Final Work Plan & Quality Assurance Project Plan Remediation Investigations and Feasibility Studies of the Helicopter Hangar Area and the Fire Training Area at Fort George G. Meade, Maryland

Submitted to:
U.S. Army Environmental Center
Aberdeen, Maryland

Prepared by:
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DAA15-93-D0010
Delivery Orders 0002 and 0003

May 5, 1995

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List of Exhibits

List of Acronyms and Abbreviations

ADD	Average Daily Dose
AEHA	Army Environmental Hygiene Agency
ARAR	Applicable or Relevant and Appropriate Requirements
ASTM	American Society for Testing and Materials
ATSDR	Agency for Toxic Substances Disease Registry
BRAC	Base Realignment and Closure Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CDI	Chronic Daily Intake
COC	Chain-of-Custody
COR	Contracting Officer's Representative
CRAVE	Carcinogen Risk Assessment Verification Endeavor
DOI	Department of the Interior
DCE	Dichloroethene
DRMO	Defense Reutilization and Marketing Office
EIS	Environmental Impact Study
ELIN	Exhibit Line Number
EMO	Environmental Management Office
EPA	United States Environmental Protection Agency
FGGM	Fort George G. Meade
FS	Feasibility Study
FTA	Fire Training Area
GC/MS	Gas Chromatography/Mass Spectrometry
GC	Gas Chromatography
gpm	Gallons Per Minute
HASP	Health and Safety Plan
HEAST	Health Effects Assessment Summary Tables
HHA	Helicopter Hanger Area
HI	Hazard Indices
IDW	Investigation Derived Waste
IR	Installation Restoration
IRDMIS	Installation Restoration Data Management Information System
IRIS	Integrated Risk Information Systems
IRM	Interim Reference Materials
MCL	Maximum Containment Level
MCLG	Maximum Containment Level Goal
MDE	Maryland Department of the Environment
MS	Mass Spectrometry
NAD27	North American Datum 1927
NCP	National Contingency Plan
NEPA	National Environmental Policy Administration
NIST	National Institute of Standards and Technology

No.	Number
NPDWR	National Primary Drinking Water Regulations
NPL	National Priorities List
ODC	Other Direct Costs
OSHA	Occupational Safety and Health Administration
PA	Preliminary Assessment
PCB	Polychlorinated Biphenyl
PCE	Perchloroethene
PID	Photoionization Detector
PP	Proposed Plan
PRI	Potomac Research, Inc.
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance/Quality Control
QAC	Quality Assurance Coordinator
QAPP	Quality Assurance Project Plan
QCP	Quality Control Plan
RCRA	Resource Conservation and Recovery Act
RfD	Reference Dose
RI/FS	Remedial Investigation/Feasibility Study
RI	Remedial Investigation
RIA	Remedial Investigation Addendum
ROD	Record of Decision
SARM	Standard Analytical Reference Material
SI	Site Inspection
SIA	Site Investigation Addendum
SLI	Site Location Identity
SQL	Sample Quantitation Limit
SVOC	Semivolatile Organic Compound
TAL	Target Analyte List
TCA	Tetrachloroethane
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TEPS	Total Environmental Program Support
TWP	Technical Work Plan
USAEC	United States Army Environmental Center
USATHAMA	United States Army Toxic and Hazardous Materials Agency
USACHPPM	United States Army Center for Health Promotion and Preventive Medicine
USC	Unique Sample Code
USEPA	United States Environmental Protection Agency
UXO	Unexploded Ordnance
VOC	Volatile Organic Compound

1.0 INTRODUCTION

This Work Plan has been prepared to address the Remedial Investigation/Feasibility Study (RI/FS) activities being conducted at the Helicopter Hangar Area (HHA) and the Fire Training Area (FTA) at Fort George G. Meade (FGGM), Maryland. It has been prepared for the U.S. Army Environmental Center (USAEC) to fulfill the requirements of deliverable ELIN A004 under Delivery Task Orders 0002 and 0003 of Contract DAAA15-93-D-0010. This Work Plan has been developed in accordance with Geotechnical Requirements for Drilling, Monitor Wells, Data Acquisition, and Reports (USATHAMA, 1987); USATHAMA Quality Assurance Plan (USATHAMA, 1990); Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (USEPA, 1988); Risk Assessment Guidance for Superfund, Volumes I and II (USEPA, 1989); Community Relations in Superfund: A Handbook (USEPA, 1988) and Superfund Public Health Evaluation Manual (USEPA, 1986).

1.1 Purpose of Investigation

The purpose of this investigation is to conduct a remedial investigation/feasibility study at the HHA and FTA sites at Fort Meade. As part of the analyses, data gaps will be identified. Previous studies have been conducted by Arthur D. Little, Inc., and by EA Engineering, Science and Technology, Inc.

The RI/FS process is designed to collect sufficient data of demonstrable quality, which can then be used to assess potential risks to human health and the environment, develop/evaluate remedial alternatives, and select a preferred remedial action. In general, data obtained during the RI phase is used to evaluate the nature, extent, and migration of contaminants at sites that are known or believed to have been adversely impacted by past hazardous waste or hazardous materials handling practices. The FS phase evaluates potential remedial actions with regard to effectiveness, risk reduction or mitigation, implementability, and cost.

1.2 Scope of Work

The scope of work is based upon Task Orders 0002 and 0003, and subsequent discussions between USAEC staff and Analysas Corporation. This scope includes the following subtasks:

- Site reconnaissance
- Project planning
- Field investigation
- Sampling and laboratory analysis
- Quality assurance
- Sample tracking and data management
- Risk assessment
- Feasibility study
- Community relations support
- Reporting

This Work Plan describes how the various tasks will be accomplished and provides the schedule for their completion.

1.3 Supporting Documents

In support of this Work Plan, Analysas Corporation has provided USAEC with a Quality Assurance Project Plan (QAPP) and a Health and Safety Plan (HASP). This Work Plan provides an overview of the field investigation activities, analytical program, data evaluation and report deliverables.

The QAPP describes the policies, organization, sampling and analysis activities, and the quality assurance and quality control protocols necessary to achieve project objectives. The HASP includes procedures for ensuring a safe and healthful workplace, conduct of safe operations, and procedures for addressing accidents or emergencies.

1.4 Work Plan Organization

This Work Plan is organized into the following sections:

Section 1.0, Introduction:

Presents overall purpose and scope, supporting documents, and Work Plan organization.

Section 2.0, Site Background:

Presents a general description of the site, including site history, previous investigations, generalized geological information, and detailed site background.

Section 3.0, Initial Evaluation:

Describes the findings of previous studies and characterizes the nature and extent of contamination found at the site.

Section 4.0, Technical Scope:

Provides the rationale, objectives and technical scope for each subtask in the Task Order. In addition, the scope, purpose, location and frequencies of field activities and sampling activities are provided.

Section 5.0, Task Activities:

Describes the subtasks to be completed for the RI/FS.

Section 6.0, Chemical Analysis Program:

Tabulates the sampling and analysis program for the field investigation.

Section 7.0, Quality Assurance:

Discusses quality assurance, data management, and data evaluation.

Section 8.0, Risk Assessment, Feasibility Study, and Community Relations:

Discusses methods for identification of Applicable or Relevant and Appropriate Requirement (ARARs), conducting the risk assessment, and conducting the feasibility study.

Section 9.0, Project Management:

Summarizes project organization and management.

Section 10.0, Schedule:

Presents the proposed schedule for conducting the RI/FS and the assumptions used to develop the schedule.

2.0 SITE BACKGROUND

2.1 Site Location and General Description

Fort George G. Meade (FGGM) is located in Anne Arundel County, Maryland, between Washington, D.C. and Baltimore, Maryland (Exhibit 2-1) and includes approximately 13,000 acres. The closest town is Laurel, Maryland, which is located less than five miles to the west.

The base has been a permanent U.S. Army installation since 1917. The installation contains administration, recreational, and housing areas, as well as Tipton Army Airfield. Former usage also included training areas and firing/combat ranges. The FGGM community consists of a residential population and daytime work force of approximately 20,000.

2.2 Site History and Previous Investigations

In 1988, under the U.S. Army Base Realignment and Closure Act, approximately 9,000 acres of the 13,000 acre facility was designated for closure. In October 1991, approximately 7,600 acres were transferred from FGGM to the Patuxent Wildlife Research Center, now known as Patuxent Environmental Science Center (PESC). A second land transfer of approximately 500 acres to PESC took place in January 1993. The Active Sanitary Landfill, 308 acres in size, is being retained for use by FGGM.

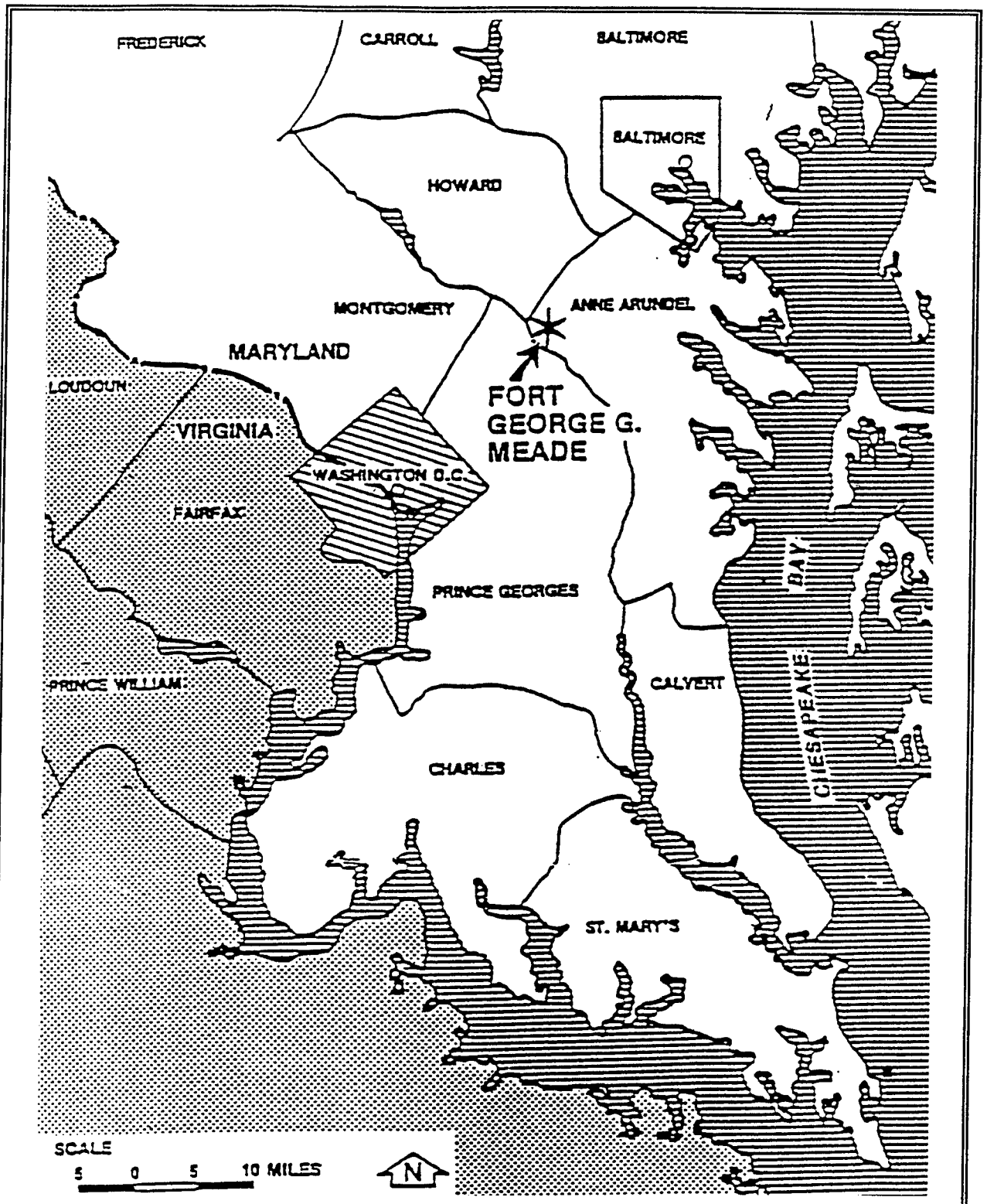
The remaining property consists of Tipton Army Airfield and its surroundings, which is approximately 440 acres. The Tipton Parcel, located south of the FGGM cantonment area, is scheduled for closure in September 1995. A site map of FGGM is shown in Exhibit 2-2.

