5.3 *Split-Barrel Sampler*—The sampler shall be constructed with the dimensions indicated in Fig. 2. The driving shoe shall be of hardened steel and shall be replaced or repaired when it becomes dented or distorted. The use of liners to produce a constant inside diameter of 1⅜ in. (35 mm) is permitted, but shall be noted on the penetration record if used. The use of a sample retainer basket is permitted, and should also be noted on the penetration record if used.

NOTE 2—Both theory and available test data suggest that *N*-values may increase between 10 to 30 % when liners are used.

5.4 *Drive-Weight Assembly:*

5.4.1 *Hammer and Anvil*—The hammer shall weigh 140 ± 2 lb (63.5 ± 1 kg) and shall be a solid rigid metallic mass. The hammer shall strike the anvil and make steel on steel contact when it is dropped. A hammer fall guide permitting a free fall shall be used. Hammers used with the cathead and rope method shall have an unimpeded overlift capacity of at least 4 in. (100 mm). For safety reasons, the use of a hammer assembly with an internal anvil is encouraged.

NOTE 3—It is suggested that the hammer fall guide be permanently marked to enable the operator or inspector to judge the hammer drop height.

5.4.2 *Hammer Drop System*—Rope-cathead, trip, semi-automatic, or automatic hammer drop systems may be used, providing the lifting apparatus will not cause penetration of the sampler while re-engaging and lifting the hammer.

5.5 *Accessory Equipment*—Accessories such as labels, sample containers, data sheets, and groundwater level measuring devices shall be provided in accordance with the requirements of the project and other ASTM standards.

6. Drilling Procedure

6.1 The boring shall be advanced incrementally to permit intermittent or continuous sampling. Test intervals and locations are normally stipulated by the project engineer or geologist. Typically, the intervals selected are 5 ft (1.5 mm) or less in homogeneous strata with test and sampling locations at every change of strata.

6.2 Any drilling procedure that provides a suitably clean and stable hole before insertion of the sampler and assures that the penetration test is performed on essentially undisturbed soil shall be acceptable. Each of the following procedures have proven to be acceptable for some subsurface conditions. The subsurface conditions anticipated should be considered when selecting the drilling method to be used.

6.2.1 Open-hole rotary drilling method.

6.2.2 Continuous flight hollow-stem auger method.

6.2.3 Wash boring method.

6.2.4 Continuous flight solid auger method.

6.3 Several drilling methods produce unacceptable borings. The process of jetting through an open tube sampler and then sampling when the desired depth is reached shall not be permitted. The continuous flight solid auger method shall not be used for advancing the boring below a water table or below the upper confining bed of a confined non-cohesive stratum that is under artesian pressure. Casing may not be advanced below the sampling elevation prior to sampling. Advancing a boring with bottom discharge bits is not permissible. It is not permissible to advance the boring for subsequent insertion of the sampler solely by means of previous sampling with the SPT sampler.

6.4 The drilling fluid level within the boring or hollow-stem augers shall be maintained at or above the in situ groundwater level at all times during drilling, removal of drill rods, and sampling.

7. Sampling and Testing Procedure

7.1 After the boring has been advanced to the desired sampling elevation and excessive cuttings have been removed, prepare for the test with the following sequence of operations.

7.1.1 Attach the split-barrel sampler to the sampling rods and lower into the borehole. Do not allow the sampler to drop onto the soil to be sampled.

7.1.2 Position the hammer above and attach the anvil to the top of the sampling rods. This may be done before the sampling rods and sampler are lowered into the borehole.

7.1.3 Rest the dead weight of the sampler, rods, anvil, and drive weight on the bottom of the boring and apply a seating blow. If excessive cuttings are encountered at the bottom of the boring, remove the sampler and sampling rods from the boring and remove the cuttings.

7.1.4 Mark the drill rods in three successive 6-in. (0.15-m) increments so that the advance of the sampler under the impact of the hammer can be easily observed for each 6-in. (0.15-m) increment.

7.2 Drive the sampler with blows from the 140-lb (63.5-kg) hammer and count the number of blows applied in each 6-in. (0.15-m) increment until one of the following occurs:

7.2.1 A total of 50 blows have been applied during any one of the three 6-in. (0.15-m) increments described in 7.1.4.

7.2.2 A total of 100 blows have been applied.

7.2.3 There is no observed advance of the sampler during the application of 10 successive blows of the hammer.

7.2.4 The sampler is advanced the complete 18 in. (0.45 m) without the limiting blow counts occurring as described in 7.2.1, 7.2.2, or 7.2.3.

