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NSWC WHITE OAK
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IRP PROGRAM RI / FS PLAN OF ACTION

NAVAL SURFACE WARFARE CENTER
WHITE OAK, MARYLAND
CONTRACT NO. N62477-85-C-0060

For the
Naval Facilities Engineering Command
Washington, D.C. 20374



By
Malcolm Pirnie, Inc.
ENVIRONMENTAL ENGINEERS, SCIENTISTS AND PLANNERS

September 1990

September 21, 1990

Ms. Lydia Chang
Naval Facilities Engineering Command
Chesapeake Division, Code 0212
Washington Navy Yard, Bldg. 212
Washington, DC 20374-2121

Re: Plan of Action
Navy IRP Program, RI/FS
Naval Surface Warfare Center
White Oak, Maryland
Contract N62477-85-C-0060

Dear Ms. Chang:

We are pleased to submit a summary of the final Scope of Work (SOW) and Plan of Action (POA) for the Remedial Investigation/Feasibility Study (RI/FS) at the Naval Surface Warfare Center (NSWC), White Oak, Maryland. This SOW is predicated on:

- The findings and recommendations contained within the draft preliminary RI Study report, as performed by Malcolm Pirnie, Inc. in May 1990.
- The SOW modification prepared by Chesapeake Division, dated March 21, 1990.
- Contract modification signed on August 30, 1990.

To provide an appropriate level of cost back-up and SOW documentation, we have prepared several enclosures which are included for your review. The following is a brief description of each of the enclosures.

Enclosure No. 1 - Scope of Work Modification

The SOW as prepared by Chesapeake Division, dated July 31, 1990, includes a general description of all activities required to complete the Remedial Investigation/Feasibility Study (RI/FS).

Enclosure No. 2 - Site Specific Scope of Services

This enclosure summarizes site specific activities for the RI Phase of the RI/FS.

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Naval Facilities Engineering Command

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Enclosure No. 3 - Project Cost Summary

Engineering costs, including our labor costs, and direct expenses for our work through completion of the Feasibility Study are estimated to be \$659,248. When we include subcontractor expenses, consisting of a drilling contractor, laboratory costs analytical services, and a contractor for site surveying, the project lump sum fee is \$959,436.

Enclosure No. 4 - Direct Expense Back-up

Provides a breakdown of our direct expenses.

Enclosure No. 5 - Travel Expenses

Provides a breakdown of our travel expenses, including travel and subsistence fees for our personnel.

Enclosure No. 6 - Drilling Program Costs

Provides a cost for installing up to 15 additional monitoring wells, installing two soil borings, taking split spoon soil samples at pre-selected intervals, and physical analyses of soil samples.

Enclosure No. 7 - Laboratory/Analytical Costs

Provides a cost for laboratory/analytical services through the expected duration of the project. Samples to be analyzed for include groundwater, surface water, stream sediment, and soil samples from the seven sites being investigated. Also tissue samples (fish/benthic) will be analyzed from several of the streams on the facility. The collection of the groundwater samples will also be performed by the lab subcontractor and those costs are described within this enclosure. A detailed description of the analytical requirements is presented within a summary table in this enclosure.

Enclosure No. 8 - Site Survey Costs

Provides the costs associated with surveying the additional monitoring wells.

Enclosure No. 9 - Project Schedule

This enclosure provides a preliminary schedule of the time required to complete each of the major project tasks in the RI/FS. Also included in this enclosure is a copy of the Amendment of Solicitation/Modification of Contract, Modification No. P0004, for the RI/FS at White Oak. Page 2 of this modification states that all work and services shall be completed by

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August 27, 1991. In accordance with our schedule contained in this enclosure, we are anticipating project completion about May 1992. This schedule is consistent with your schedule as described in Section III of the Scope of Work modification, dated July 31, 1990. Please comment on the discrepancy between the contract modification schedule and the SOW schedule.

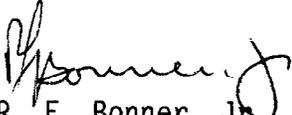
Enclosure No. 10 - Organization

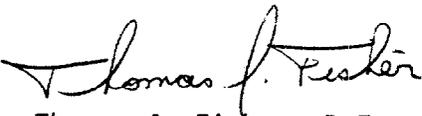
The organizational chart for the RI/FS activities is included in this enclosure.

We look forward to continuing our investigation at NSWC White Oak with your staff under the IRP program. Should there be any questions on this Plan of Action, please feel free to contact us.

Very truly yours,

MALCOLM PIRNIE, INC.


R. F. Bonner, Jr., P.E.
Vice President


Thomas J. Fisher, P.E.
Project Manager

jmt
0931-03-1040

Enclosures

21 March 1990
Revised 31 JULY 1990

Commanding Officer
Chesapeake Division
Naval Facilities Engineering Command
Washington Navy Yard, Bldg 212
Washington, DC 20374-2121

NACIP Confirmation Study
Naval Surface Warfare Center, White Oak, Maryland
Contract No. N62477-85-C-0060
P-0004

SCOPE OF WORK MODIFICATION

I. General Requirements

It is the Navy policy to convert all Navy Assessment and Control of Installation Pollutants (NACIP) terminology and scope under the Installation Restoration Program (IRP) to be EPA equivalent in order to comply with Navy policy and the Superfund Amendment Reauthorization Act (SARA) to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The NACIP program will be referred to as the IRP, and the Confirmation Study will be referred to as the Remedial Investigation and Feasibility Study (RI/FS).

In addition to work contained in the original Scope of Work dated 19 November 1984 revised 16 April 1985, in the Scope of Work Modification dated 7 November 1986 revised 20 January 1987, and the Scope of Work Modification dated 9 June 1988 revised 18 January 1989; the A&E Contractor shall accomplish RI/FS to better characterize the sites as outlined below. Findings and results from previous efforts shall be included as well as the findings and results obtained under this modification.

II. Project Description

1. REMEDIAL INVESTIGATION (RI)

The objectives of the RI are to acquire the necessary data to define the extent of confirmed environmental contamination and to continue to assess the associated potential risks to human health, welfare, and the environment. The data collected must be sufficient to support a definitive Feasibility Study (FS) and/or decision documents that address the applicable, relevant, and appropriate requirements (ARARs) for mitigating confirmed environmental contamination at each site.

Meeting this objective will require quantification of the magnitude and extent of contamination at the sites. The investigation shall include the identification of specific chemical contaminants present and their concentrations within the soil and determination of the potential for contaminant migration by assessing site-specific hydrogeologic and contaminant characteristics.

1.1 Remedial Action Work Plan:

A. Update the existing RI Sampling Plan. This plan must be prepared in accordance with EPA guidance and shall at a minimum consist of a detailed description of the approach to, and the technical rationale for, characterizing the site. It shall include identification of all required equipment, materials, and supplies; identification of all subcontractors and their general responsibilities; plans and objectives for all field activities including but not limited to borings, monitoring wells, test pits, and site preparation activities; the number, types, and location of all samples to be taken; the methods of sample collection, preparation, and analysis; the design, construction, and abandonment procedures for soil borings, monitoring wells, test pits, etc.; and a detailed schedule.

B. Update the Field and Laboratory Quality Assurance/Quality Control (QA/QC) Plan. This plan must be prepared in accordance with the Sampling and Chemical Analysis Quality Assurance Guide for the Navy Installation Restoration Program, NEESA 20.2-047B. In accordance with this guidance document, the laboratory to be used must be approved by Naval Energy and Environmental Support Activity (NEESA) through Martin Marietta Energy Systems' quality assurance coordinator before initiation of any sampling activities. It shall at a minimum include the data management and field and laboratory QA/QC procedures including sample chain-of-custody requirements, sample handling protocols, specifications for duplicate samples, field blanks, and decontamination rinseate samples, specifications for field and laboratory data management, specifications for decontamination procedures, and procedures for disposal of investigation generated wastes.

C. Update the Health and Safety Plan. This plan shall address general and site-specific requirements to ensure safe working conditions during the RI. The plan shall include the requirements for protective clothing and equipment; detailed description of safety monitoring equipment and its accuracy; procedures for controlling site access; procedures for communication with various emergency response organizations including police department, fire department, and hospitals; and decontamination procedures for personnel and equipment.

D. Develop a Community Relations Plan. This plan must be prepared in accordance with Navy guidance, the Installation Restoration Public Affairs Plan dated 26 January 1989. This plan shall include a protocol for encouraging public participation and strategies to be used for periodic news releases. This plan will be executed by NSWC personnel.

1.2 Remedial Action Field Work:

A. Groundwater Monitoring Well Installation - Install additional groundwater monitoring wells at locations as specified below:

<u>Site No.</u>	<u>No. of Wells</u>	<u>Location</u>
Site 2	1	Near the perimeter fence.
Site 3	3	Downgradient from the site.
Site 4	5	Downgradient from the site.
Site 9	1	Downgradient from the site.
Site 11	5	Downgradient from the former leaching wells.

B. Groundwater Sampling - Collect groundwater samples from the existing monitoring wells and perform lab analysis on these samples as specified below:

<u>Site No.</u>	<u>No. of Wells</u>	<u>Type of analyses</u>
Site 2	5	pH, total and dissolved metals, polychlorinated biphenols (PCBs), volatile organics (VOAs), and semivolatiles (BNAs).
Site 3	7	pH, total and dissolved metals, PCBs, and VOAs.
Site 4	17	pH, total and dissolved metals, PCBs, VOAs, and BNAs.
Site 7	3	pH, total and dissolved metals, and nitroaromatics.
Site 8	5	pH, total and dissolved metals, PCBs, VOAs, and BNAs.
Site 9	14	pH, total and dissolved metals, PCBs, VOAs, and nitroaromatics.
Site 11	21	pH, total and dissolved metals, and VOAs.
Background	2	pH, total and dissolved metals, PCBs, VOAs, BNAs, and nitroaromatics.

C. Surface Water Sampling - Collect surface water samples and perform lab analysis on these samples as specified below:

<u>Site No.</u>	<u>No. of Samples</u>	<u>Type of analyses</u>
Site 2	6	pH, VOAs, and PCBs.
Site 9	3	pH, total and dissolved metals, VOAs, and nitroaromatics.
Site 11	2	pH, total and dissolved metals, and VOAs.
Paint Branch	3	pH, total and dissolved metals, PCBs, VOAs, BNAs, and nitroaromatics.