Numerous environmental investigations have been conducted at Fort Meade, following the Base Realignment Closure Act. Extensive documentation of previous studies is found in the Final Work Plan, Feasibility Study and Remedial Investigation/ Site Inspection Addendum for Fort George G. Meade, Maryland, (Arthur D. Little, Inc., November 1993), which is incorporated here by reference.

2.3 Site and Regional Geology

Fort Meade is located in the Coastal Plain physiographic province, which is characterized by rolling uplands dissected by low-gradient streams that generally flow south toward broad, flat river valleys. The installation is located in the Patuxent River watershed, one of the primary drainage systems in Anne Arundel county. Surface water drainage in the vicinity of the FTA and HHA is directed toward the Little Patuxent River, which serves as a primary tributary of the Patuxent River.

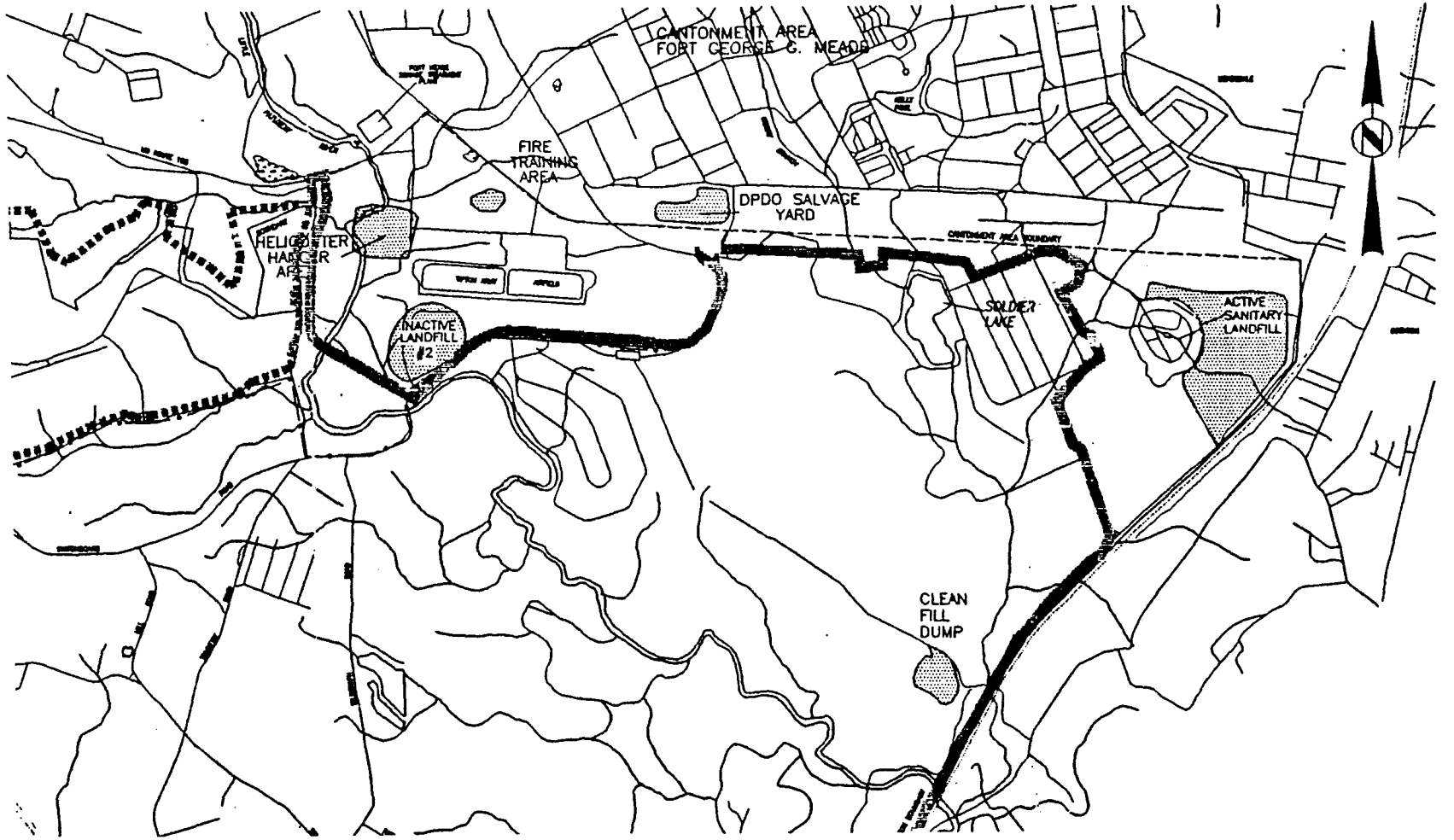
Quaternary-age deposits of alluvium overlie a wedge-shaped mass of unconsolidated fluvial and lacustrine sediments in this region. These Coastal Plain sediments, in turn, overlie much older consolidated rocks, most likely a crystalline basement complex (Exhibit 2-3). The Potomac Group, of Lower Cretaceous age, comprises the Coastal Plain sediments in the vicinity of the study areas; its component formations from oldest to youngest are the Patuxent, Arundel and Patapsco Formations.



ANALYSAS CORPORATION SCALE: As shown

December, 1994 Prepared for USAEC Source: EA Engineering

EXHIBIT 2-1: FORT MEADE LOCATION MAP, MARYLAND



ANALYSAS CORPORATION SCALE: 1"=3500'

December, 1994 Prepared for USAEC Source: A.D. Little, Inc

EXHIBIT 2-2: SITE LOCATION MAP, FORT MEADE, MARYLAND

SYSTEM	SERIES	GROUP	FORMATION	AVERAGE THICKNESS	HYDRO-GEOLOGY	LITHOLOGY
	UPPER CRETACEOUS		Magothy Formation	100	Aquifer	Sand, light gray to white, with interbedded thin layers of organic black clay.
CRETACEOUS	LOWER CRETACEOUS	Potomac	Patapsco Formation Upper Part	250	Confining Bed	Clay, tough, variegated color.
					Aquifer	Sand, fine to medium, brown color.
			Patapsco Formation Lower Part	250	Confining Bed	Clay, tough, variegated color.
					Aquifer	Sand, fine to medium, brown color.
			Arundel Clay	250 (?)	Confining Bed	Clay, red, brown, and gray, contains some ironstone nodules and plant remains.
			Patuxent Formation	250 (?)	Aquifer ? Confining Bed Aquifer ?	Sand, gray and yellow, with interbedded clay; kaolinized feldspar and lignite common. Locally clay layers predominate.
LOWER PALEOZOIC (?) TO PRECAMBRIAN (?)			Basement Complex	Unknown	Confining Bed	Probably gneiss, granite, gabbro, metagabbro, quartz diorite and granitized schist.

From Maryland Geological Survey Report of Investigations No. 46, "Evaluation of the Water-Supply Potential of Aquifers in the Potomac Group of Anne Arundel County, Maryland", 1986

Exhibit 2-3: Stratigraphic Column for Fort George G. Meade, Maryland

The Potomac Group is composed of three separate and distinct aquifers in the vicinity of FGGM, known as the upper and lower Patapsco and the Patuxent aquifers. The middle confining layer of the Patapsco Formation and the Arundel Formation separate the aquifers. All three aquifers are confined regionally. Both the upper and lower Patapsco outcrop at Fort Meade and are water table aquifers.

The clay layer in the Patapsco forms an unnamed confining bed separating the upper and lower Patapsco aquifers. The lower sandy layer of the Patapsco forms the lower Patapsco aquifer. The aquifer acts both as a water table aquifer and as a confined aquifer, depending on whether or not the upper Patapsco aquifer is present.

The Arundel Formation, or middle confining layer, acts as a confining bed between the lower Patapsco and the Patuxent aquifers. The Arundel has a low vertical permeability.

The Patuxent Formation forms the lower confined aquifer. The Patuxent aquifer has been identified as a confined aquifer. Based on regional geology, it is likely that the Patuxent aquifer exists under water table conditions west of the base, but is unlikely to do so at Fort Meade. Regional ground water flow in the Patuxent is toward the southeast, consistent with the regional dip.

Land elevation in the vicinity of the HHA is approximately 100 feet above mean sea level. Wells previously installed at the HHA identified fill material, with sand and some gravel. Based upon existing monitoring well logs, the underlying shallow aquifer appears to be the Lower Patapsco aquifer. Ground water at the site is shallow, usually found within four to eight feet of the ground surface. Ground water records obtained from the Fort Meade Environmental Management Office indicate that shallow ground water is flowing generally northwest, toward the river.

The HHA is bounded by the Little Patuxent River. The river supports a viable population of the glassy darter, an endangered fish, in the vicinity of the HHA. Exhibit 2-4 shows the location of the glassy darter habitat.

Land elevation in the vicinity of the Fire Training Area is approximately 120 feet above mean sea level. Wells installed by another contractor indicate that subsurface soils consist of poorly sorted, medium-grained sand, which grades downward into fine-grained sand with silt. This description is consistent with the lower Patapsco Formation. Ground water is encountered at approximately five to seven feet below ground surface.

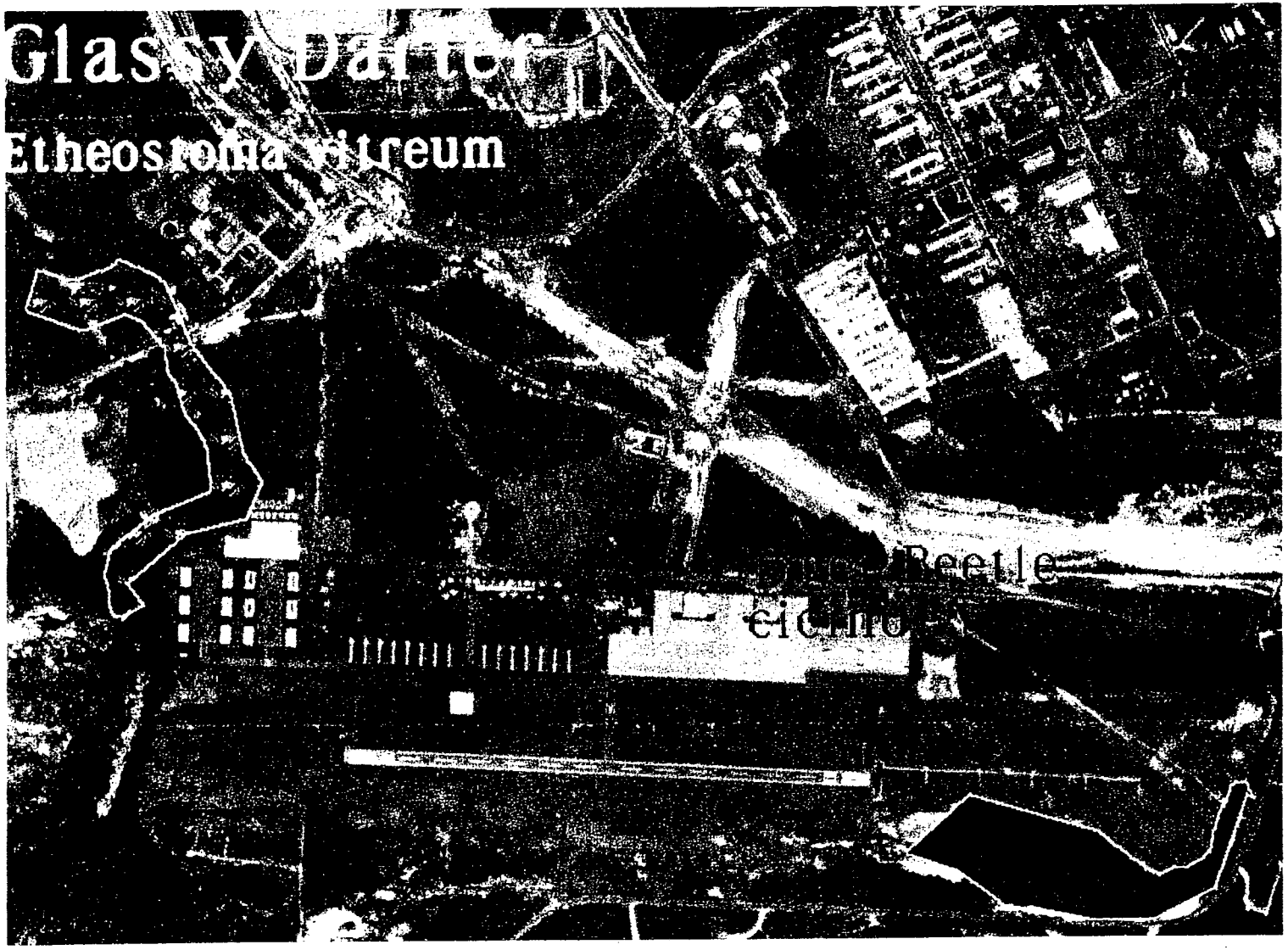


EXHIBIT 2-4: HABITAT LOCATION, GLASSY DARTER
FORT MEADE, MARYLAND

3.0 INITIAL EVALUATION

Analysas Corporation evaluated existing data from previous studies conducted at the HHA and at the FTA, comparing these analytical data to regulatory standards.