7.3 Record the number of blows required to effect each 6 in. (0.15 m) of penetration or fraction thereof. The first 6 in. is considered to be a seating drive. The sum of the number of blows required for the second and third 6 in. of penetration is termed the "standard penetration resistance", or the "*N*-value". If the sampler is driven less than 18 in. (0.45 m), as permitted in 7.2.1, 7.2.2, or 7.2.3, the number of blows per each complete 6-in. (0.15-m) increment and per each partial increment shall be recorded on the boring log. For partial increments, the depth of penetration shall be reported to the nearest 1 in. (25 mm), in addition to the number of blows. If the sampler advances below the bottom of the boring under the static weight of the drill rods or the weight of the drill rods plus the static weight of the hammer, this information should be noted on the boring log.

7.4 The raising and dropping of the 140-lb (63.5-kg) hammer shall be accomplished using either of the following two methods:

7.4.1 By using a trip, automatic, or semi-automatic hammer drop system which lifts the 140-lb (63.5-kg) hammer and allows it to drop 30 ± 1.0 in. (0.76 m ± 25 mm) unimpeded.

7.4.2 By using a cathead to pull a rope attached to the hammer. When the cathead and rope method is used the system and operation shall conform to the following:

7.4.2.1 The cathead shall be essentially free of rust, oil, or grease and have a diameter in the range of 6 to 10 in. (150 to 250 mm).

7.4.2.2 The cathead should be operated at a minimum speed of rotation of 100 RPM, or the approximate speed of rotation shall be reported on the boring log.

7.4.2.3 No more than 2¼ rope turns on the cathead may be used during the performance of the penetration test, as shown in Fig. 1.

NOTE 4—The operator should generally use either 1¾ or 2¼ rope turns, depending upon whether or not the rope comes off the top (1¾ turns) or the bottom (2¼ turns) of the cathead. It is generally known and accepted that 2¾ or more rope turns considerably impedes the fall of the hammer and should not be used to perform the test. The cathead rope should be maintained in a relatively dry, clean, and unfrayed condition.

7.4.2.4 For each hammer blow, a 30-in. (0.76-m) lift and drop shall be employed by the operator. The operation of pulling and throwing the rope shall be performed rhythmically without holding the rope at the top of the stroke.

7.5 Bring the sampler to the surface and open. Record the percent recovery or the length of sample recovered. Describe the soil samples recovered as to composition, color, stratification, and condition, then place one or more representative portions of the sample into sealable moisture-proof containers (jars) without ramming or distorting any apparent stratification. Seal each container to prevent evaporation of soil moisture. Affix labels to the containers bearing job designation, boring number, sample depth, and the blow count per 6-in. (0.15-m) increment. Protect the samples against extreme temperature changes. If there is a soil change within the sampler, make a jar for each stratum and note its location in the sampler barrel.

8. Report

8.1 Drilling information shall be recorded in the field and shall include the following:

8.1.1 Name and location of job,

8.1.2 Names of crew,

8.1.3 Type and make of drilling machine,

8.1.4 Weather conditions,

8.1.5 Date and time of start and finish of boring,

8.1.6 Boring number and location (station and coordinates, if available and applicable),

8.1.7 Surface elevation, if available,

8.1.8 Method of advancing and cleaning the boring,

8.1.9 Method of keeping boring open,

8.1.10 Depth of water surface and drilling depth at the time of a noted loss of drilling fluid, and time and date when reading or notation was made,

8.1.11 Location of strata changes,

8.1.12 Size of casing, depth of cased portion of boring,

8.1.13 Equipment and method of driving sampler,

8.1.14 Type sampler and length and inside diameter of barrel (note use of liners),

8.1.15 Size, type, and section length of the sampling rods, and

8.1.16 Remarks.

8.2 Data obtained for each sample shall be recorded in the field and shall include the following:

8.2.1 Sample depth and, if utilized, the sample number,

8.2.2 Description of soil,

8.2.3 Strata changes within sample,

8.2.4 Sampler penetration and recovery lengths, and

8.2.5 Number of blows per 6-in. (0.15-m) or partial increment.

9. Precision and Bias

9.1 Variations in *N*-values of 100 % or more have been observed when using different standard penetration test apparatus and drillers for adjacent borings in the same soil formation. Current opinion, based on field experience, indicates that when using the same apparatus and driller, *N*-values in the same soil can be reproduced with a coefficient of variation of about 10 %.

9.2 The use of faulty equipment, such as an extremely massive or damaged anvil, a rusty cathead, a low speed cathead, an old, oily rope, or massive or poorly lubricated rope sheaves can significantly contribute to differences in *N*-values

obtained between operator-drill rig systems.

9.3 The variability in *N*-values produced by different drill rigs and operators may be reduced by measuring that part of the hammer energy delivered into the drill rods from the sampler and adjusting *N* on the basis of comparative energies. A method for energy measurement and *N*-value adjustment is currently under development.