D. Sediment Sampling - Collect sediment samples from a stream at or near the site and perform lab analysis on these samples as specified below:

<u>Site No.</u>	<u>No. of Samples</u>	<u>Type of analyses</u>
Site 2	10	total metals, VOAs, and PCBs
Site 3	4	total metals
Site 9	10	total metals, nitroaromatics, and VOAs
Site 11	3	total metals
Paint Branch	3	total metals, PCBs, VOAs, BNAs, and nitroaromatics

E. Soil Sampling - For Site 2, develop a grid system on the landfill and to the east of the landfill. Collect representative samples within this grid system for a total of 20 samples. Select 6 locations within this grid system that appear to be contaminated and collect boring samples at depths of 1 foot, 3 feet, and 5 feet intervals. All soil samples should be analyzed for total metals, VOAs, BNAs, and PCBs. For Site 3 and Site 4, collect 2 surface soil samples from each site and analyze for total metals, VOAs, and BNAs. For Site 7, collect 6 soil samples from 2 soil borings at depths of 5 feet, 10 feet, and 15 feet

F. Ecological Assessment - Identify flora and fauna in the aquatic and terrestrial environment in and around each site. Perform semi-quantitative estimates of the aquatic macroinvertebrates population and their potential effects.

G. Bio Assay - Collect fish and composite them into two samples for each of the following sites: Site 2, Site 9, Site 11, and the Paint Branch. Fish samples shall be analyzed for PCBs, Poly Aromatic Hydrocarbons (PAHs), and metals.

H. Hydrogeological Characterization - Survey and perform slug test at 38 wells and perform pump test at 3 monitoring wells to determine the groundwater depth and groundwater velocity and to fully characterized the groundwater movement.

I. Well Abandonment - Three monitoring wells located at Site 11 will be properly abandoned according to EPA guidance since these wells do not bear any groundwater for routine sampling.

1.3 Remedial Action Report:

A. Conduct a base-line risk assessment including both the human health evaluation and the environmental evaluation. This assessment should supplement the contamination investigations for determining the need for developing a feasibility study and remedial alternatives for each site. The results of the assessment shall be incorporated into the RI report.

B. Establish and use the Applicable or Relevant and Appropriate Requirements (ARARs) for each site during the contamination evaluation.

C. Interpret the data and determine the degree and extent of the contamination, if any, at all sites.

D. Make recommendations for each site and support them. Four possible recommendations to be made are (1) no further action or long term monitoring - include a decision document and/or monitoring plan, (2) collect additional data - include a work plan to do so, (3) immediate removal action - specify the danger and potential removal methods to minimize the danger, and (4) conduct a FS.

E. Prepare a Remedial Action report which shall include a summary and interpretation of all data gathered during the investigation. It shall be a stand-alone document with format as per EPA Guidance on Remedial Investigations Under CERCLA. As appropriate, the content of the report shall include executive summary, introduction, site features investigation, hazardous substances investigation, hydrogeologic investigation, surface water investigation, air investigation, biota investigation, public health and environmental concerns and recommendations.

2. FEASIBILITY STUDY (FS)

The objective of this effort is to select and describe a remedial action appropriate for mitigating confirmed environmental contamination at each site. Meeting this objective will require the preparation of a Feasibility Study (FS) Report, which will provide necessary data, direction, and documented supportive rationale to acquire regulatory concurrence at federal, state, and local levels with the recommended remedial alternatives. Successful completion of the FS shall result in unimpaired subsequent development of engineering plans and specifications and implementation of selected remedial actions.

2.1 Screen Control Measures

All control measures, including management methods and technologies relevant to remedying site problems identified in the remedial investigation studies shall be screened on the basis of feasibility, cost, and environmental and public health impacts to reduce the number of control measures to be considered for the development and review of detailed alternatives. Control measures shall not be eliminated solely because of inability to meet standards. When used in conjunction with other control measures, standards may be attainable. Innovative, unique, or unproved technologies that have relevant application to site problems shall be brought to the Government's attention during the monthly progress report in a brief synopsis format.

2.2 Develop Detailed Alternatives

Detailed alternatives shall be developed from the control measures that passed the screening process. The alternatives shall be described with sufficient detail to apply the evaluation and selection criteria discussed below. The "no action" alternative also shall be developed.

The description of each detailed alternative shall include at a minimum: identification of technologies incorporated; key design assumptions that will affect performance; implementability; environmental impact; cost; measures needed to ensure worker safety during implementation; and identification of management methods incorporated, such as land use controls, personnel training and supervision, permanent relocations, and coordination with federal, state, and local agencies.

The cost information for each detailed alternative shall include estimates of capital costs, operating and maintenance costs, present worth analysis, and sensitivity analysis.

2.3 Evaluate Detailed Alternatives

An evaluation of each detailed alternative shall be performed using the following criteria: engineering feasibility, cost analysis, public health analysis, environmental assessment, and regulatory requirements.

A narrative matrix shall be prepared to present the major conclusion of the evaluation for each detailed alternative, including an evaluation of the effectiveness of each method. The engineering feasibility criteria shall focus on performance, reliability, and implementability.

During cost analysis, four types of costs shall be examined: capital costs, operating and maintenance costs, best estimates of present worth, and range of present worth calculated from the sensitivity analysis. These costs shall provide the basis for comparing the costs of the detailed alternatives and shall be summarized in a table for each site. All major uncertainties in costs shall be discussed, and recommendations shall be made for dealing with them.

The public health analysis shall focus on three areas: degree of immediate and long-term public health protection, levels at which remedial alternatives reduce adverse long-term effects on residual contamination, and worker health and safety.

As a baseline, the environmental assessment shall include determination of the value or uses of the land, water, air, and biotic resources that are or threaten to become contaminated; identification and, to the extent practicable, quantification of impacts that exist or are likely to develop; and assessment of the significance of those impacts. For each detailed alternative, the environmental assessment shall address impacts on water quality, air quality, flora and fauna, socioeconomics, land use, and cultural resources to the extent that such impacts distinguish among alternatives or otherwise significantly impact the selection of the best alternative. Reasonable means of mitigating adverse impacts shall also be identified. Any significant adverse environmental impacts associated with implementation of the alternatives under consideration shall be identified and addressed. These impacts shall be included in the detailed evaluation of each alternative or combination of alternatives.

Detailed alternatives shall be reviewed for their level of compliance with standards, regulations, guidance, advisories, and ordinances. The safety and practicality of each alternative shall be reviewed and described when requirements are not definitive or achievable. The time needed to obtain permits or achieve compliance with standards shall be reviewed and stated for each alternative.

2.4 Describe Selected Alternatives

Selected alternatives shall be described with the following information:

- conceptual design drawings of the overall site showing general locations for project actions and facilities;
- an engineering description, including conceptual design criteria and rationale, of the recommended remedial alternative for the site;
- an operational description of process units or other facilities;
- types of equipment required, including approximate capacity, size, and materials of construction;
- unique structural concepts for facilities;
- a list of additional engineering data required to proceed with design;
- an estimated volume of materials to be excavated;
- a preliminary project schedule for completion of the detailed design effort and implementation in the field;
- a cost analysis, including implementation cost estimates, operating and maintenance cost estimates, and duration of operating expenses;
- a regulatory compliance analysis, including construction and environmental permit requirements, a description of technical requirements for environmental mitigation measures, right-of-way requirements, and operation permit requirements.

The descriptions shall be comprehensive and of sufficient detail for use as a baseline document for the design and construction of the selected remedial alternatives.

2.5 Feasibility Study Report

The FS report shall at least include an introduction and findings from the above efforts in sections 2.1 (Screen control measures), 2.2 (Develop detailed alternatives), 2.3 (Evaluate detailed alternatives), and 2.4 (Describe selected alternatives). It shall be a stand-alone document with format as per EPA Guidance on Feasibility Study Under CERCLA. If appropriate, the content of the report shall include introduction, environmental setting, field program, discussion of results and significance of findings, alternative measures, and recommendations. For each site either a Record of Decision or a Decision Document shall be prepared, as appropriate.

3. NEWS RELEASE/PUBLIC MEETING

The contractor shall provide technical expertise on the subject study to the Government in preparation of a News Release/Public Meeting. Prepare backup and presentation materials necessary for the release/hearing. Give a dry run of the News Release/Public Meeting presentation to Navy personnel. Finally, attend the actual News Release/Public Hearing and give a presentation on the results of the subject study to the public and be prepared to respond to questions raised by the audience.

III. Submissions

A. Submit draft Work Plan and Health and Safety Plan as outlined in this Scope of Work for the recommended sampling and investigation. Incorporate Government comments in the final plans. Obtain approval from EIC for both plans before any sampling or field investigation starts.

B. Submit for approval a Quality Assurance/Quality Control (QA/QC) Plan. Incorporate Government comments in the final plan. Obtain certification for the analytical laboratory through NEESA per the NACIP QA/QC Program outlined in this Scope of Work before any sampling or field investigation starts.

C. Submit a draft Community Relations Plan, which includes a protocol for encouraging public participation and strategies to be used for periodic news releases by the NSWC personnel. Incorporate Government comments in the final plan.

D. Submit a draft Remedial Investigation report. Findings/results of sampling and investigation efforts from previous work shall be included as well as the findings and results obtained under this modification. The Remedial Investigation report shall include all items described in Section 1.3.

E. Submit a final Remedial Investigation report, which incorporates all Governments comments where appropriate.

F. Submit a draft Feasibility Study report, which includes the following sections: Screen Control Measures, Develop Detailed Alternatives, Evaluate Detailed Alternatives, and Describe Selected Alternatives as described in Sections 2.1, 2.2, 2.3, 2.4, and 2.5.

G. Submit a final Feasibility Study report, which incorporates all Government comments where appropriate.

H. Submit a monthly progress report, which includes work accomplished, problems encountered, and work planned for the upcoming month. The monthly report shall also summarize all work completed in the past month.

IV. Meetings and Presentations

A. Attend 8 meetings with and/or give presentations to the Technical Review Committee.

B. Meet with Navy personnel after the submittal of the draft RI report to present the findings and discuss the report content.

C. Meet with Navy personnel after the submittal of the draft FS report to present the findings and discuss the report content.

D. Conduct 2 formal presentations on the findings and recommendations of the RI/FS with the submission of the final reports.

E. Perform a dry run of the News Release/Public Meeting presentation to Navy personnel. Attend the actual News Release/Public Hearing and give a presentation on the results of the subject study to the public and be prepared to respond to questions raised by the audience.

III. Schedule

A. The Sampling Plan, QA/QC Plan, and the Health and Safety Plan shall be submitted within 12 weeks of the award of this modification.

B. The Community Relations Plan shall be submitted within 36 weeks of the award of this modification.

C. The laboratory certification shall be accomplished within 2 weeks after the submittal of the QA/QC Plan.

D. Field work shall be initiated within 8 weeks after all plans are approved and the laboratory is certified.

E. The RI draft report shall be submitted within 26 weeks after the initiation of field work.

F. The RI final report shall be submitted within 4 weeks after the receipt of the Navy's comments on the draft RI report.

G. The FS draft report shall be submitted within 20 weeks after the final RI report is submitted.

H. The FS final report shall be submitted within 4 weeks after the receipt of the Navy's comments on the draft FS report.

IV. Other Requirements

All routine submittal requirements and all applicable administrative instructions contained in the original Scope of Work shall remain in force for the work described in this modification. The EIC for this contract is Ms. Lydia WC Chang. She can be reached on (202) 433-3760.