3.1 Helicopter Hangar Area Characterization

The Helicopter Hangar Area (HHA) is located at the west end of Tipton Army Airfield, as shown in Exhibit 3-1. The site consists of the Building 90 Helicopter Hangar, vehicle parking to the north of the hangar, and helicopter parking south of the hangar. Previously the site was the fire training area which was relocated to its current site. A 10,000 gallon underground fuel oil tank is located at the west end of the parking lot. Surface water discharges from the west of the area to the Little Patuxent River, located approximately 100 feet west of the hangar building. North of the parking lot is the deluge pumping station. Fuel tanks were removed from this location in January, 1990. A petroleum recovery system was installed and has been operated by the Environmental Management Office (EMO) at Fort Meade. A tributary to the Little Patuxent River is located approximately 150 feet north of the hangar building parking lot.

During Analysas Corporation's initial site visit, an outfall was observed discharging into the river. A distinct sheen was visible on the surface water, along with orange flocculent stains at the outfall. The origin of the flow could not be determined in the field. On a subsequent visit, a layer of foamy material of unknown origin was observed in the surface water below this outfall. A second outfall, reportedly discharging building or parking lot runoff, was not observed to be flowing at the time of either of the site visits. An oil-water separator associated with the hangar was also observed; its point of discharge was not obvious during the site visits.

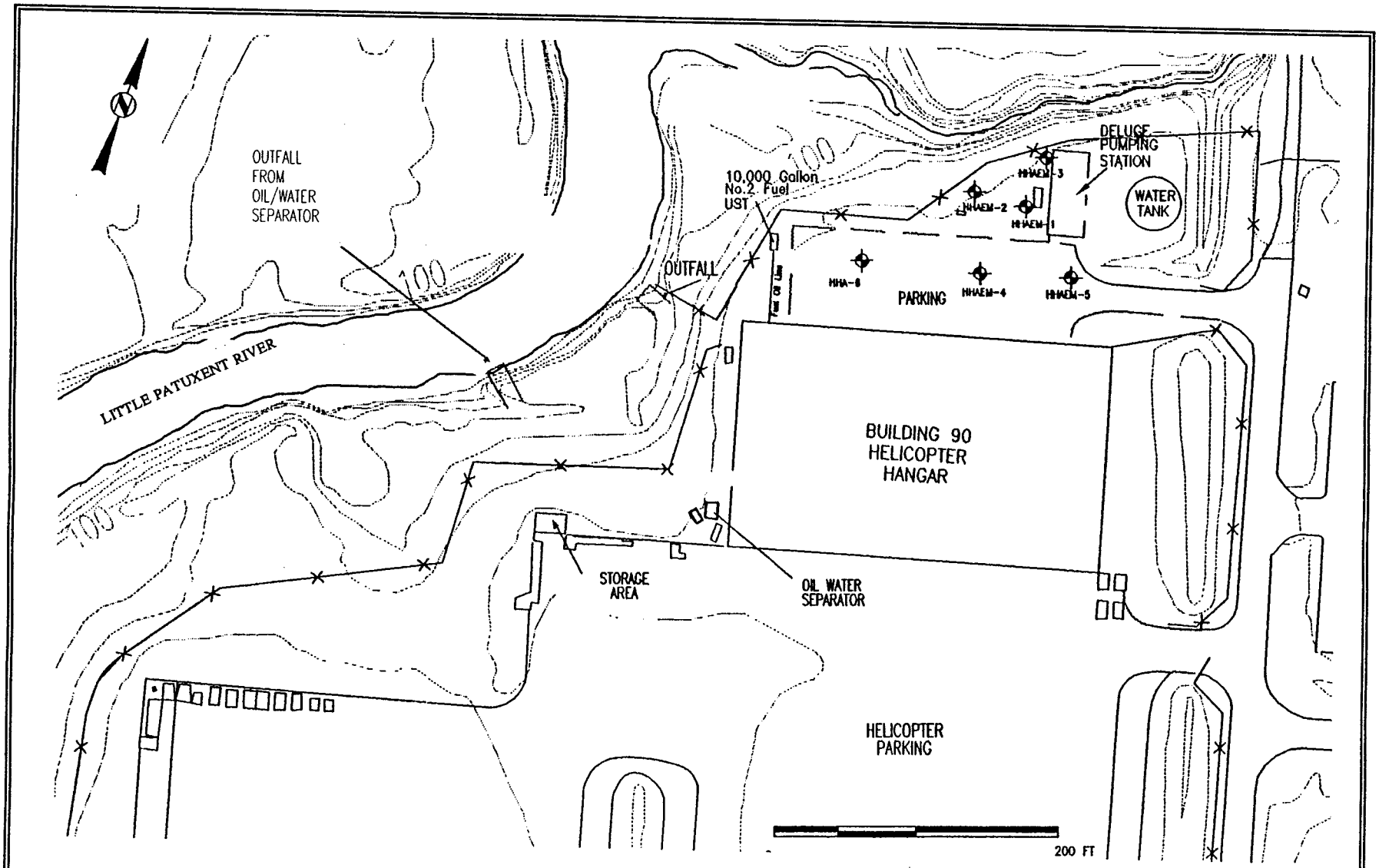
Previous investigations at this site related to releases of petroleum from underground storage tanks have resulted in the installation of a monitoring well network, as well as a ground water recovery and treatment system. Investigations conducted by Arthur D. Little, Inc., and by the Fort Meade EMO have indicated the presence of soil and ground water contamination with volatile and semi-volatile organic constituents, total petroleum hydrocarbons, and metals.

In addition to the use of fuels in this area, including JP-4 and diesel fuel, other materials that are used or stored include hydraulic and lubricating oils, detergents, and solvents (MEK, toluene, naphtha, isopropyl alcohol.)

3.2 Fire Training Area Characterization

The Fire Training Area (FTA) is located north of Tipton Army Airfield, and is shown in Exhibit 3-2. The area was constructed in 1979 for use by the Fort Meade Fire Department. Fires are set using gasoline or aviation fuel and extinguished with water or aqueous film-forming foam (AFFF). AFFF is a synthetic extinguishing agent.

The fire training pit is constructed of concrete and is about one foot high and twenty feet in diameter. During the site visit, it contained several inches of dirty water and the bottom appeared to have a thick layer of sludge . The pit itself is in poor repair. Three ground water monitoring wells had previously been installed by another contractor in the Fire Training Area. The wells are



ANALYSAS CORPORATION SCALE: As shown

December, 1994 Prepared for USAEC Source: A.D. Little, Inc.

EXHIBIT 3-1: HELICOPTER HANGAR AREA MAP
FORT MEADE, MARYLAND

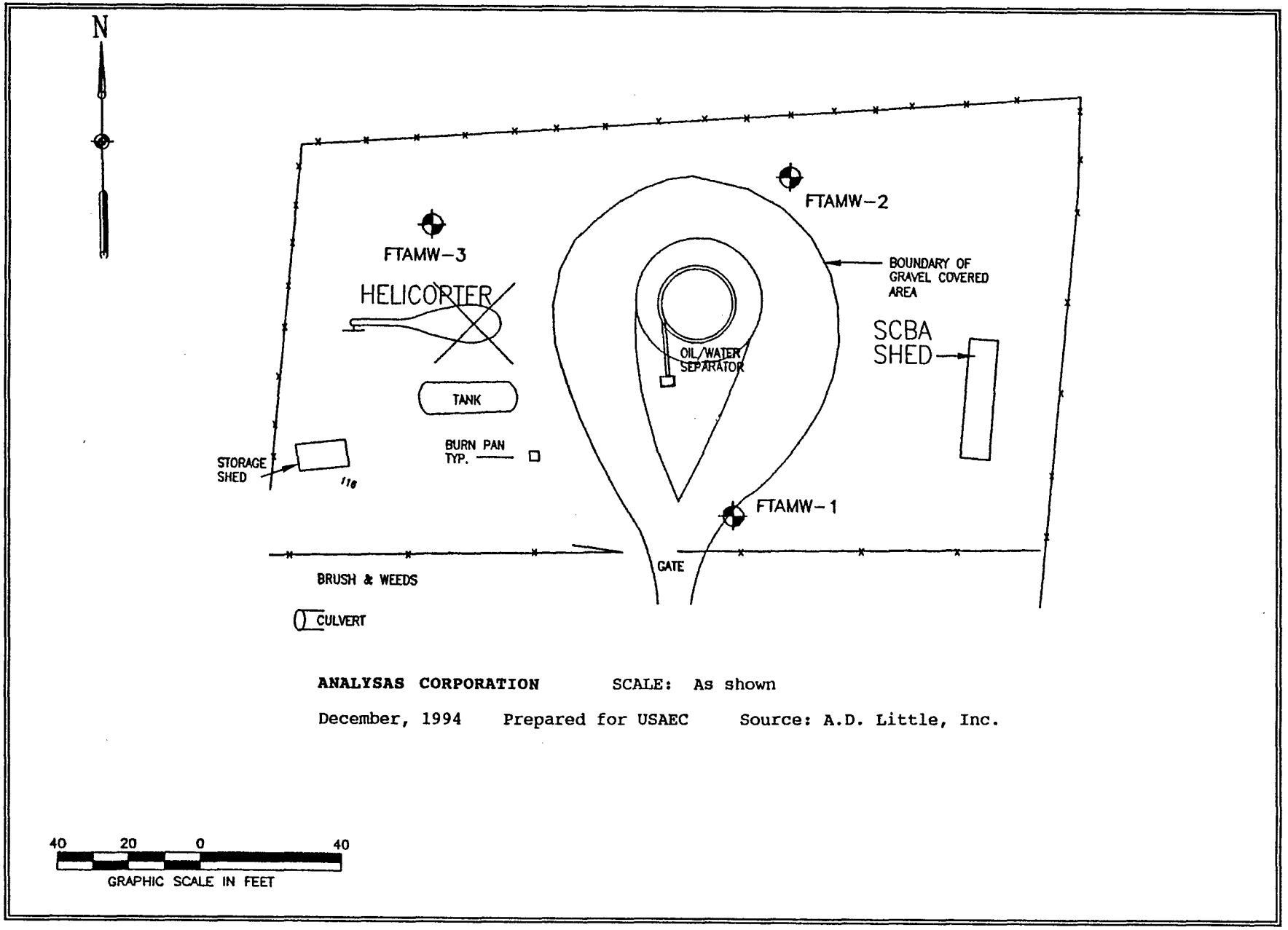


EXHIBIT 3-2: FIRE TRAINING AREA MAP
FORT MEADE, MARYLAND

A small oil-water separator was observed near the fire training pit. It contained a significant amount of oil with a strong diesel-type odor. Water from the separator reportedly leaves the site via an underground pipeline; however, this could not be determined from field observation.

A small burn pan is also located in the fire training area. The soil around the pan is discolored. Vegetative stress was noted in this area as well. A small storage building is located on the west side of the site. Other features within the area include an old dilapidated helicopter; several abandoned cars; fire extinguishers; a large fuel storage tank, which appeared to be empty; and several storage trailers. It is presumed that these items were intended for use in fire training scenarios.