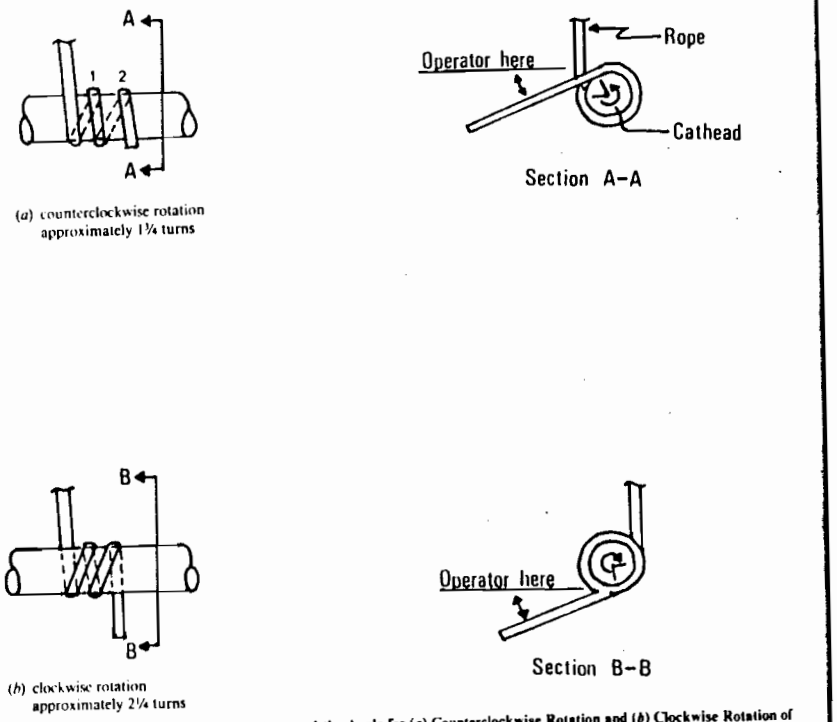
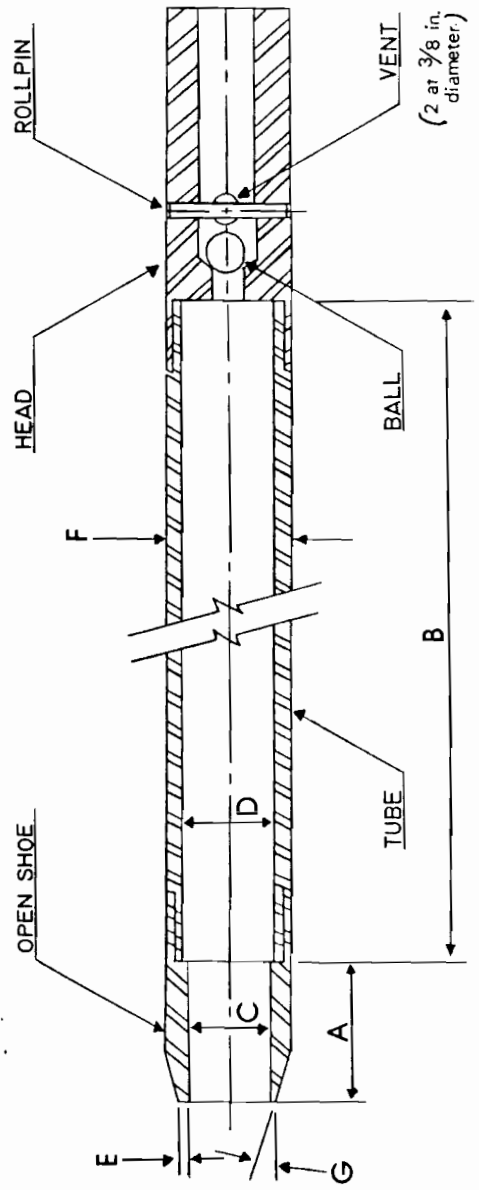


FIG. 1 Definitions of the Number of Rope Turns and the Angle for (*a*) Counterclockwise Rotation and (*b*) Clockwise Rotation of the Cathead



A = 1.0 to 2.0 in. (25 to 50 mm)
B = 18.0 to 30.0 in. (0.457 to 0.762 m)
C = 1.375 ± 0.005 in. (34.92 ± 0.13 mm)
D = 1.50 ± 0.05 − 0.00 in. (38.1 ± 1.3 − 0.0 mm)
E = 0.10 ± 0.02 in. (2.54 ± 0.25 mm)
F = 2.00 ± 0.05 − 0.00 in. (50.8 ± 1.3 − 0.0 mm)
G = 16.0° to 23.0°

The 1½ in. (38 mm) inside diameter split barrel may be used with a 16-gage wall thickness split liner. The penetrating end of the drive shoe may be slightly rounded. Metal or plastic retainers may be used to retain soil samples.

FIG. 2 Split-Barrel Sampler