The Government reserves the right to negotiate for Phase III - Design of the Remedial Action within 52 weeks from the completion of the RI/FS effort.

ENCLOSURE NO. 2
SITE SPECIFIC SCOPE OF SERVICES

The following sections describe the technical approach for each of the seven sites.

Site 2 - Apple Orchard Landfill

One additional monitoring well (2GW76) will be installed to the north of the landfill near the perimeter fence. The purpose of this well is to detect groundwater contamination that may be moving off-site to the residential area to the north of the facility.

See Figure 1 for the locations of all monitoring wells, soil, surface water and stream sediment sampling points.

A total of five groundwater monitoring wells (four existing wells and one newly installed well) will be sampled during this phase of the RI.

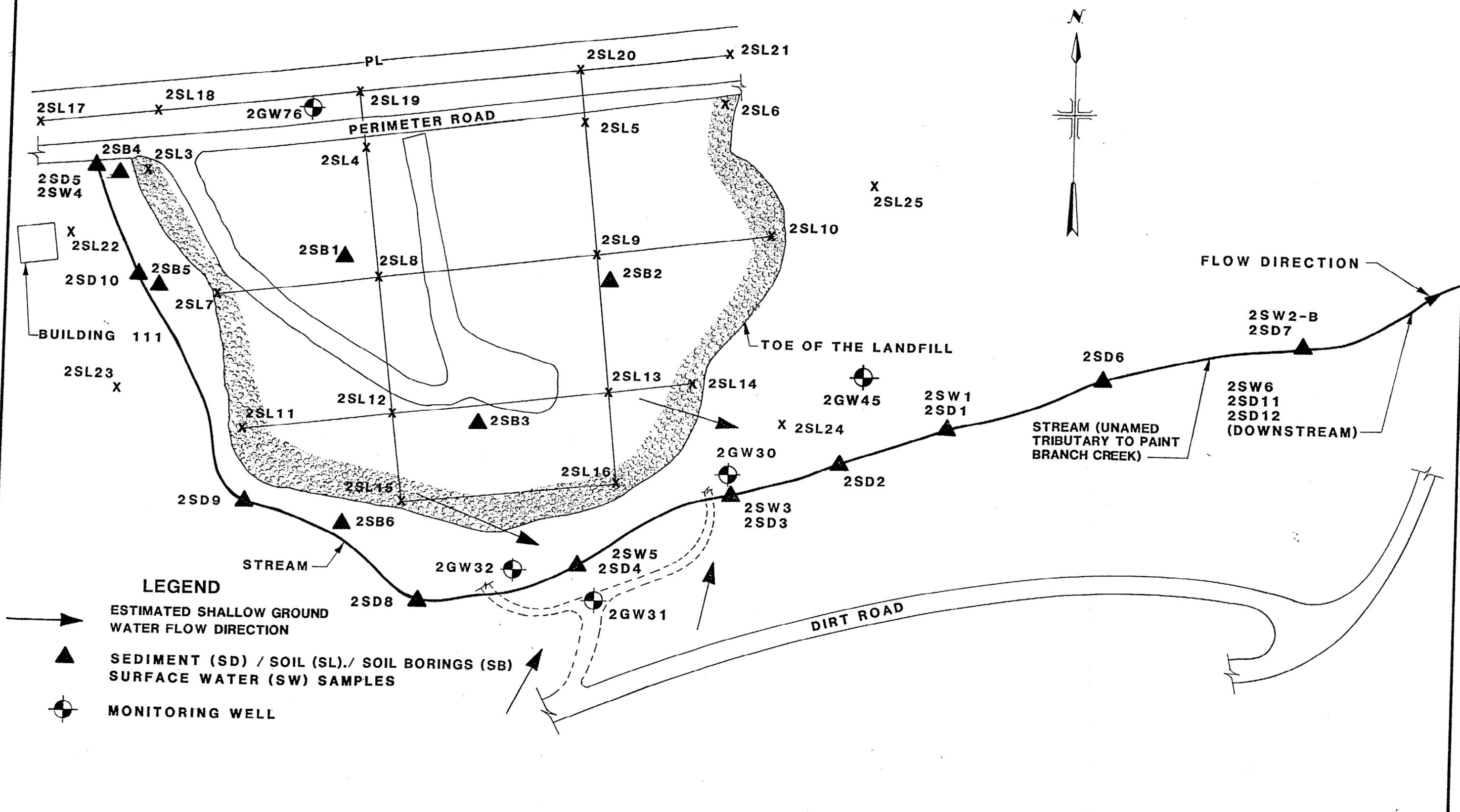
All surface water (six locations) and stream sediment (ten locations) points that were sampled during the first RI Phase will be resampled during this RI Phase of work.

A sampling grid containing 20 points (2SL3 through 2SL22) has been established at Site 2 and surficial soil samples will be collected at these points. Also, at three additional locations (2SB1 through 2SB3) within this grid system, boring samples will be collected at depths of one foot and three feet. Three additional surficial soil samples (2SL23 through 2SL25) will be collected outside of the grid system to determine if contamination exists on the surface outside of the landfill surface. Also, at three additional soil boring locations (2SB4 through 2SB6), soil samples will be collected at depths of 1 foot, 3 feet and 5 feet to further delineate contamination in the subsurface.

Slug tests will be performed at two wells at this site for the estimation of hydraulic conductivity.

The collection of three fish samples, if available and three benthic samples will be conducted at Site 2.

Groundwater samples will be analyzed for total and dissolved metals, total and dissolved mercury, PCBs, semivolatiles and VOAs. Surface water will be analyzed for PCBs and VOAs. All stream sediments will be analyzed



LEGEND

- ESTIMATED SHALLOW GROUND WATER FLOW DIRECTION
- ▲ SEDIMENT (SD) / SOIL (SL) / SOIL BORINGS (SB) SURFACE WATER (SW) SAMPLES
- ⊗ MONITORING WELL

NOT TO SCALE

**MALCOLM
PIRNIE**

WHITE OAK, MARYLAND
 NSWC REMEDIAL INVESTIGATION / FEASIBILITY STUDY
 SITE 2 - GROUND WATER, SOIL AND SEDIMENT SAMPLING LOCATIONS

MALCOLM PIRNIE, INC.

SEPT. 1990

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for total metals, PCBs and VOAs. Surficial and subsurface soil samples collected from the site will be analyzed for total metals, semivolatiles, PCBs and VOAs. Fish and benthic samples will be analyzed for metals, PCBs, PAHs, AS-hydride and SE-hydride.

Site 3 - Pistol Range Landfill

Three additional groundwater monitoring wells will be installed to characterize the downgradient and vertical extent of groundwater contamination at Site 3. One shallow well (3GW77) will be installed on the landfill side of the stream downgradient of well 3GW47. The other two wells (3GW78D and 3GW78S) will be installed as a cluster on the west side of the stream just south of Dahlgren Road to characterize the downgradient and vertical extent of contamination. The shallow clustered well will be screened in the sand and gravel unit overlying the bedrock while the deep well will be screened in the bedrock.

See Figure 2 for the locations of all monitoring wells, soil and stream sediment sampling locations.

All seven monitoring wells (four existing and three newly installed wells) will be sampled during this phase of work.

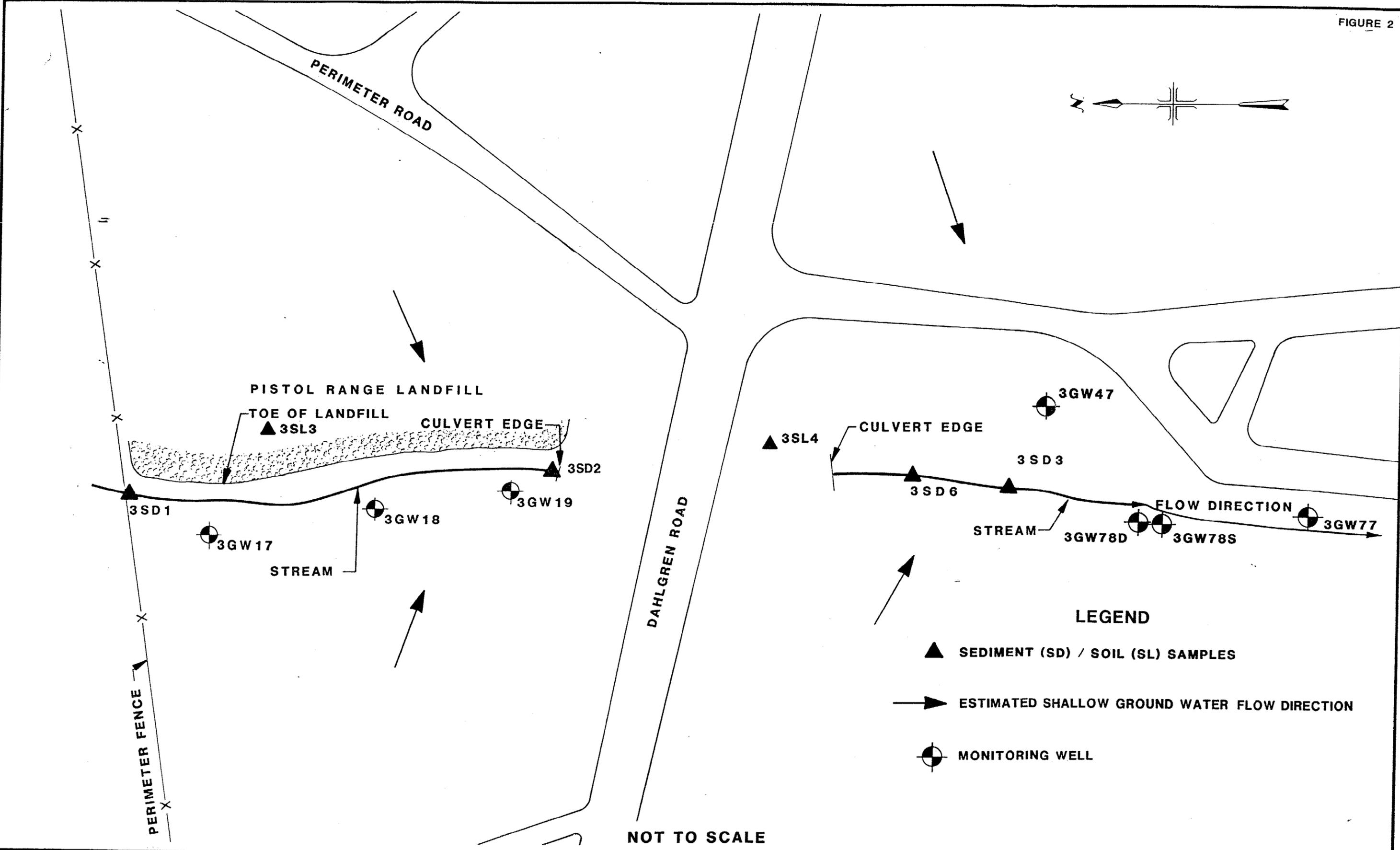
All four sediment locations sampled during the first RI Phase will be resampled during this phase of work.