The site is flat and sparsely vegetated. A drainage swale and culvert are located adjacent to the gate. It is unknown at this time where site drainage goes. Regionally, the area is drained to the north to a tributary which flows to a feeder stream of the Little Patuxent River. Historical information indicates a very shallow ground water gradient in this area, which may be subject to seasonal fluctuation. Previous studies indicate that the shallow ground water at the FTA may have been contaminated with volatile organic compounds and metals.

4.0 OBJECTIVE, RATIONALE, and TECHNICAL SCOPE

4.1 Study Objectives

This section summarizes the tasks necessary to complete the objectives of the Fort Meade HHA and FTA investigations. The components of a phased site remediation program include site inspection, remedial investigation, feasibility study, proposed plan, and record of decision. Objectives for each component are included in this section, and a complete description of each is included in Sections 5.0 through 8.0.

4.1.1 Field Investigation

The purpose of a Site Investigation (SI) is to evaluate if releases of potential contamination have occurred at suspect sites and to determine if further investigation is warranted. The objectives of this phase are to monitor the known contamination for changes or trends; to confirm or deny suspected contamination; and to address data gaps identified during earlier studies.

4.1.2 Remedial Investigation

The overall purpose of an Remedial Investigation (RI) is to further evaluate the extent and rate of migration of contamination at sites which, according to historical and site data, may present an adverse effect on human health and the environment. RIs are conducted to gather the necessary information for supporting a risk-based decision as to which remedy appears to be the most appropriate. The objective of this RI is to evaluate the extent of contamination at both the HHA and the FTA, and develop sufficient data to perform a risk assessment for each site.

4.1.3 Feasibility Study

The purpose of the Feasibility Study (FS) is to review various remedial technologies to develop remedial alternatives that are combination of appropriate technologies. Then alternatives are evaluated with regards to effectiveness, implementability, and costs to select a preferred remedial action..

The FS will address risks present at the HHA and FTA and determine potential remedies for each site. Tasks required to complete the FS include:

- Development and screening of alternatives.
- Detailed analysis of alternatives.

4.1.4 Proposed Plan and Record of Decision

The purpose of the Proposed Plan (PP) is to involve the public in the choice of remedial alternatives. To do this, the PP summarizes the FS, selects the preferred remedial alternative, and seeks input from the public.

The Record of Decision (ROD) has three components: the declaration, the decision summary, and the responsiveness summary. The purpose of a ROD is to document the remedial action plan for a site. The declaration serves three purposes:

- Legally certify that the choice of remedial action was selected in accordance with CERCLA and the National Contingency Plan (NCP).
- Outline the selected remedy.
- Provide public information regarding site history, characteristics and risks, and outline the remedy selection process and other alternatives considered.

The decision document provides the details necessary to support the declaration. Information in the decision document includes site history, contamination, analysis leading to the final remedy, and regulatory requirements.

The purpose of the responsiveness summary is to incorporate public comments into the ROD. The summary includes a discussion of public preferences and how they were included in the decision process. This component also serves to document U.S. Army's response to the public.

4.2 Sampling Objectives and Technical Scope

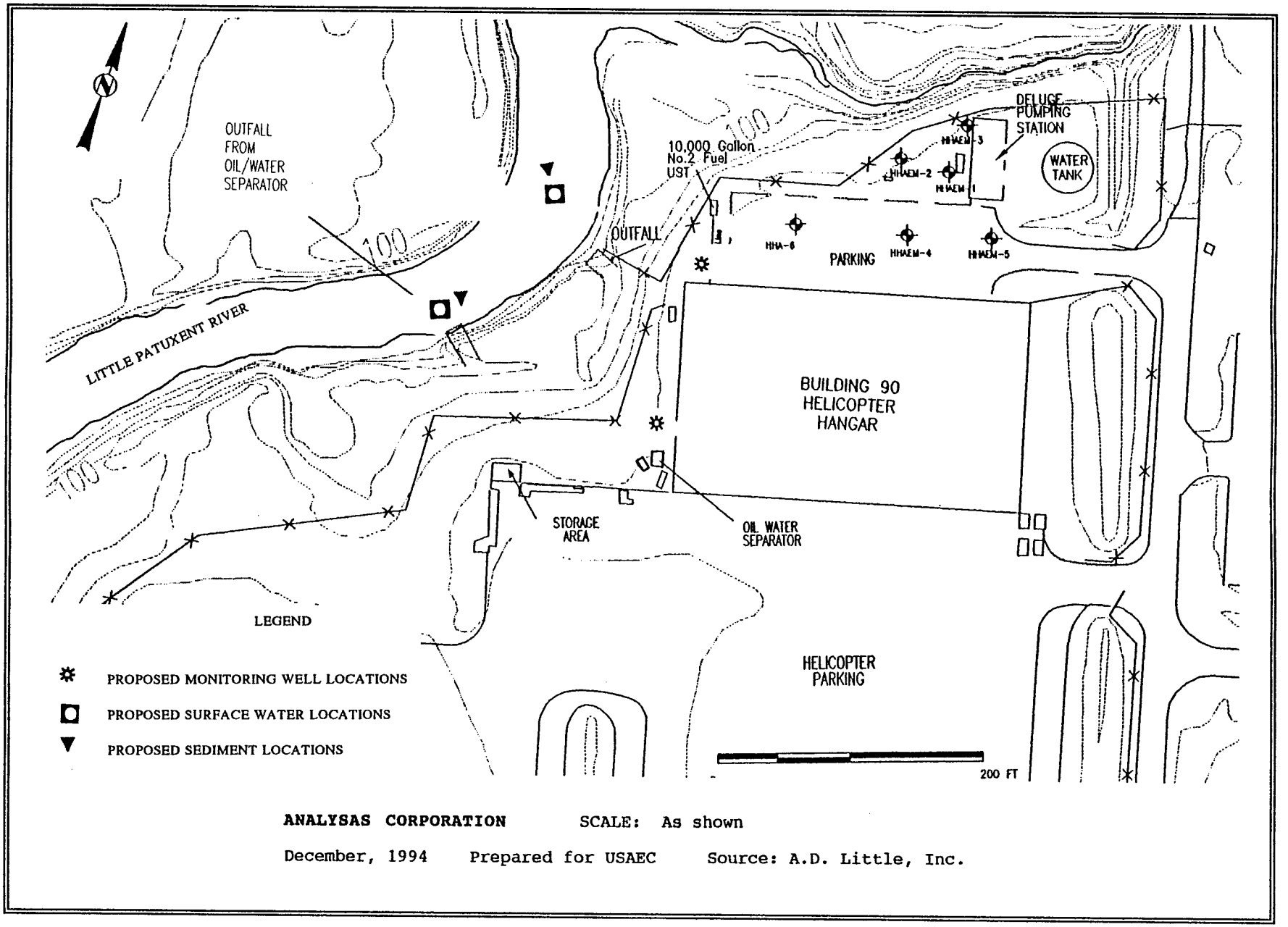
In the following section, the objectives and the technical scope are addressed for both the HHA and FTA. The following information is provided for each site: objective, technical scope, analytical program, and proposed sampling locations. Details relating to sampling procedures are summarized in Section 5.0. Details relating to the analytical program are also in the QAPP.

4.2.1 Site-Specific Samples

The objective of the field investigation for the HHA is to determine if activities in this area, such as use of oil storage tanks and oil-water separators, and discharges to the river, have impacted soil, ground water, or the Little Patuxent River or its tributary. The tasks necessary to achieve this objective include:

- Install a monitoring well in the area of the 10,000-gallon tank in the northwest corner and a monitoring well near the oil-water separator.
- Collect three soil samples using a split-spoon sampler during the installation of the monitoring well.
- Collect ground water samples from the two new and three of the existing monitoring wells.
- Collect two surface water and two sediment samples from the Little Patuxent River. The samples will be collected from upstream and downstream of the HHA.
- Water Level Measurements
- Aquifer Testing

The proposed locations for the new and the monitoring wells are illustrated on Exhibit 4-1. The series of wells HHEM-1 to HHAEM-5 were installed as part of the recovery for the underground storage tank previously removed in January 1990. In the SIA investigation the well HHA-6 was installed in early 1994. The surface water and sediment sampling points at HHA are also illustrated on Exhibit 4-1. Exhibit 4-2 summarizes the laboratory samples to be collected at the HHA, including site types, media codes, and analytical parameters.



ANALYSAS CORPORATION SCALE: As shown

December, 1994 Prepared for USAEC Source: A.D. Little, Inc.

EXHIBIT 4-1: PROPOSED SAMPLING LOCATIONS HELICOPTER HANGAR AREA

Exhibit 4-2: Summary of Chemical Analyses
at Helicopter Hanger Area

	SUBSURFACE SOIL	GROUNDWATER	SURFACE-WATER	SEDIMENT
Analyses Volatile Organic Compounds UM05/LM33	6	5	2	2
Base-Neutral and Acid Extractable Compounds UM06/LM30	6	5	2	2
Pesticides/PCBS UH21/LH19	6	5	2	2
Target Analyte List Metals SS15/SB07 JS14/JB06	6	5	2	2
Cyanide TY03/KY04	6	5	2	2
Sulfide EPA 376.1	6	0	0	2
Total Organic Carbon EPA 415.1	6	0	0	2

The objective of the field investigation for the FTA is to determine if activities in this area, such as use of the fire training pit and the oil-water separator, have impacted soil, ground water, sediment and surface water. The tasks necessary to achieve this objective include:

- Install two monitoring wells in or around the FTA.
- Collect three subsurface soil samples using a split-spoon sampler during the installation of the monitoring wells.
- Collect ground water samples from the two new and the three existing monitoring wells.
- Collect one surface water and one sediment samples from at the culvert which conveys the drainage along the southern boundary of the FTA.

The proposed locations for the new monitoring wells and the sampling points are illustrated on Exhibit 4-3. Exhibit 4-4 summarizes the laboratory samples to be collected at the FTA, including site types, media codes, and analytical parameters.

4.2.2 Non-Site-Specific Samples

As part of the RI/FS, a number of non-site-specific samples will be collected. These are used for a variety of purposes, including determination of background concentrations, waste handling, and quality assurance. Each sample type is discussed below:

- **Drilling Water Supply:** According to USATHAMA's *Geotechnical Requirements for Drilling, Monitoring Wells, Data Acquisition, and Reports,* all water used during drilling must be laboratory analyzed and approved prior to drilling operations. Concurrent RI/FS work occurring at FGGM will identify and test an available water supply prior to our field work. If necessary, Analysas will collect two samples for this purpose. The water source will be identified and approved by USAEC and FGGM personnel.

- **Investigation Derived Waste:** During the field investigation, investigation derived waste (IDW) such as waste soil and waste water will be drummed. Samples will be collected and analyzed from the drums to determine the proper disposal method. Seven samples, three for soils and four for water, have been included for this purpose.

4.2.3 Quality Field Samples

Quality control samples, including field blanks, rinsate blanks, trip blanks, and field collocates, are part of this task. Laboratory quality control samples are specified in the QAPP.

- Install two monitoring wells in or around the FTA.
- Collect three subsurface soil samples using a split-spoon sampler during the installation of the monitoring wells.
- Collect ground water samples from the two new and the three existing monitoring wells.
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Quality control samples, including field blanks, rinsate blanks, trip blanks, and field collocates, are part of this task. Laboratory quality control samples are specified in the QAPP.

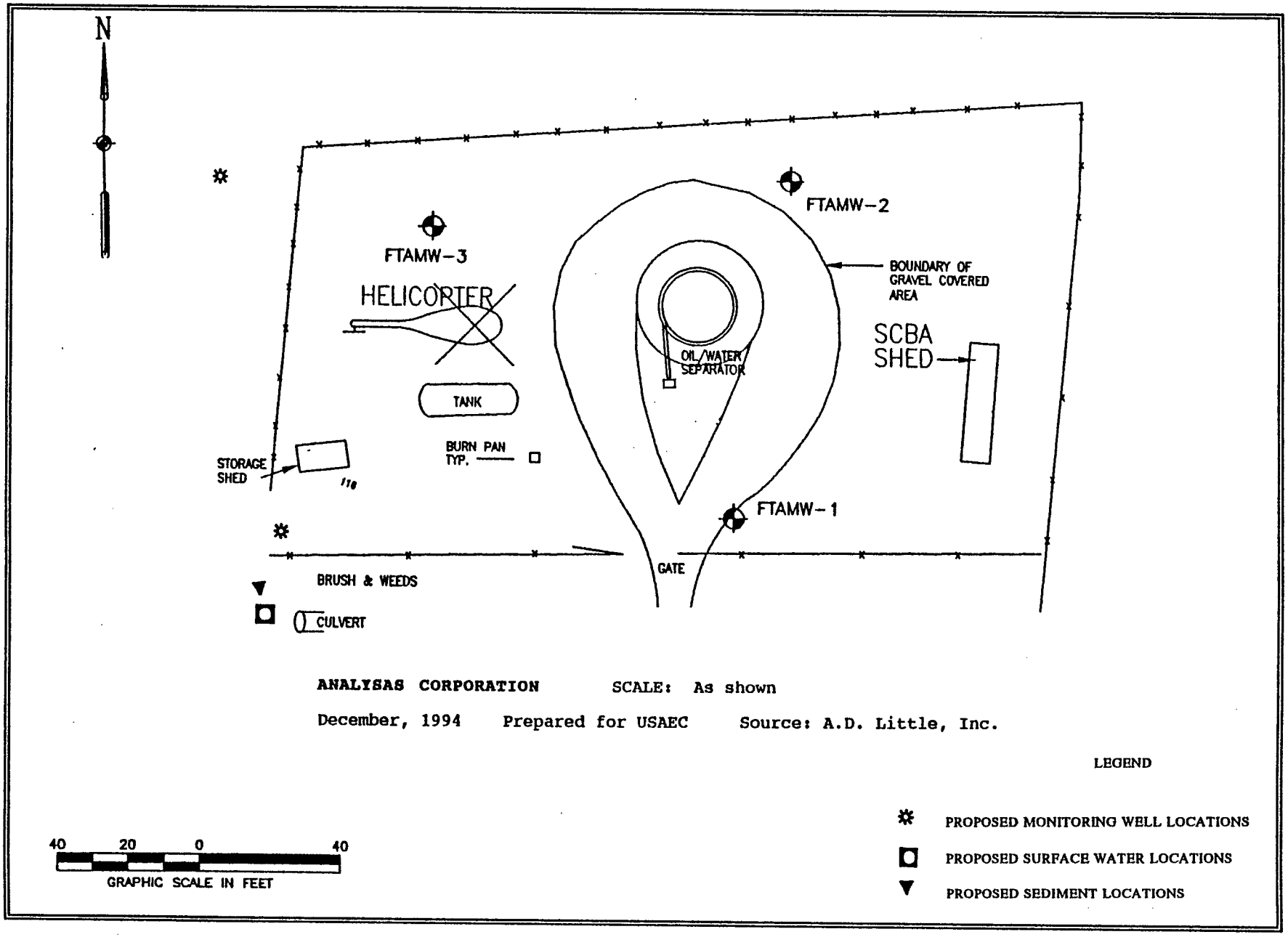


EXHIBIT 4-3: PROPOSED SAMPLING LOCATIONS FIRE TRAINING AREA

Exhibit 4-4: Summary of Chemical Analyses
at Fire Training Area

	SUBSURFACE SOIL	GROUNDWATER	SURFACE-WATER	SEDIMENT
Analyses Volatile Organic Compounds UM05/LM33	6	5	1	1
Base-Neutral and Acid Extractable Compounds UM06/LM30	6	5	1	1
Pesticides/PCBS UH21/LH19	6	5	1	1
Target Analyte List Metals SS15/SB07 JS14/JB06	6	5	1	1
Cyanide TY03/KY04	6	5	1	1
Sulfide EPA 376.1	6	0	0	1
Total Organic Carbon EPA 415.1	6	0	0	1

5.0 - PROJECT PLANNING and FIELD INVESTIGATIONS

5.1 Task 1.0 - Project Planning

Task 1.0, Project Planning, includes overall project management activities, the initial data review, and preparation of the Management Plan and the Technical Plans. The Management Plan details the overall management of the project relating to both project staffing and financial resource allocation. The Technical Plans include the Work Plan, Quality Assurance Project Plan (QAPP), and Health and Safety Plan (HASP). Each plan and data review are discussed below.

5.1.1 Subtask 1.1 - Review Existing Reports

Past reports were reviewed in order to conduct a data gap analysis, and to better understand site conditions. The findings of the review have been incorporated into Sections 2.0 and 3.0 of this Work Plan. The primary topics included:

- Regional and site physiography and hydrology
- Regional and site geology and hydrogeology
- History and characteristics of each site
- Nature and extent of contamination for each site
- Analytical procedures
- Data reduction, validation, and reporting
- Internal quality control
- Performance and system audits
- Preventive maintenance
- Data assessment procedures
- Corrective actions
- Quality assurance reports
- References
- Appendices

The QAPP specifies data quality goals and objectives and the personnel responsible for data quality. Additional procedures discussed in the QAPP are data collection under controlled conditions, identification and correction of problem situations, assurance that non-laboratory activities do not compromise analytical data control, and record keeping.

USAEC performance demonstrated methods will be used for all ground water, surface water, sediment and soil analyses. Frequency of laboratory and field quality control samples is specified in the QAPP.

5.1.2 Subtask 1.2 - Prepare Management Plan

A Management Plan has been prepared, in accordance with Exhibit Line Number (ELIN) A003, to describe Analysas Corporation's approach to managing and controlling the RI/FS. The Management Plan identities the major project tasks in the work breakdown structure and resource allocations, including subcontractors, for each task. The Management Plan includes the following information in six main components:

- Introduction - contractual information
- Organization structure - projects and task organization
- Program management - internal staff meetings, quality assurance, problem resolution, and resource utilization plan
- Technical approach - discussion of individual tasks
- Personnel - abbreviated staff resumes
- Communications plan - reporting, meetings, and deliverables

A Resource Utilization Plan prepared in accordance with ELIN A001 provides the information utilized in the Monthly Performance and Cost Report as the planned expenditures are contained within the Management Plan.

5.1.3 Subtask 1.3 - Prepare Work Plan

This Work Plan, deliverable ELIN A004, has been prepared in accordance with CERCLA guidance. The Work Plan incorporated the review of project materials provided by USAEC and other sources, such as the Maryland Geological Survey, site visits, and discussions with USAEC and Fort Meade EMO personnel.

5.1.4 Subtask 1.4 - Prepare Quality Assurance Project Plan

The Quality Assurance Project Plan (QAPP) describes the policy, organization, functional activities, quality assurance and quality control protocols necessary to achieve the project objectives. The QAPP for this project has been prepared in accordance with ELIN A005 and *USATHAMA Quality Assurance Program* and includes requirements from *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods,* as well as the *USATHAMA Quality Assurance Plan,* and *Chemical Data Quality Management for Hazardous Waste Remedial Activities.* The following information is included in the QAPP:

- Project description
- Project organization and responsibilities
- Quality assurance objectives for measurement
- Sampling procedures
- Sample custody
- Calibration

5.1.5 Subtask 1.5 - Prepare Health and Safety Plan

A Health and Safety Plan (HASP), deliverable ELIN A008, has been prepared and will be implemented in accordance with EPA protocol *Guidelines for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* and the *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities.* Alternative standards may include those published by the American Conference of Governmental Industrial Hygienists (ACGIH) or explosive ordnance disposal (EOD) requirements as well as with Title 29 CFR 1910.120, *Hazardous Waste Operations and Emergency Response.*

As a basis for this HASP, we used site-specific information from the Safety Plan prepared by

Arthur D. Little (November, 1993).

5.2 Task 2.0 - Field Investigation

A field investigation will be conducted at Fort Meade. The majority of the field investigations will be carried out over a 30- day period following final USAEC approval of the Work Plan. The field investigation will include collection of soil samples from soil borings; installation and sampling of ground water wells; sampling of ground water from existing wells; and collection of surface water and sediment samples. Selected samples will be analyzed for Target Compound List (TCL) volatile organic constituents, Target Analyte List (TAL) metals, pesticides, polychlorinated biphenyls (PCBs), semi-volatile organic compounds (SVOC), cyanide, sulfide, and total organic carbon.

Because there is a potential for unexploded ordnance (UXO) on-site, surface and downhole UXO avoidance surveys will be conducted whenever subsurface activities are being performed. UXB International is the UXO subcontractor.

All field activities will be conducted in accordance with the HASP. Based upon currently available information, it is anticipated that all activities on-site will be conducted in modified Level D personal protective equipment.

The discussion of the field investigation activities required by the RI/FS are grouped together according to the subtasks listed above. Information regarding sampling locations, names and analytical parameters is included in Section 4.2 of this Work Plan. Detailed information about analytical and sampling procedures is provided in the QAPP. This section identifies the project tasks necessary to complete the investigation.

The following sections provide details on the RI/FS field activities:

Subtask 2.1	Mobilization/Demobilization
Subtask 2.2	UXO Survey
Subtask 2.3	Surface Water/Sediment Sampling
Subtask 2.4	Monitoring Well Installation and Soil Sampling
Subtask 2.5	Aquifer Testing
Subtask 2.6	Ground Water Sampling
Subtask 2.7	Location/Elevation Surveying
Subtask 2.8	Health and Safety Monitoring
Subtask 2.9	Waste Handling

5.2.1 Subtask 2.1 - Mobilization/Demobilization

The field investigation activities will begin with mobilization. Mobilization of staff and equipment will be required to prepare for the field effort and will continue throughout its duration to support the various subcontractor services and field tasks. Mobilization activities include:

- Procuring subcontractor for UXO avoidance survey, drilling, location and elevation survey and laboratory services.
- Orienting field personnel on current management procedures and health and safety protocols.
- Constructing and decommissioning of a decontamination area.
- Assembly and transporting of field equipment to and from Fort Meade.
- Coordinating and scheduling of subcontractors.
- Site walkovers to locate all sampling points.
- Identification of water source for drilling and collecting two samples for analysis.
- Obtaining USAEC approval for the drilling water, bentonite, and gravel pack before beginning drilling and well construction.

Subcontractors procurement will include final evaluation and selection of subcontractors for drilling, a location and elevation survey, UXO avoidance survey, and laboratory services. Upon final subcontractor selection, subcontracts will be executed between Analysas Corporation and each subcontractor. All subcontractors will be subject to the guidelines, protocols, and data quality objectives presented in the USAEC-approved plans. All subcontracts will be awarded in accordance with contracting guidelines established by USAEC and Analysas Corporation.

Based on current understanding of site conditions, we anticipate construction of a small, temporary decontamination area on-site. This will eliminate any need to remove vehicles or equipment which has not been decontaminated from the site, for off-site decontamination.

5.2.2 Subtask 2.2 - Avoidance UXO Survey

Because there is a potential for UXO on-site, surface and downhole UXO avoidance surveys will be conducted whenever subsurface activities, such as drilling, are being performed. Procedures for the downhole UXO avoidance survey are provided in the HASP.

5.2.3 Subtask 2.3 - Surface Water/Sediment Sampling

Two surface water and two sediment samples will be collected from the HHA at the locations shown in Exhibit 4-1. One surface water and one sediment sample will be collected from the FTA at the locations shown in Exhibit 4-3.

Water samples from perennial streams will be taken during periods of moderate flow. Sample locations should be taken between the stream center and stream banks For intermittent streams and ditches, water samples will be taken after a rainfall event if possible, and will be at the lowest point of the drainage way. Surface water samples will be taken at 1/2 to 2/3 of the water depth. The depth of water at each sampling point will be measured after each collection. The bottles will be rinsed with the stream water immediately downstream prior to sampling. Care will be taken not to disrupt upstream sediments during sample collection and to avoid air bubbles in the sample bottles. Surface water sampling will require both filtered and non-filtered samples. Samples for metals analysis shall be field-filtered, if required other nonvolatiles shall be laboratory-filtered.

Sediment samples will be collected beneath the sediment-water interface.

The sampling sites and dates will be recorded in field notes and identified in the field with wooden

stakes painted fluorescent orange. The stakes will be labeled with the sample code.