Two surface soil samples designated as 3SL3 and 3SL4 will be collected at the site to further document surficial contamination at Pistol Range Landfill.

Slug tests will be performed at two wells at this site for the estimation of hydraulic conductivity.

The collection of two fish samples, if available and two benthic samples will be conducted at Site 3.

The seven groundwater samples will be analyzed for total and dissolved metals and mercury, PCBs and VOAs. The four stream sediment samples will be analyzed for total mercury and metals. Both surficial soil samples will be analyzed for total metals, semivolatiles and VOAs. The fish and benthic samples will be analyzed for metals, PCBs, PAHs, AS-hydride and SE-hydride.



Site 4 - Chemical Burial Site

Five additional groundwater monitoring wells will be installed at Site 4 to further characterize the horizontal and vertical extent of contamination. One well (4GW79) will be installed to the south of well 4GW15 and east of 4GW50 to estimate the horizontal extent of volatile organic contamination to the southeast of Site 4. Two wells (4GW80S and 4GW80D) to be installed as a cluster will be constructed downgradient (south) of well 4GW51S to aid in the evaluation of the horizontal and vertical extent of contamination. Two other wells (4GW81 and 4GW82) will also be installed downgradient (south) of the site to estimate the extent of the volatile organic contamination plume.

See Figure 3 for the locations of all monitoring wells and surface soil sample points.

All seventeen monitoring wells (12 existing and 5 newly constructed) will be sampled during this phase of work.

Two surficial soil samples (4SL1 and 4SL2) will be collected at Site 4 to document contamination in the surface soils.

Slug tests will be performed at seven wells at Site 4 for the estimation of hydraulic conductivity. Also two pump tests will be performed at two wells at Site 4 to collect data for use in estimating hydraulic conductivity, transmissivity and the coefficient of storage.

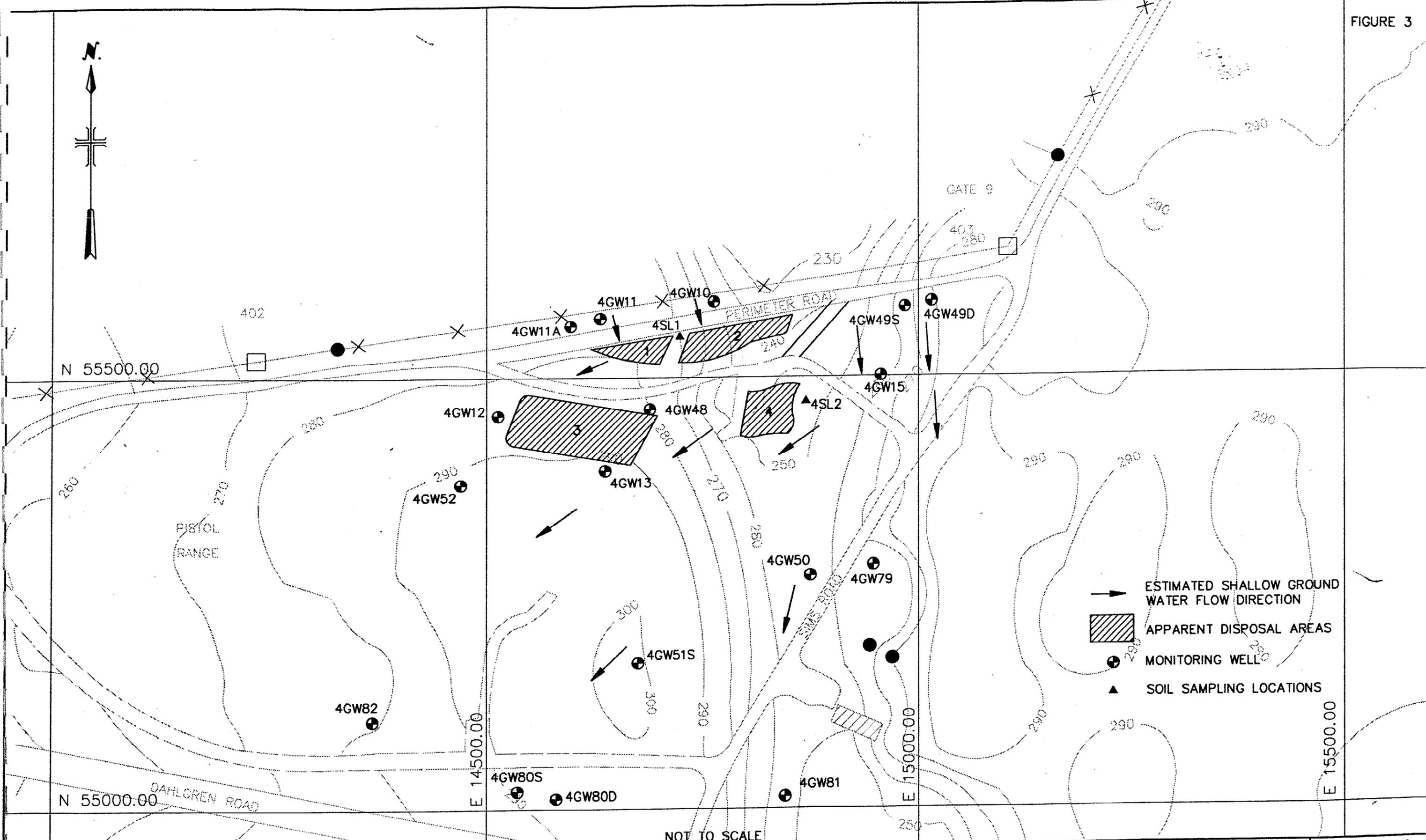
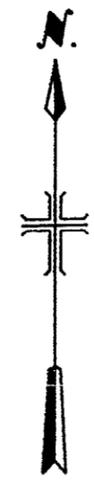
The 17 groundwater samples will be analyzed for total and dissolved metals and mercury, semivolatiles, PCBs and VOAs. Surficial soil samples will be analyzed for total metals, semivolatiles and VOAs.

Site 7 - Ordnance Burn Area

All three existing monitoring wells will be resampled during this phase of work. See Figure 4 for the location of all monitoring wells and other sampling points at Site 7.

Two soil borings (7SB28 and 7SB29) will be drilled within the swale with soil samples collected from depths of 5 feet, 10 feet and 15 feet to estimate the vertical extent of nitroaromatic contamination in the shallow soil.

Slug tests will be performed at two wells at Site 7 for the estimation of hydraulic conductivity.



- ➔ ESTIMATED SHALLOW GROUND WATER FLOW DIRECTION
- ▨ APPARENT DISPOSAL AREAS
- ⊕ MONITORING WELL
- ▲ SOIL SAMPLING LOCATIONS

NOT TO SCALE

**MALCOLM
PIRNIE**

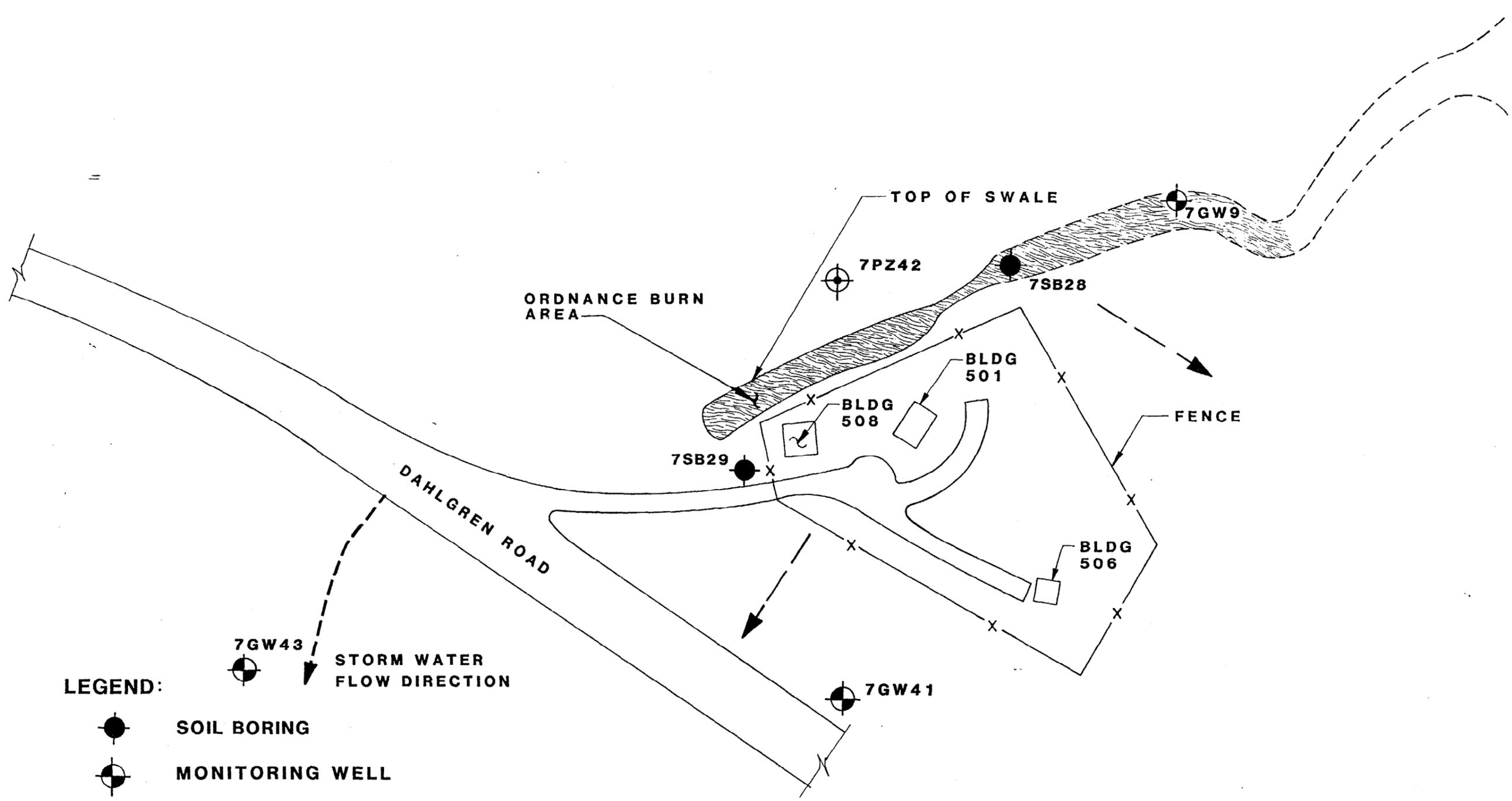
WHITE OAK, MARYLAND
 NSWC REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SITE 4 - GROUND WATER AND SOIL SAMPLING LOCATIONS

MALCOLM PIRNIE, INC.