All sampling activities will be performed in accordance with the guidelines given in the Basic Contract and the USATHAMA *Geotechnical Requirements for Drilling, Monitoring Wells, Data Acquisition, and Reports.*

Pre-certified containers to collect samples will be provided by the laboratory contractor. Surface water and sediment samples will be collected, packaged, and shipped to the USAEC performance demonstrated laboratory for chemical analysis as specified in the QAPP.

5.2.4 Subtask 2.4 - Monitoring Well Installation and Soil Sampling

5.2.4.1 Subtask 2.4.1 - Monitoring Well Installation

Two monitoring wells will be installed at both HHA and FTA at the locations shown in Exhibits 4-1 and 4-3, respectively. Depth to completion will be determined by the elevation of the shallow water table. Initial completion depth estimates are 20 feet at HHA and 30 feet at FTA. The wells will be drilled and installed by a Maryland licensed driller under the supervision of an Analysas geologist. Soil samples will be collected continuously during well drilling and logged in accordance with USAEC guidance. The driller will be Environmental Drilling Inc. (EDI).

Any boring not completed as a well will be abandoned in accordance with USAEC guidelines.

We have assumed that no wells will be installed in bedrock, and that standard drilling methods (hollow stem augers) can be used. Field procedures associated with the installation of the wells will be in accordance with USAEC guidelines, as well as the QAPP and discussions with USAEC personnel. Monitoring well construction specification will include a 4-inch diameter PVC screen and riser and 10-foot screen lengths, site conditions permitting. If variances from these specifications are necessary, they must be approved by USAEC. Monitoring wells are to be completed with the screened interval across the water table interface to intercept any light non-aqueous phase liquid contaminants that might be present.

All drill cuttings, drilling fluids, and decontamination fluids will be drummed prior to chemical characterization and managed as described in Subtask 2.9.

5.2.4.2 Subtask 2.4.2 - Soil Sampling

Continuous split spoon samples will be taken from each boring during drilling. Three samples from each boring will be submitted for laboratory analysis. At least one soil sample will be taken from the unsaturated zone and the saturated zone for chemical analysis.

Pre-certified containers to collect samples will be provided by the laboratory contractor. Soil samples will be collected, packaged, and shipped to the USAEC performance demonstrated laboratory for chemical analysis as specified in the QAPP.

5.2.4.3 Subtask 2.4.3 - Monitoring Well Development

All new monitoring wells will be developed no sooner than 48 hours and no later than 7 days after

installation to remove fine-grained material from around the sand pack and to remove water lost during the drilling process. In addition to containerization of all media associated with well construction, we will drum all purge and development waters. The purpose of developing is to ensure that the resulting ground water is chemically and physically representative of the screened aquifer.

A minimum of five times the standing water volume in the well will be removed for development purposes. It is also assumed that the drilling subcontractor will provide a support vehicle equipped with a pump for development. Additional requirements for development are described in the *USATHAMA Geotechnical Requirements for Drilling, Monitoring Wells, Data Acquisition, and Reports.*

5.2.5 Subtask 2.5 - Aquifer Testing

If site conditions indicate a need for aquifer testing, Analysas proposes slug testing at a combination of new and existing wells (minimum of three) at HHA and FTA. Slug testing generates the least IDW, while providing essential data on aquifer characteristics.

5.2.6 Subtask 2.6 - Ground Water Sampling

Ground water samples will be taken from a total of five wells at both HHA and FTA: three existing wells, and the two newly installed wells. Wells that are newly installed will be allowed to stabilize after well development has been completed.

Analysas is recommending that single-use certified disposable bailers be used for collection of ground water samples. The disposable bailers provide consistent results and reduce the chance of cross-contamination. Immediately prior to sampling, the wells will be purged and sampled in accordance with USAEC methods to ensure a fresh and representative sample for analysis. The bottle and cap will be rinsed with water from the well at the time of the sampling. The sampling sites and dates will be recorded in field notes.

Ground water sampling will require both filtered and non-filtered samples. Samples for metals analysis will be field-filtered, if required other nonvolatiles will be laboratory-filtered. Samples will be collected, packaged, and shipped to the laboratory for chemical analysis as specified in the QAPP.

In addition to the sampling for chemical analysis, ground water levels in the new and existing wells will be measured prior to chemical sampling at a minimum of two separate rounds. Ground water levels will be measured for all wells at each site within at least a ten-hour period using an electronic measuring device. Depth to water will be measured from top of the PVC riser of the monitoring well. Measurements will be read within 0.1 foot accuracy. The wetted portion of the electronic tape will be decontaminated between each measurement.

5.2.7 Subtask 2.7 - Location/Elevation Surveying

The four new ground water monitoring wells installed and the sampling sites at HHA and FTA will be surveyed for location and elevation by a Maryland registered surveyor. For horizontal

control, all positions will be surveyed to determine map coordinates using a Universal Transverse Mercator (UTM) or Maryland State Plane at an accuracy of ±3 feet (±1 meter). For vertical control, survey locations will be surveyed to an accuracy of ±0.05 feet (±1.5 centimeters) using the National Geodetic Vertical datum of 1929. Field survey data presented by the contractor will clearly list the coordinates and elevation, as appropriate for all surveyed locations. The location and elevation survey will result in a Maryland-certified basemap including wells, benchmarks and references with associated elevations and documentation of survey accuracy.

For each new well, the vertical elevations surveyed will be the ground elevation at the base of the well, the top of the PVC riser, and the top of the metal casing. At surface water and sediment sample locations, the elevation of the site location stake top will be surveyed.

5.2.8 Subtask 2.8 - Health and Safety Monitoring

Health and safety monitoring will be an integral part of the field investigation program, to provide protection to site workers and to aid in the control of site contaminants. Further details associated with the site-specific health and safety monitoring program are presented in the HASP, developed under Task 1.5. A designated Site Health and Safety Officer will be present during all field activities to assure day-to-day management of health and safety issues.

5.2.9 Subtask 2.9 - Waste Handling

Wastes generated during the field investigation are managed under this subtask. Potentially hazardous wastes that may be generated by investigation derived waste (IDW) which includes drill cuttings, drill fluids, development water, decontamination fluids, and protective clothing.

In accordance with Section C.3.1.9 (Disposal of Wastes Generated Incidental to Investigations) of the basic USAEC contract, we will containerize all soil cuttings, drilling water, decontamination fluids, and other investigation derived wastes. Analysas will provide for the characterization of this waste in order to determine the appropriate disposal requirements. Investigation-derived waste will be visually inspected and field tested using a Photo Ionization Detector (PID) or Flame Ionization Detector. We will select individual drums for compositing on the basis of visual similarities, and field testing. We have assumed that the drilling subcontractor will provide support in moving the drums from the point of generation to a common accumulation area to be designated by Fort Meade.

Analysas assumes that we will be able to composite representative sample aliquots from two to three drums into a single sample for analysis. Composite samples will be collected from the drummed materials and will be analyzed by the RCRA Toxicity Characteristic Leaching Procedure (TCLP) for organics and metals. The analysis will aid in characterizing if the IDW is hazardous and shall account for all federal, state of Maryland, and local requirements. The ultimate disposal of materials will be pursued through the use of installation hazardous waste disposal contracts or procedures.

If the material is not classified as a RCRA hazardous waste according to the TCLP analysis, it will be disposed of at locations specified by the Fort Meade Environmental Officer. We anticipate disposing of non-hazardous wastes generated during the investigation, such as packing materials,

in Fort Meade waste handling facilities.

If the material is classified as a RCRA hazardous waste, it will be disposed of in accordance with 40 CFR Part 262, *Standards Applicable to Generators of Hazardous Waste* and the guidance of the Fort Meade Environmental Officer. A licensed hazardous material disposal firm will be engaged to provide the transport and disposal of any RCRA hazardous waste generated during this investigation. We expect, however, that Fort Meade staff will issue any necessary manifests, indicating Fort Meade as the waste generator.

6.0 CHEMICAL ANALYSIS PROGRAM

6.1 Task 3.0 - Laboratory Analysis

6.1.1 Subtask 3.1 - Coordination of Laboratory, Field, and Data Validation Activities

The coordination of the analytical laboratory with field activities and data management will be accomplished by Analysas Corporation's designated Lead Chemist and staff. The Lead Chemist will be responsible for planning, tracking, coordinating, and documenting all aspects of sampling, analysis, and data validation. Specific duties include:

Collecting all reports and guidance documents related to sample documentation, analytical procedures, data validation, and QA/QC procedures from USAEC and distributing as appropriate

Coordinating all sample analysis requests from Task Manager

Advising the program and project staff regarding appropriate data quality objectives (DQOs) and analytical methods

Providing direction for non-routine analyses

Ensuring proper distribution of sample containers, appropriate preservation of samples, use of chain-of-custody forms, and other appropriate sampling and analysis documentation forms to sampling teams

Ensuring that sample documentation procedures presented in the QAPP are followed

Coordinating the delivery of samples to the subcontract laboratory, or if necessary, the backup laboratory:

- Ensuring that detection limits are below drinking water standards/maximum contaminant levels (MCL)
- Reviewing weekly quality control reports
- Receiving all laboratory analytical data

Ensuring that specified laboratory analytical data are appropriately reviewed using USAEC procedures before they are transmitted to Program and Task Managers, or their designated representatives

Reporting to the Program QA Officer regarding data quality and appropriate corrective actions

These activities will be coordinated with the assistance of the Program and Task Managers, Field Activities Subtask Manager, Project Quality Assurance Officer, and USAEC staff, as appropriate.

6.1.2 Subtask 3.2 - Sample Analysis

The objective of the chemical analysis program is to provide an accurate definition of the type and extent of contamination at Fort Meade so that remedial action procedures can be developed. The analytical program has been designed to provide reliable qualitative and quantitative data consistent with USAEC target reporting limits and the requirements of federal and state agencies.

Our proposed subcontract laboratory, PACE, Incorporated, (PACE) has provided analytical support to USAEC for several years and is committed to providing timely, high quality data in support of this project. This laboratory also has extensive experience in USAEC analytical support and is capable of meeting detection limit and quality assurance requirements. This section presents a detailed description of the analytical services and procedures to be provided by PACE in support of the Feasibility Study and Remedial Investigation/Site Inspection. If the services of a backup laboratory are required, that laboratory's credentials and necessary specific information regarding their analytical procedures will be provided as an Amendment to this Work Plan.

6.1.2.1 - Sample Receipt

All samples received at PACE will be inspected by the Sample Receipt Officer. Information regarding the date and time of receipt, airbill number and sample condition will be recorded and the chain-of-custody form will be signed by the Sample Receipt Officer. Any discrepancies in the documentation or number of samples and problems such as missing, broken or damaged samples will be reported to the Analysas Corporation Lead Chemist within 24 hours. All samples will be stored in a manner appropriate to the requested analysis. Analyses will be scheduled in accordance with the holding times stated in the USATHAMA QA Manual.

6.1.2.2 - Lot Assignment

USAEC quality assurance procedures state that the number of samples that can be analyzed by a given method on a single day, as determined by the rate-limiting steps in an analytical process, be designated as a lot. The samples thus grouped will be labeled with a USAEC identification consisting of a three letter code. Individual field and quality control samples within each lot are assigned an individual three digit designation in addition to the lot code (e.g., AAA001, AAA002, etc.). Spiked USAEC soil or water QC samples will be added to each lot. Generally four QC samples are required: one method blank, one low spike and two high spikes. Lot sizes are defined in each certified method; however, every effort will be made to maximize the lot size without compromising holding time.

6.1.2.3 - Standards and Quality Control Samples

Standards and quality control samples will be prepared using Standard Analytical Reference Materials (SARMs) and Interim Reference Materials (IRMs) supplied by USAEC or from standard materials obtained from the EPA or the National Institute of Standards and Technology (NIST). In some cases it may be necessary to use standard materials obtained from commercial sources. These materials will be characterized using documentation supplied by the vendor and PACE analytical data. The commercial standards will be characterized using two independent analytical methods whenever possible.

Analytical standard working solutions will be prepared by the analyst in the manner stated in the

approved analytical method. All standard preparation will be documented in the analyst's notebook or a standards preparation logbook unique to USAEC. As new or replacement standards are received, they will be validated against either the previously used standard, a commercially prepared quantitative standard or a standard prepared by another analyst for the purpose of validation. A new solution is considered to be acceptable if its analytically obtained value is within five percent of the theoretical value.

6.1.2.4 - Instrument Calibration

The USAEC QA Plan and the performance demonstrated analytical procedures describe, in detail, the requirements for instrument calibration. During initial calibration a minimum of one blank and five calibration standards (Class 1 methods) or one blank and three calibration standards (Class 1A and 1B methods) that bracket the certification testing range will be analyzed on a single day. In addition, Class 1 and 1B methods require the analysis of calibration check standards at the end of the initial calibration. If the results of the calibration check standards are not acceptable, they will be reanalyzed. If reanalysis produces unacceptable results, analysis will be stopped until a successful initial calibration can be achieved. The highest calibration standard will be analyzed each day to verify that the instrument response has not changed from the previous calibration. If the response is outside the acceptable range, the standard will be reanalyzed. If the response is still not acceptable, an initial calibration will be performed. On each day of analysis, instruments will be tuned, as applicable, and the required number and concentrations of standards will be analyzed with each lot of samples. If calibration criteria are not met, the appropriate corrective action will be pursued and documented by the analyst.

6.1.2.5 - Analytical Procedures

A complete listing of the methods to be used in this program is provided in the QAPP. To the extent possible, only performance demonstrated methods will be used in the analysis of field samples.

While TCLP does not require USAEC performance demonstration, EPA or other published methods will be used and all reported values must be supported by calibration and quality in accordance with the USAEC QA Plan.

Waste samples will be tested prior to disposal using the RCRA Toxicity Characteristic Leaching Procedure as described in Method 1311 of Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. This method requires that a portion of the waste be extracted for approximately 18 hours and the subsequent leachate be submitted for the analyses listed in the QAPP. Once the leachate has been generated, the analysis will be performed using EPA methods.

All field and association quality control sample will be analyzed according to the reference methods. If deviation from the reference method becomes necessary due to the nature of an individual sample, the method modification will be approved in advance by the Lead Chemist and will be documented in the analyst's notebook and the data package.

The analytical procedures used for PCBs require that the detection of any compound be confirmed on a second column.

The subcontract laboratory will forward a weekly quality control report to the Analysas Lead Chemist. This report will include USAEC control charts for all certified analytical methods, a discussion of any out-of-control situations or data trends and any corrective action taken. The report will also provide a summary of quality control procedures and results for the non-certified analytical methods.

Within 21 days of sample receipt, the laboratory must deliver transfer files to the USAEC Installation Restoration Data Management Information System (IRDMIS). Within 60 days of receipt of the last sample for each round, data packages must be delivered to the Lead Chemist. The data package must contain all information necessary to validate the reported data. This will include:

Chain-of-custody forms

Narrative discussing problems noted during analysis, deviations from the analytical procedure, or limitation on the use of the data

Data sheets or any other preprinted forms used by the laboratory

Original chromatograms, strip charts and/or other instrument output

All hardcopy GC/MS output including expanded scale blow-up of manually integrated peak(s)

Copies of all relevant notebook pages or standard forms used to record information such as standard preparation, sample preparation/extraction, instrument calibration, instrument operating conditions, percent moisture or any other information relevant to the analytical data.

A copy of the completed Quality Assurance Coordinator (QAC) Checklist

At least 10 percent of the completed packages will be reviewed by the Analysas Lead Chemist.

6.1.3 - Subtask 3.3 - Laboratory Data Management

PACE will enter all sample results into IRDMIS. Specific instructions for format, coding and submission as provided in the current IRDMIS User's Guide will be followed. Data will be entered on a coding form by the analyst with the entry verified by another analyst and the group leader or section manager. QA personnel will also review the data for any obvious errors. Flagging codes as defined in the IRDMIS User's Guide will be used to alert the data users to any analytical problems or limitations on the use of the data. The data will be entered into IRDMIS, checked through two USAEC software routines, printed out, and verified by a Data Entry

Specialist. Verified data will then be submitted to USAEC and Analysas. Each data package will include a hardcopy of the IRDMIS data for that lot.

A complete data package will also be assembled for each lot. The data packages will be forwarded to Analysas Lead Chemist within 40 days of sample receipt. The Lead Chemist will review approximately 10 percent of the data packages, and any problems or omissions noted in this review will be resolved with PACE. When data package review is completed, all packages will be forwarded to USAEC.

7.0 QUALITY ASSURANCE, DATA MANAGEMENT, and DATA EVALUATION

7.1 Task 4.0 - Quality Assurance

The Quality Assurance (QA) reviews under this subtask are systematic evaluations of four aspects of the Fort Meade project: (1) overall project activities and documents; (2) field/geotechnical activities; (3) laboratory analysis activities; and (4) data files and packages. The overall project and field Quality Assurance reviews will be undertaken by the Project QA Office or a designee. The laboratory Quality Assurance reviews will largely be undertaken by our subcontracted laboratory, with QA oversight provided by Analysas's Lead Chemist or her designee. The Lead Chemist will also review USAEC data packages from our subcontracted laboratory. These reviews will assure that activities are implemented and data evaluation in accordance with this Work Plan and the QAPP and associated Standard Operating Procedures, provided as a separate document. These documents adhere to the requirements specified in the *USATHAMA QA Program* and the *USATHAMA Geotechnical Requirements for Drilling, Monitoring Wells, Data Acquisition, and Reports.*

7.1.1 Subtask 4.1 - Field & Laboratory Quality Assurance Reviews

Field Quality Assurance reviews will be performed on site for at least one day during field investigation activities. Through a combination of on-site observations and on-site and off-site review of documentation, the following will be reviewed to ensure conformance with the above-referenced documents:

- Field logbooks and forms
- Field chemical/physical analyses, including calibration and QC samples
- Containers and sample preservation used for collected samples
- Sample storage and security
- Sample containers
- Location and elevation survey
- On-site steam cleaning drill rig procedures prior to drilling activities, between each well, and before leaving the site
- "Dig-safe" and UXO screening procedures
- Confining and containerizing drilling wastes (wastes from decontamination of drilling rigs and the PVC pipe used for casings; and surface runoff)
- Drilling activities (including water sources used) and well materials (filter pack, bentonite, and grout)
- Well development and presample purging techniques
- Depth measuring techniques
- Well construction and security
- Accurate drawing and notes of the well locations and drilling operations
- Specified numbers and types of soil, ground water, surface water, and sediment samples collected and sent to the laboratory

Laboratory Quality Assurance reviews undertaken by the Quality Assurance Coordinator (QAC) at PACE, Incorporated, (PACE), our contract laboratory, include verification that the following meet USAEC requirements:

- Sample log-in and inspection
- QC samples (usually one method blank, one low spike, and two high spikes) and sample lot sizes
- Instrument calibration using SARMs, IRMs, or "off-the-shelf" materials characterized by two methods (initial and/or daily calibrations)
- Logs including laboratory notebooks and/or forms (sample log-in, laboratory chain-of-custody forms, instrument usage, calibration, and maintenance notebooks/logs, sample preparation notebooks and logs, sample analysis spreadsheets and files, standard solution preparation and identification, analysis methods notebooks, and, when required, corrective action documentation
- Laboratory water quality (ASTM Type I and Type II)
- Control charts (single day XBAR, range control charts for high spikes, and three-day moving XBAR and Range control charts for low spikes and GC/MS analyses)
- Identification of out-of-control systems and corrective action procedures

Analysas will provide QA oversight through review of laboratory weekly status reports, Quality Control (QC) summary reports, control charts, and at least weekly phone calls to the laboratory.

The result of the field and laboratory reviews will consist of observations and notations as to whether approved practices are followed. A formal report composed of summary findings will be distributed to the Program Manager and Task Manager. Deviations from the program, task, or USAEC QA plans will be noted and discussed as appropriate, with the staff members, appropriate management, and USAEC.

7.1.2 Subtask 4.2 - Data Review

As required by the USAEC QA Plan, all data packages will be reviewed by PACE's Quality Assurance Coordinator. This review serves two purposes: it ensures that all required data and documentation are provided in the package and it checks the content for technical and record keeping errors. The reviewer's name and date of review will be recorded on the Quality Assurance Coordinator (QAC) Checklist; any corrective actions required will also be noted. When the corrective action has been completed the QAC will initial and date the original comment. The QAC's signature on the checklist will indicate that the data are considered valid and usable. PACE will provide Analysas with USAEC data packages for review.

An additional review of at least 10 percent of the data packages will be performed by the Analysas Lead Chemist, hand validating them using EPA Region III data-validation guidelines. The package will be chosen to cover as broad as possible a range of analyses and matrices. In some cases, a particular lot may be selected for additional review by Analysas or USAEC Project Manager. The Lead Chemist will assess the completeness of the documentation provided, adherence to the certified or other published method, adherence to USAEC quality control requirements, and acceptability of the quality control data. The Lead Chemist will also provide a technical review of the data and verify at least one calculation for standard preparation and final reported analyte values from the raw data contained in the data packages to the final reported value in USAEC's Installation Restoration Data Management Information System (IRDMIS) database. Any discrepancies or omissions will be discussed promptly with PACE. A copy of the Analysas Lead Chemist's review will be added to the data package.

IRDMIS data files will be record-checked by PACE to assess if the method was performed correctly and within the sample holding times specified. After successfully passing the record check, the samples are group-checked to confirm that the proper number of control samples were analyzed and each sample site corresponds to a valid map site.

Any deviations or problems with data files and/or packages will be reviewed by PACE, and appropriate corrective actions will be taken as necessary and will be fully documented.

7.2. Task 5.0 - Sample Tracking and Data Management

7.2.1 Subtask 5.1 - Sample Tracking

All samples collected for chemical analysis during the performance of the Fort Meade RI/FS are assigned unique sample designation codes so that all chemical and physical data collected in association with each sample can be directly linked to a specific location, depth, time, and sample media prior to interpretation. Each assigned sample designation code is composed of a predetermined Site Location Identify (SLI) and a Unique Sample Code (USC). The SLI is composed of an alphanumeric code that includes the IRDMIS Site ID, Site Type, and Media Code. The USC provides further detail on the area identification, sample interval, and sample media. The SLI will remain consistent for all samples collected from a single location, regardless of depth, and may therefore correspond to several data sets from a particular event. The USC, when concatenated with the SLI, serves to uniquely delineate a data set. All sampling locations that were established previously and that are scheduled for resampling during these field activities will use the previously established Site ID to maintain consistency with IRDMIS. All newly established sites will be assigned Site IDs consistent with those already in existence.

7.2.2 Subtask 5.2 - Data Reduction/Evaluation

Under this task, data obtained from previous studies and this study will be evaluated and integrated to provide a basic characterization of the occurrence and distribution of chemical contamination and site characteristics that are likely to influence human exposure or remediation feasibility. The output from this task will be used for completing the RI, the risk assessment, and the feasibility study.

Initially, this will include reducing and organizing the raw field data into IRDMIS format. Data reduction will result in the following:

- For the risk assessment, all IRDMIS Level III chemical data will be compiled in site-and media-specific tables. The data will also be summarized on additional tables that will include, for each medium at each site, range of concentrations, arithmetic mean concentration, and upper 95 percent confidence limit of the mean. These tables will be used in preparation of the Remedial Investigation (RI) and the Feasibility Study (FS).

- The chemical concentrations will be plotted onto ground water elevation contour maps so that source areas and possible directions of contaminant migration can be evaluated.

- The chemical results of the ground water sampling will be reviewed along with water table data that correspond to that particular sampling event. These data will be used in conjunction with the hydraulic data to evaluate the historical and future contaminant migration flow paths.

- The lateral distribution of various contaminants with the ground water will be contoured for each aquifer at each site. This data will be used in conjunction with hydraulic data to evaluate the historical and future contaminant migration flow paths.

- The elevation survey data will result in completion of site maps that will be used to correlate all the data acquired at the site. These maps will provide the basis for all sampling data, and provide precise vertical elevations and hydraulic elevation measurements.

- Chemical data for analysis of background samples, along with data from previous investigations and regionally available background data, will be selected from the analysis of background and field samples, and will be evaluated using frequency plots to assess if elevated concentrations are present at any locations.

All of the above-mentioned reduced data will then be integrated into an overall surface and subsurface conceptual model for use in the completion of the risk assessments and feasibility studies for HHA and FTA.