SEPTEMBER 1990

00146DB32

DATE: 09/25/90 11:12 AM SCALE: 1:12000 09/25, 1990 at 12:18



LEGEND:

-  **SOIL BORING**
-  **MONITORING WELL**
-  **POTENTIAL SHALLOW GROUND WATER FLOW DIRECTION**
-  **PIEZOMETER**

NOT TO SCALE

**MALCOLM
PIRNIE**

WHITE OAK, MARYLAND
NSWC REMEDIAL INVESTIGATION / FEASIBILITY STUDY
SITE 7 - GROUND WATER & SOIL BORING SAMPLING LOCATIONS

MALCOLM PIRNIE, INC.

SEPT. 1990

Groundwater samples will be analyzed for total and dissolved metals, total and dissolved mercury and nitroaromatics. Soil boring samples will be analyzed for nitroaromatics.

Site 8 - Abandoned Chemical Disposal Pit

All five existing monitoring wells will be resampled during this phase of the RI. See Figure 5 for the location of all monitoring wells to be resampled during this phase of work.

Slug tests will be performed at two wells for the estimation of hydraulic conductivity.

The groundwater samples will be analyzed for total and dissolved metals and mercury, semivolatiles and VOAs.

Site 9 - Industrial Wastewater Disposal Area 300

One additional monitoring well (9GW83) will be installed downgradient of the site to further characterize the horizontal extent of groundwater contamination.

See Figure 6 for the locations of all monitoring wells and other sampling points such as surface water and stream sediment.

All 14 monitoring wells (13 existing and 1 newly installed) will be sampled at Site 9 during this phase of work.

All surface water (three locations) and stream sediment (ten locations) locations that were sampled during the first RI Phase will be resampled during this phase of work.

Slug tests will be performed at ten wells for the estimation of hydraulic conductivity.

The collection of three fish and three benthic samples will be conducted at Site 9.

The groundwater samples will be analyzed for total and dissolved metals and mercury, nitroaromatics, PCBs and VOAs. Surface water samples will be analyzed for total and dissolved metals, nitroaromatics and VOAs. Stream sediment samples will be analyzed for total metals, nitroaromatics and VOAs. The fish and benthic samples will be analyzed for metals, PCBs, PAHs, AS-hydride and SE-hydride.

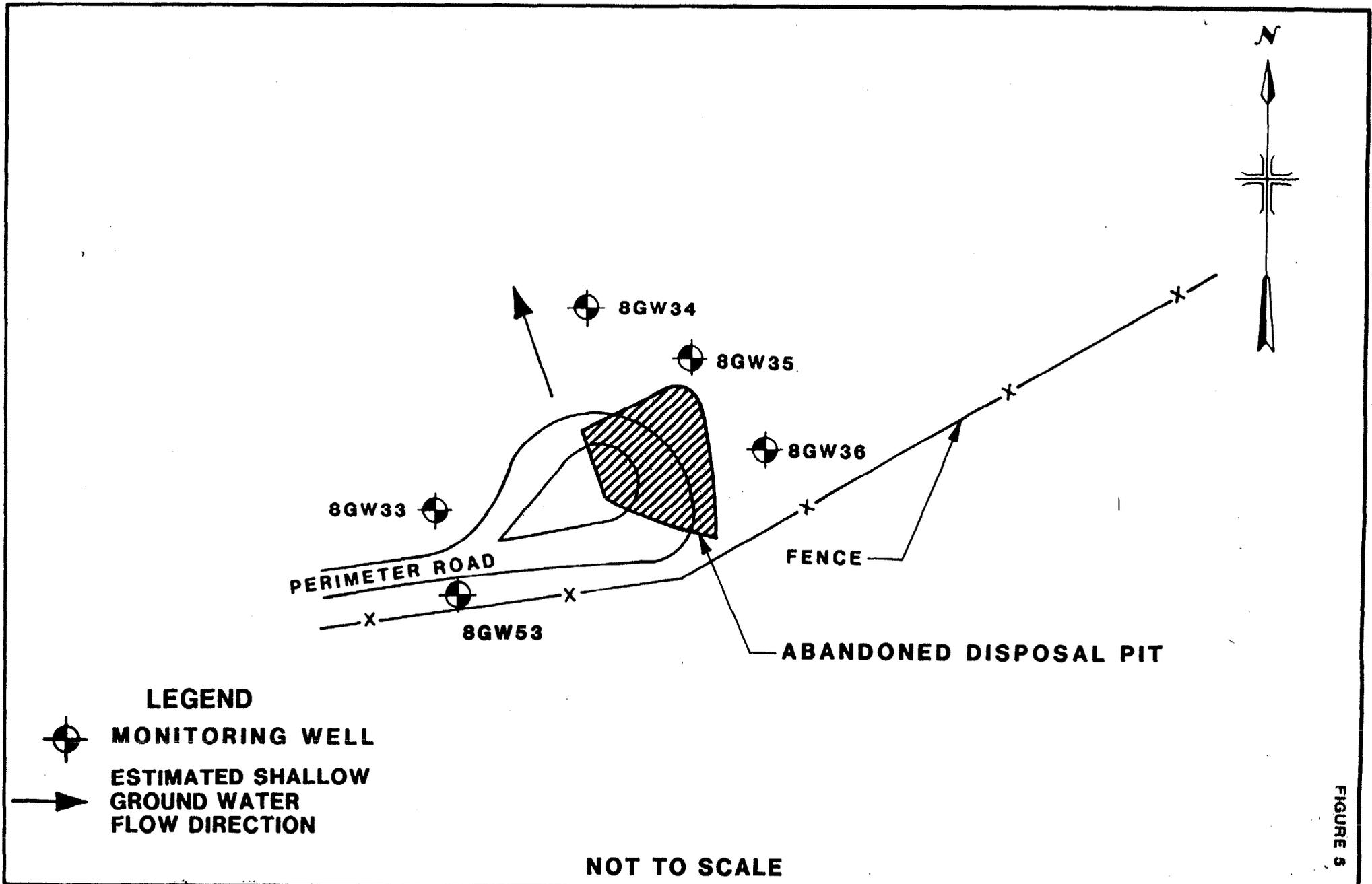
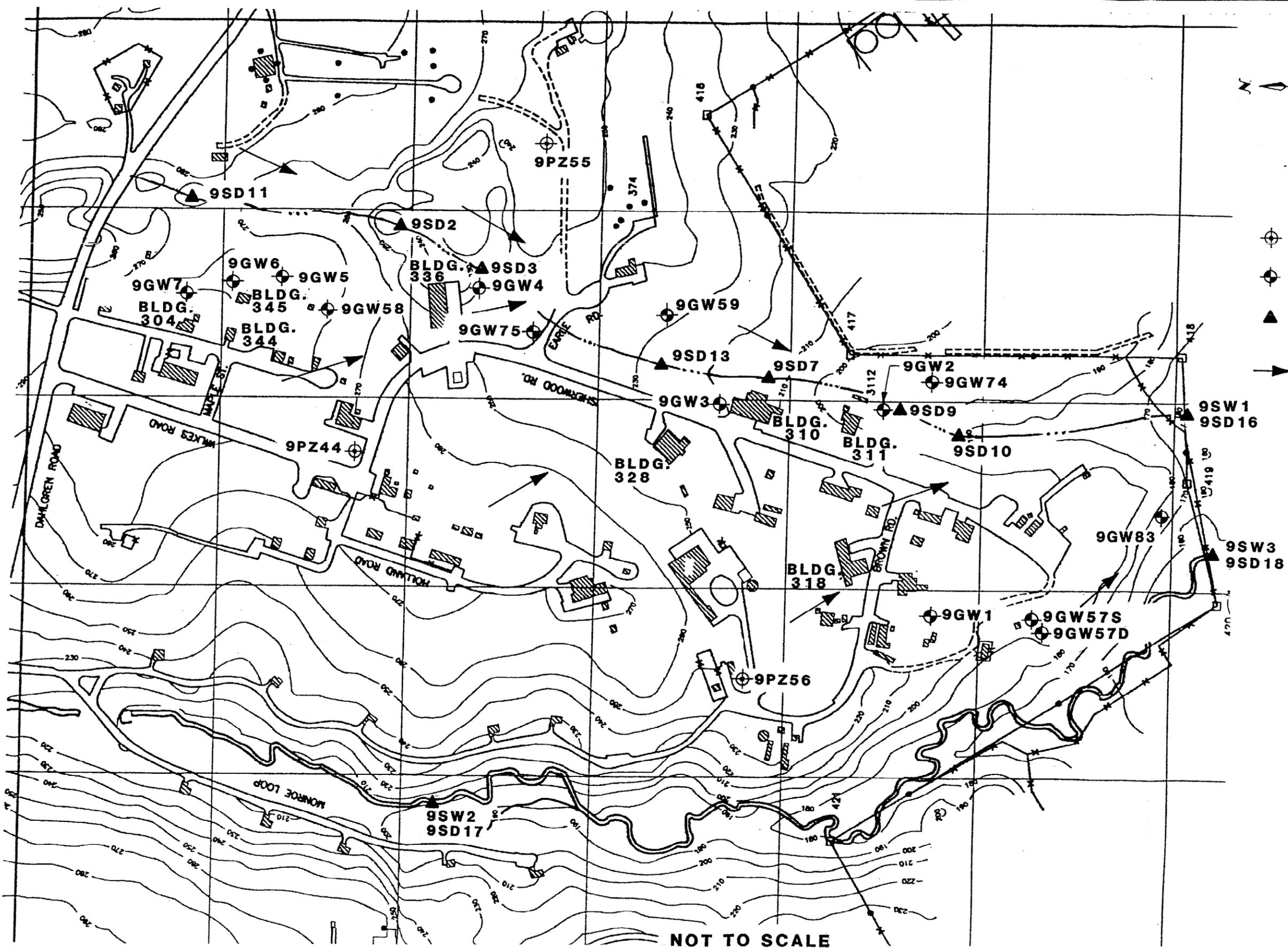


FIGURE 5



- LEGEND**
- ⊕ PIEZOMETER
 - ⊙ MONITORING WELL
 - ▲ SEDIMENT (SD) / SURFACE WATER (SW)
 - ➔ ESTIMATED SHALLOW GROUNDWATER FLOW DIRECTION

NOT TO SCALE

**MALCOLM
PIRNIE**

**WHITE OAK, MARYLAND
NSWC REMEDIAL INVESTIGATION / FEASIBILITY STUDY
SITE 9 - GROUND WATER, SURFACE WATER AND SEDIMENT LOCATIONS**

MALCOLM PIRNIE, INC.

SEPT. 1990

00146D04Z

Site 11 - Industrial Wastewater Disposal Area 100

Five additional monitoring wells (11GW84 through 11GW88) will be installed to better characterize the extent of downgradient contamination from three former leaching wells.

See Figure 7 for the locations of all monitoring wells, surface water and stream sediment sampling points.

All 21 groundwater monitoring wells (16 existing and 5 newly installed) will be sampled during this phase of the RI.

All surface water (two locations) and stream sediment (three locations) locations that were sampled during the first RI Phase will be resampled during this phase of work.

Slug tests will be performed at 13 wells at Site 11 for the estimation of hydraulic conductivity. Also, pump tests will be performed at one well at this site for the estimation of hydraulic conductivity, transmissivity and coefficient of storage.

The collection of three fish and three benthic samples will be performed at Site 11.

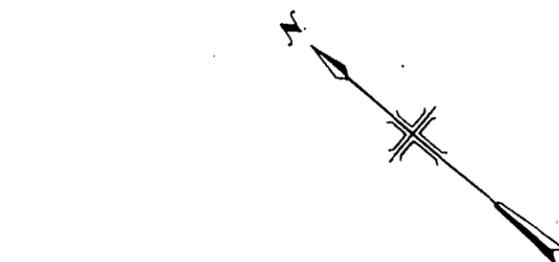
The groundwater samples will be analyzed for total and dissolved metals, total and dissolved mercury and VOAs. The surface water samples will be analyzed for total and dissolved metals and VOAs. The sediment samples will be analyzed for total metals. The fish and benthic samples will be analyzed for metals, PCBs, PAHs, AS-hydride and SE-hydride.

Paint Branch Creek

All three surface water and stream sediment locations that were sampled during the first RI Phase will be resampled during this phase of work. See Figure 8 for the locations of the three sampling points.

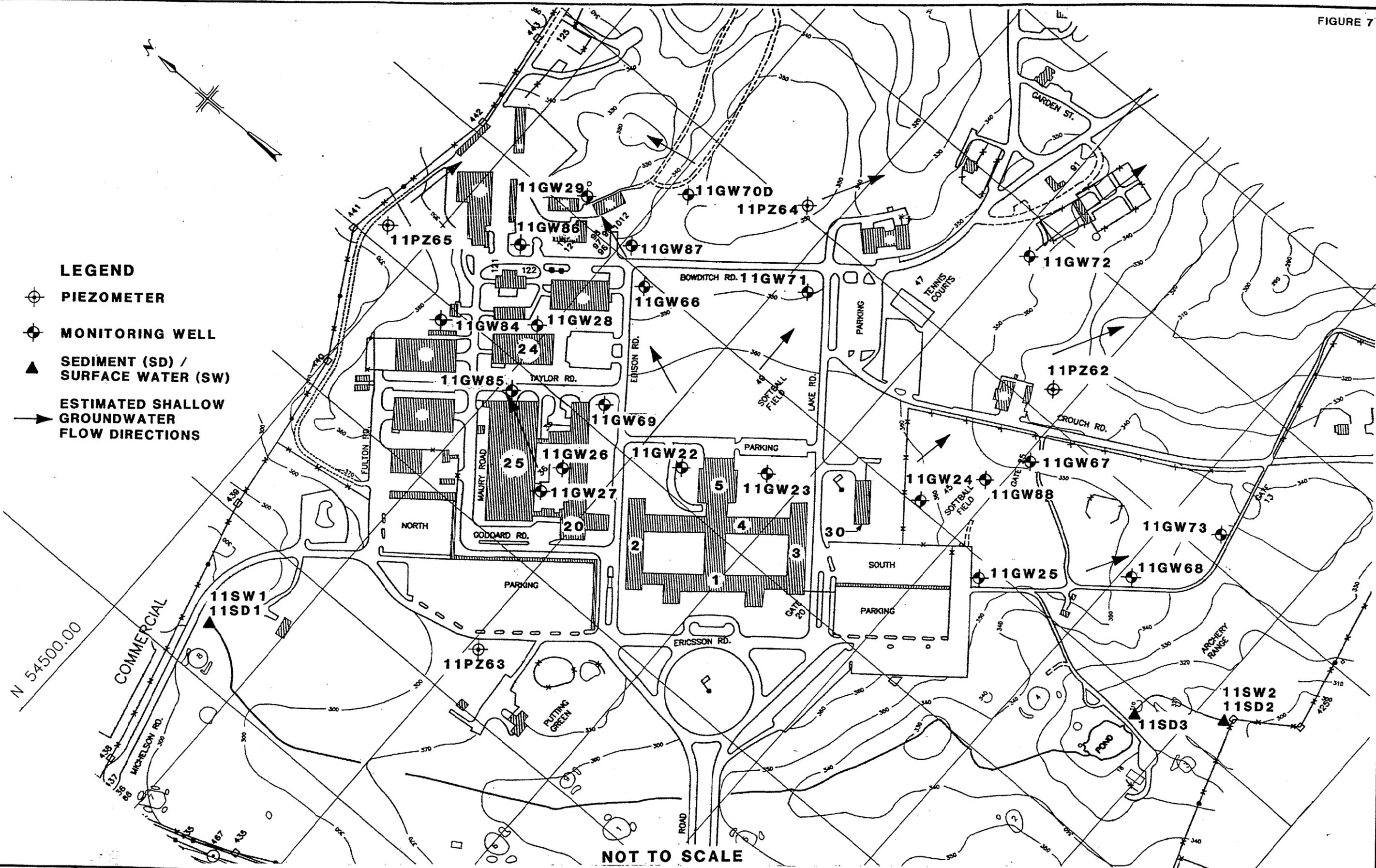
The collection of three fish and three benthic samples will be conducted in Paint Branch Creek.

The surface water samples will be analyzed for total and dissolved metals and mercury, PCBs, semivolatiles, nitroaromatics and VOAs. Stream sediment samples will be analyzed for total metals, total mercury, nitroaromatics, PCBs, semivolatiles and VOAs. The fish and benthic samples will be analyzed for metals, PCBs, PAHs, AS-hydride and SE-hydride.



LEGEND

-  **PIEZOMETER**
-  **MONITORING WELL**
-  **SEDIMENT (SD) / SURFACE WATER (SW)**
-  **ESTIMATED SHALLOW GROUNDWATER FLOW DIRECTIONS**



NOT TO SCALE

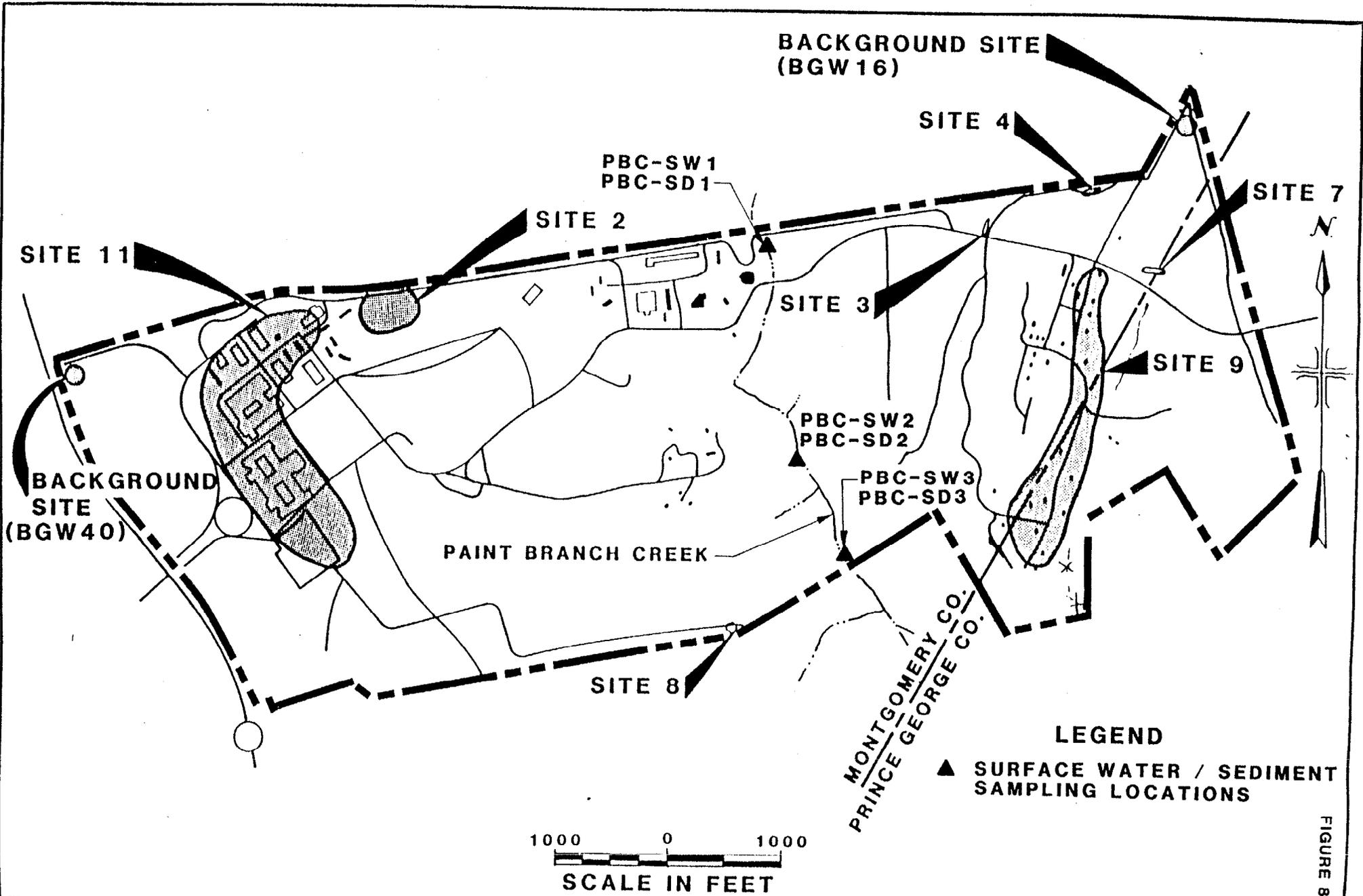


FIGURE 8

**MALCOLM
PIRNIE**

**WHITE OAK, MARYLAND
NSWC REMEDIAL INVESTIGATION / FEASIBILITY STUDY
PAINT BRANCH CREEK / BACKGROUND
WELLS SAMPLING LOCATIONS**

MALCOLM PIRNIE, INC.

SEPT. 1990

Background Monitoring Wells

The two existing background monitoring wells designated as BGW16 and BGW40 will be resampled for this phase of work. The locations of the background wells are depicted in Figure 8.

The groundwater samples will be analyzed for total and dissolved metals and mercury, semivolatiles, PCBs, nitroaromatics and VOAs. The list of analyses selected represent the total list of compounds that have been detected in significant concentrations during the Verification Phase and first RI Phase or detected in a quantity or location that could not be explained due to lack of sufficient data. Field measurements for pH and specific conductivity will be performed for all ground and surface water samples.

III. LABORATORY PROGRAM COSTS (Enclosure No. 7)

Laboratory Base Cost	\$ 198,000
Subcontract Administration Costs (10% Admin)	<u>19,800</u>
	\$ 217,800

IV. SITE SURVEY COSTS (Enclosure No. 8)

Surveyor Base Cost	\$ 5,000
Subcontract Administration Costs (10% Admin)	<u>500</u>
	\$ 5,500

SUMMARY

I. ENGINEERING	\$ 659,248
II. DRILLING PROGRAM	76,888
III. LABORATORY PROGRAM	217,800
IV. SURVEYING PROGRAM	<u>5,500</u>
Total Lump Sum Fee	\$959,436

ENCLOSURE NO. 4
STANDARD EXPENSE SUMMARY

Expense Classification <u>Description</u>	<u>Activity/Task</u>	<u>Account Totals</u>
Reproduction/Printing	Lump Sum	\$ 3,500
Travel and Subsistence	See Enclosure No. 5	21,810
Computer Services	Data Logging, Analysis, Spread Sheets and Modeling	3,818
Equipment/Supplies	Equipment Rental: Hu, OVA, Photovac, Explosimeter, Hermit, Data logger and generator for one month	4,000
	Equipment Purchases: Submersible Pump (4") Steel tripod with crank type winch	3,000
	Monitoring Accessories: Hydrogen Calibration Gas, HNu accessories, etc.	750
	Bioassay Equipment	2,000
	Safety Clothing and Materials: Gloves, Tyvek, Decon, etc.	1,000
	Supplies: PVC and endoflex tubing, rope, wiring and sampling supplies	1,000
	Trailer Rental:	<u>1,000</u>
		\$12,750
Communications/Postage	Phone, Telecommunications, Postage and Overnight Delivery	3,000
Text Editor Rental	400 hours of text editing at \$5/hour	<u>2,000</u>
	Billable Standard Expenses	\$46,878

ENCLOSURE NO. 5

TRAVEL AND SUBSISTENCE SUMMARY

<u>Description of Activity</u>	<u>Costs</u>
Air Fare (13 trips @ \$350/round trip)	\$ 4,550
Company Car Expense (30 trips @ \$120 each, computed as 500 miles per trip @ \$0.24/mile)	3,600
Subsistence (91 days @ \$105/day plus 30 day trips @ \$35/day)	10,605
Auto Rentals (47 days @ \$65/day)	<u>3,055</u>
Total Billable Travel Expense	\$21,810

ENCLOSURE NO. 6

DRILLING PROGRAM COSTS

The drilling program includes the installation of 15 monitoring wells and the drilling of two soil borings at Site 7. The estimated costs for drilling is \$69,898. A breakdown of activities and costs to be performed during the drilling is provided as follows:

<u>Description</u>	<u>Costs</u>
1. Mobilization/demobilization:	
ATV Rig	\$ 750
Truck-Mounted Rig	\$ 750
Air Rotary Rig	\$ 1,000
2. Drilling Footage:	
Drilling with 4 1/4-inch I.D. augers to obtain split spoon samples and facilitate 2-foot well installation Estimated: 620 feet at \$9/ft	\$ 5,580
Reaming hole with 8 1/4-inch I.D. augers to facilitate 4-foot well installation Estimated: 160 feet at \$18/ft	\$ 2,880
Drilling 12-inch air rotary in overburden to facilitate facilitate 8-inch steel casing installation Estimated: 40 feet at \$45/ft	\$ 1,800
Drilling 8-inch air rotary to facilitate 4-inch well installation in bedrock Estimated: 80 feet at \$42/ft	\$ 3,360
3. Split spoon samples Estimated: 310 at \$15 each	\$ 4,650
4. Well abandonment Estimated: 51 feet at \$18/ft	\$ 918
5. Shelby tubes Estimated: 2 at \$80 each	\$ 160
6. Screen/sand pack/riser/sealer installations:	
2-inch PVC screen and sand pack Estimated: 185 feet at \$25/ft	\$ 4,625

	2-inch PVC riser and sealing material Estimated: 225 feet at \$22/ft	\$ 4,950
	4-inch PVC screen and sand pack Estimated: 100 feet at \$30/ft	\$ 3,000
	4-inch Stainless steel screen and sand pack Estimated: 80 feet at \$60/ft	\$ 4,800
	4-inch PVC riser and sealing material Estimated: 100 feet at \$28/ft	\$ 2,800
	8-inch surface casing and grouting in place Estimated: 40 feet at \$65/ft	\$ 2,600
7.	Well Development Estimated: 50 hours at \$125/hr	\$ 6,250
8.	Materials:	
	Steel locking protective covers Estimated: 15 at \$200 each	\$ 3,000
	4-inch Steel bollards Estimated: 45 at \$65 each	\$ 2,925
	55 Gallon DOT-17 Drums (filled and left on site) Estimated: 20 at \$85 each	\$ 1,700
9.	Site Restoration/Concrete Pad Installation/Standby Time Estimated: 50 hours at \$150/hour	\$ 7,500
10.	Decontamination of tools/augers/equipment Estimated: 25 hours at \$150/hour	\$ 3,750
11.	Well Permits Estimated: 15 permits at \$10 each	\$ 150
	Total Drilling Program*	\$69,898

*Does not include Malcolm Pirnie's 10 Percent Administration Fee

ENCLOSURE NO. 7

LABORATORY PROGRAM COSTS

The attached table provides a summary of the analyses to be performed under this project at the NSWC. The total fee for the laboratory program is \$198,000. The laboratory summary is broken down, by water, soil and tissue analysis as well as groundwater sampling costs. Estimated costs for each are listed as follows:

Analytical Costs:

Water	-	\$ 88,000
Soil	-	64,000
Tissue	-	<u>26,500</u>

Total \$178,500

Sampling Cost:

Groundwater - \$ 19,500

Total Laboratory Program* \$198,000

* Does not include Malcolm Pirnie's 10 Percent Administration Fee

**ENCLOSURE NO. 7
(Continued)**

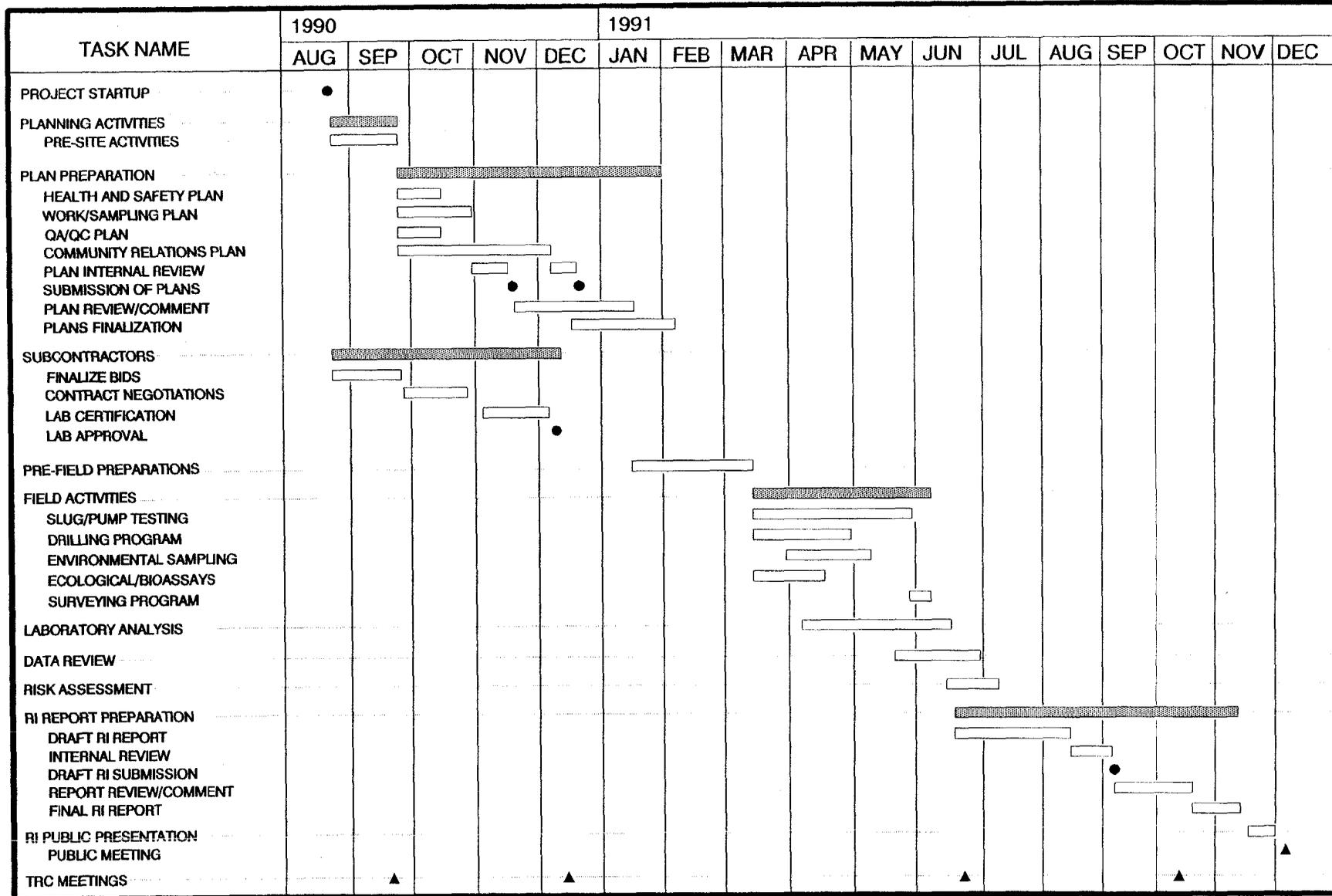
ANALYTICAL SUMMARY

Water Samples					Soil Samples					Tissue Samples			
Parameter	Ground Water	Surface Water	QA/QC (1)	Total Water	Parameter	Soil	Stream Sediment	QA/QC (1)	Total Soil	Parameter	Number		Total
											Fish	Benthic	
Total Metals (2)	74	8	23	105	Total Metals	42	30	7	79	Metals (4)	14	14	28
Filtered Metals (2)	74	8	23	105	Filtered Metals	---	---	---	---	PCBs	14	14	28
Total Mercury	74	3	17	94	Total Mercury	2	7	1	10	PAH	14	14	28
Filtered Mercury	74	3	17	94	Filtered Mercury	---	---	---	---	AS-Hydride	14	14	28
PCBs	50	9	19	78	PCBs	38	13	6	57	SE-Hydride	14	14	28
BNAs	29	3	14	46	BNAs	42	3	5	50				
VOAs	71	14	36	121	VOAs	42	23	7	72				
Nitroaromatics (3)	19	6	10	35	Nitroaromatics	6	13	3	22				
Total	465	54	159	678	Total	172	89	29	290	Total	70	70	140

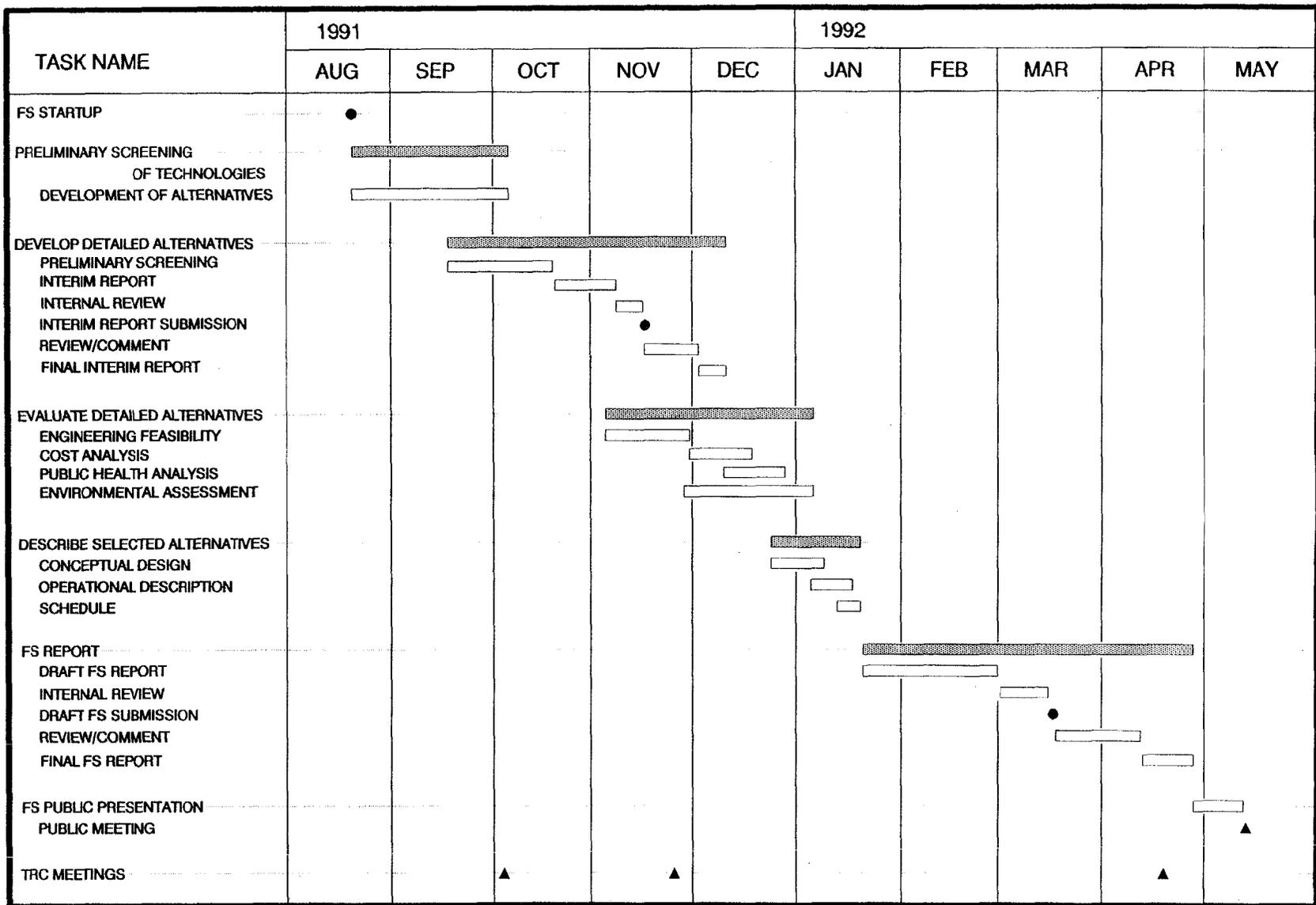
Notes:

1. QA/QC samples for water include field blanks, trip blanks, equipment rinsates, and field duplicates. QA/QC samples for soil include field duplicates only.
2. Metals to be analyzed for total and filtered include cadmium, chromium, copper, lead, and zinc.
3. Nitroaromatics include TNT, RDX, HMX, 2,4-dinitrotoluene, 2,6-dinitrotoluene, and 1,3,5-trinitrobenzene.
4. Metals to be analyzed for tissue samples include cadmium, chromium, copper, lead, mercury, nickel and zinc.
5. Measurements for pH and temperature for water samples will be performed in the field.

ENCLOSURE NO. 9 REMEDIAL INVESTIGATION SCHEDULE



ENCLOSURE NO. 9 (CONTINUED) FEASIBILITY STUDY (FS) SCHEDULE



AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT				1. CONTRACT ID CODE	PAGE OF PAGES 1 2
2. AMENDMENT/MODIFICATION NO. P00004		3. EFFECTIVE DATE 27 AUGUST 1990	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. (If applicable)	
6. ISSUED BY CHESAPEAKE DIVISION NAVAL FACILITIES ENGINEERING COMMAND BUILDING 212, WASHINGTON NAVY YARD WASHINGTON, D.C. 20374-2121		CODE N62477	7. ADMINISTERED BY (If other than Item 6)		CODE
8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code) Malcolm Pirnie, Inc. 100 Eisenhower Drive P.O. Box 36 Paramus, NJ 07652				(y)	9A. AMENDMENT OF SOLICITATION NO.
					9B. DATED (SEE ITEM 11)
				XX	10A. MODIFICATION OF CONTRACT/ORDER NO. N62477-85-C-0060
				XX	10B. DATED (SEE ITEM 13) 09 SEP 85
CODE	FACILITY CODE		11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS		

The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers is extended, is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)
AF1701804.K706 000 62477 3 062477 2D 000000 C07001850060 \$959,436.00

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(y)	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
X	CHANGES CLAUSE
	D. OTHER (Specify type of modification and authority)

E. IMPORTANT: Contractor is not, is required to sign this document and return ALL copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)
CONTRACT TITLE: NAVY ASSESSMENT AND CONTROL OF INSTALLATION POLLUTANTS (NACIP) CONFIRMATION STUDY, NAVAL SURFACE WEAPONS CENTER (NSWC), WHITE OAK, MD

As a modification to this contract, you are hereby directed to provide engineering services, as directed by the Contracting Officer and as specifically described in the attached Scope of Work dated 21 March 1990 revised 31 July 1990.

(CONTINUED ON PAGE 2)

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)	
15B. CONTRACTOR/OFFEROR		16B. UNITED STATES OF AMERICA	
15C. DATE SIGNED		16C. DATE SIGNED	
(Signature of person authorized to sign)		BY (Signature of Contracting Officer)	

As a consequence of this modification, the contract price is hereby INCREASED in the amount of NINE HUNDRED FIFTY-NINE THOUSAND FOUR HUNDRED THIRTY-SIX AND NO/100 (\$959,436.00) DOLLARS.

The contract price is hereby increased from \$880,995.00 to a new contract total of \$1,840,431.00.

All work and services required by this modification shall be completed by 27 August 1991.

DISTRIBUTION:

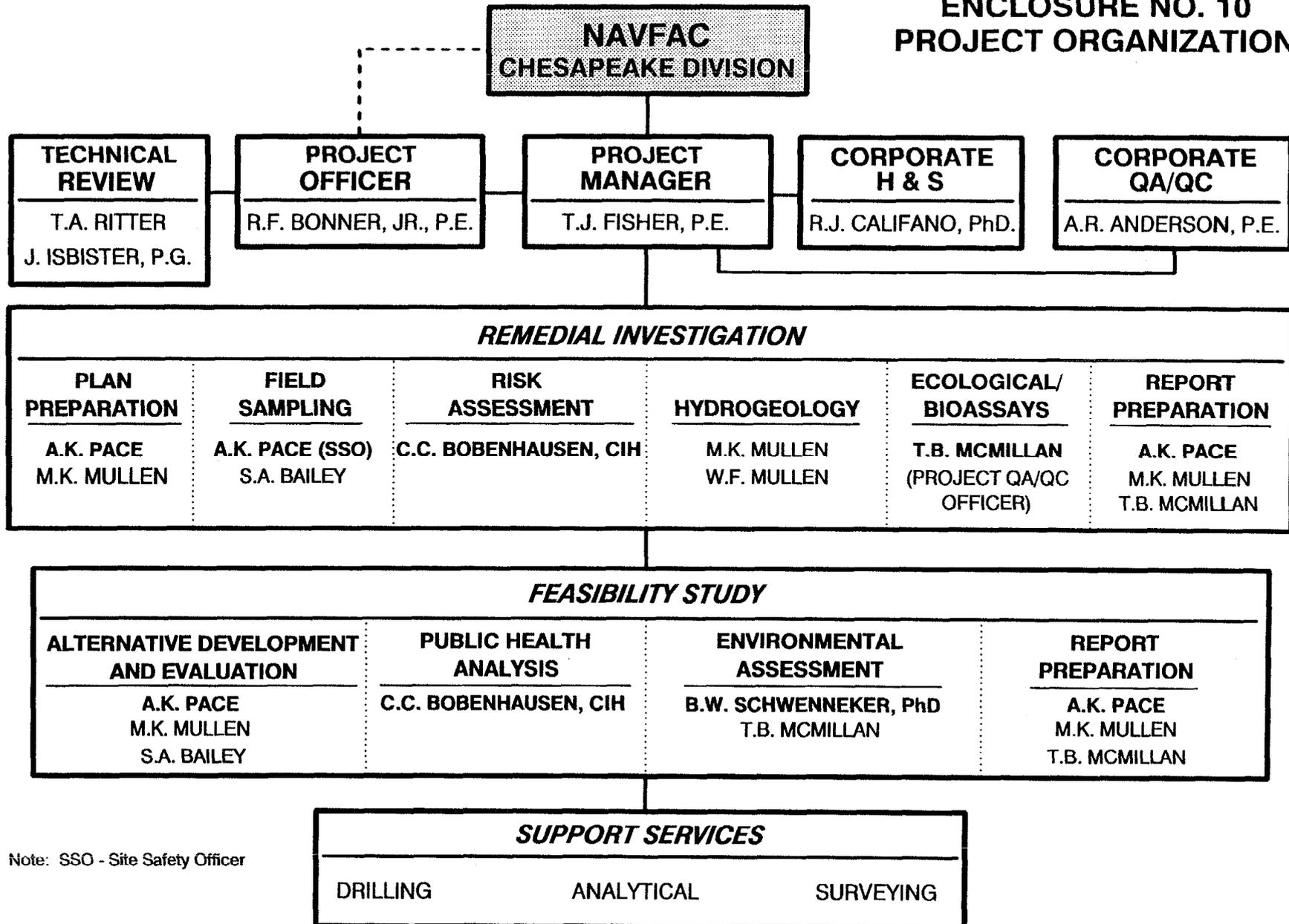
CHESNAVFACENCOM (ORIGINAL)

UIC N62583 (PAYING OFFICE)

0131 0132 114 0222GM Route

This modification cancels OA X01 dated 7-31-90 (SCPE).

ENCLOSURE NO. 10 PROJECT ORGANIZATION



Note: SSO - Site Safety Officer