7.2.3 IRDMIS Data Management

Management of IRDMIS data consists of proper formatting and loading of (1) IRDMIS Map Data, (2) IRDMIS geotechnical data, and (3) IRDMIS chemical data.

7.2.3.1 IRDMIS Map Data

IRDMIS map data entry refers to registering sampling locations by a specific naming convention and a coordinate system (easting and northing locations) using the USAEC software program called PC IRDMIS or PC TOOL.

The naming convention consists of a 4-character Site Type (e.g., WELL, BORE, LAKE) (Section 9.17 of the Data Dictionary) and a 10-character Site Identification (Section 9.16 of the Data Dictionary) that has few restrictions on the use of the 10 characters, except that the Site ID cannot contain any spaces. A Site Identification should be used throughout that site's sampling history. The coordinate system will be in Universal Transverse Mercator (UTM) or Maryland State Plane and the locations can be either surveyed, digitized, or read from a map.

In general, map data entry will occur when samples are taken from new locations in the field. For example, if the sampling location is an immovable site like a well (WELL) or a building (BLDG), then the sampling information for that site will only have to be entered once. However, soil sampling, surface water sampling, and other such sampling will need to be entered each time a sample is taken unless it can be determined that the site is identical to an original sampling location already recorded in the map database.

Distributing Existing Map Databases. Analysas will acquire the latest Fort Meade map database from AEC and will send this map database to the contract laboratory so that proper record and group checks will be possible.

Updating the Fort Meade Map Databases. Analysas will be responsible for providing both the subcontract laboratory and USAEC with updated map files based on sampling efforts at Fort Meade. When a new site is sampled, Analysas will enter the map data as follows to ensure proper processing of the associated analytical data:

- As a sampling round is completed, Analysas will follow the procedures discussed in Chapter 3 of the *PC Data Entry & Validation Subsystem User's Manual* to enter map data into the PC IRDMIS Level I computer system.

- The new site will be named based on a 4-character Site Type and a 10-character Site Identification as explained in Section 9.17 and 9.16 of the Data Dictionary, respectively. The sample's location will be determined by a surveyor, a map, or a digitized location coordinate so that the X and Y coordinates can be entered. Also, the following chart can be used as a guideline for map data entry:

Required Elements Map Data Entry:

	Field Name	Size/Type	Data Dictionary Section
(1)*	Installation	A2	11.04
(2)*	Site Type	A4	9.17
(3)*	Site Identification	AN10	9.16
(4)	Description	AN16	9.07
(5)	Pointer Site Type	A4	9.14
(6)	Pointer Site ID	A10	9.13
(7)	Aquifer Name	A10	9.01
(8)*	Coordinate System	A3	9.05
(9)*	Coordinate Source	A1	9.03
(10)*	Coordinate Accuracy	N1	9.03
(11)*	X Coordinate	N7	9.20
(12)*	Y Coordinate	N7	9.21
(13)	Surface Elevation	N7	9.18
(14)	Elevation Source	A1	9.06
(15)	Elevation Accuracy	N1	9.06
(16)*	Base Closure Indicator	A1	9.02

* Necessary map data entry element to create a legal map file. All others can be considered optional or have default values, but should eventually be entered for completeness.

- Analysas will then transfer the data into an ASCII-based "transfer" file that will be sent for processing, validation, and loading to the USAEC legal repository known as Level III.

- Once the map file has been loaded to Level III as indicated by the USAEC weekly status reports, Analysas will request the latest map files to be sent electronically. Once Analysas receives the map file it can be copied to the local IRDMIS data system and sent to the subcontracted laboratory so that proper record and group checks can continue.

7.2.3.2 IRDMIS Geotechnical Data.

Analysas will provide USAEC with updated geotechnical files based on sampling efforts at Fort Meade. When a new well site is drilled and constructed for sampling, Analysas will enter the geotechnical data as follows to insure proper processing of the associated geotechnical data through the IRDMIS data systems.

- As a new sampling round is being completed, Analysas will follow the procedures discussed in Chapter 2 of the *PC Data Entry & Validation Subsystem User's Manual* to enter geotechnical data into the PC IRDMIS Level I computer system.

- There are three types of geotechnical data that Analysas will be responsible for entering and keeping updated. They are (GWC) Geotechnical Well Construction data (GFD) Geotechnical Field Drilling data, and (GGS) Geotechnical Ground Water Stabilized data. GWC and GFD geotechnical data files will be created for each new well that is drilled and constructed. GGS geotechnical information will be gathered and entered for every well that will be sampled including existing well sites.

- The following guidelines will be used to ensure that all pertinent geotechnical information is collected and entered properly into Level I of the PC IRDMIS computer system:

Required Elements Geotechnical Data-Well Construction Entry:

(GWC)	Geotechnical Well Construction	Size/Type	Data Dictionary Section
(1)*	Installation	A2	11.04
(2)*	File Type	A3	9.09
(3)*	Organization	A2	10.09
(4)*	Site Type	A4	9.17
(5)*	Site Identification	A10	9.16
(6)	Prime Contractor	A2	9.15
(7)*	Well Construction Date	D	10.11
(8)*	Action/Measurement	A4	10.01
(9)	Method Number	N2	10.08
(10)	Depth (ft)	N9	10.03
(11)	Interval Thickness	N9	10.06
(12)	Value	N6.2	10.10
(13)	Units	A4	9.19
(14)	Entry	A6	10.04

* Necessary map data entry element to create a legal map file. All others can be considered optional or have default values, but should eventually be entered for completeness.

Bedrock Well (GWC) require the following Action/Measurement data:

DPTOT	Direct measurement of depth from ground surface to the deepest point encountered during drilling and/or sampling in a bore hole.
STKUP	Field measurement of length of PVC riser above ground surface (use negative values if below ground surface).
CSEAL	Direct measurement from ground surface of length of permanent external casing used to seal off the overburden of an open-hole (bedrock) well.
CASES	Direct measurement of inside diameter of permanent external casing used to seal off the overburden of an open-hole (bedrock) well.

Screened Wells (GWC) require the following Action/Measurement data:

DPTOT	Direct measurement of depth from ground surface to the deepest point encountered during drilling and/or sampling in a bore hole.
STKUP	Field measurement of length of PVC riser above ground surface (use negative values if below ground surface).
CASE	Direct measurement of length from ground surface to top of the screen of an overburden (screen) well.
CASED	Direct measurement of the inside diameter of the casing of an overburden (screened) well.
SCREN	Length of the screen of an overburden (screened) well.
GROUT	Length of the interval filled with neat cement or cement grout for an overburden (screened) well.
BSEAL	Measurement of length of bentonite seal of an overburden (screened) well.
GFILT	Direct measurement of length of gravel filter or sand pack of an overburden (screened) well.

NOTES: All measurements to the nearest tenth of a foot
Additional Action/Measurements are optional

Required Elements Geotechnical Data-Field Drilling Entry:

(GFD)	Geotechnical Field Drilling	Size/Type	Data Dictionary Section
(1)*	Installation	A2	11.04
(2)*	File Type	A3	9.09
(3)*	Organization	A2	10.09
(4)*	Site Type	A4	9.17
(5)*	Site Identification	A10	9.16
(6)	Prime Contractor	A2	9.15
(7)*	Well Construction Date	D	10.11
(8)*	Action/Measurement	A4	10.01
(9)	Method Number	N2	10.08
(10)	Depth (ft)	N9	10.03
(11)	Interval Thickness	N9	10.06
(12)	Value	N6.2	10.10
(13)	Units	A4	9.19
(14)	Entry	A6	10.04

* Necessary map data entry element to create a legal map file. All others can be considered optional or have default values, but should eventually be entered for completeness.

DPTOT Direct measurement of depth from ground surface to the deepest point encountered during drilling and/or sampling in a bore hole.

GRDWT Direct or estimated measurement of depth from ground surface to first encountered ground water level at time of drilling.

NOGWT No ground water encountered at time of drilling.

USCS Visual classification in the field of an interval using the Unified Soil Classification System (expanded to include rock classification and special codes).

NOTES: All measurements to the nearest tenth of a foot
Additional Action/Measurements are optional

(GGS)	Geotechnical Ground Water Stabilized	Size/Type	Data Dictionary Section
(1)*	Installation	A2	11.04
(2)*	File Type	A3	9.09
(3)*	Organization	A2	10.09

(4)*	Site Type	A4	9.17
(5)*	Site Identification	A10	9.16
(6)	Prime Contractor	A2	9.15
(7)*	Measurement Date	D	10.07
(8)*	Depth (ft)	N9	10.03

* Necessary map data entry element to create a legal map file. All others can be considered optional or have default values, but should eventually be entered for completeness.

Further information on Action/Measurement requirements can be found in the USAEC Data Dictionary Section 10.01.

Analysas will then transfer the geotechnical data into an ASCII-based "transfer" file that will be sent for processing, validation, and loading to the USAEC legal repository known as Level III. Analysas will confirm that the geotechnical file has been loaded to Level III as indicated by the USAEC weekly status reports for each well for which data has been generated. Analysas will confirm that the chemical data transfer files have been loaded to Level III as indicated by the USAEC weekly status reports for each for which data has been generated.

Analysas internal tracking system will also ensure that all field samples have been the proper analysis performed and will contract the laboratory and the USAEC Project officer whenever and wherever discrepancies arise.

Any and all data which require changes will be handled in the following manner:

IRDMIS Map Data:

- All changes will be made by Analysas
- All resubmissions will be handled by Analysas

IRDMIS Geotechnical Data:

- All changes will be made by Analysas
- All resubmissions will be handled by Analysas

IRDMIS Chemical Data:

- All analytical data changes will be handled by the contract laboratory with notification provided to Analysas.
- All map data sites associated with chemical transfer files will be handled by Analysas unless otherwise noted.

- All resubmission of chemical data will be handled by the contracted laboratory including submissions that require a USAEC modification memo, with notification provided by Analysas.

- Any changes that Analysas makes will be noted and a copy of the transfer file will be sent to the contract laboratory to maintain an updated chemical database tracking system.

8.0 RISK ASSESSMENT, FEASIBILITY STUDY, and COMMUNITY RELATIONS

8.1 Risk Assessment

8.1.1 Introduction

Under Delivery Order 0002 Analysas is conducting an RI/FS that will include a baseline risk assessment. This risk assessment (RA) will integrate all environmental data for the HHA and FTA.

The RA will be conducted in accordance with guidelines and procedures provided in Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual; Risk Assessment Guidance for Superfund, Volume II: Environmental Manual; Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA; Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; Superfund Public Health Evaluation Manual; and Conducting Remedial Investigation/Feasibility Studies for CERCLA Municipal Landfill Sites.

Additional guidance as published in the Federal Register may also be used. The public health risk assessment will consist of five principal components: hazard identification, dose-response assessment, exposure assessment, risk characterization, and limitations/uncertainties.

The objective of expanded human risk assessment is to assess and quantify the potential present and future human health risks resulting from exposure to contaminants in the ground water, sediments, surface water, and air at the HHA in the absence of any remedial action has been taken. A limited-scope ecological risk assessment will evaluate a full range of the ecological systems present (e.g., aquatic, wetlands, terestrial) and stressors (chemical, physical, biological). Risk characterization will focus on relevance, balance clarity, consistency and the appropriate detail

This evaluation of risk will assume that exposure to chemicals on the site occurs under baseline conditions. Baseline is specifically defined for this site using the following assumptions:

No site remediation will occur.

When considering land use, the baseline risk assessment considers both actual risks from current land use and potential risks from future land use, assuming no remedial action.

Current and future risks are based on present chemical concentrations; no natural attenuation is assumed to occur when calculating future risks.

8.1.2 Hazard Identification

The objective of the FGGM hazard identification is to present an organized compilation of the new chemical analysis data on the hazardous substances present at the HHA site, to identify data sets suitable for use in a quantitative risk evaluation, and to identify contaminants of concern upon which the quantitative assessment of risk will be based.

The hazard identification will not be performed until all raw and summary data are deemed valid, accurate, and acceptable for our use by USAEC. Hazard identification will be performed using only Level III IRDMIS data.

Non-detects will be included in the calculation of average exposure concentrations as one-half the reported sample quantitation limit; qualified data deemed unacceptable for risk assessment purposes will be included in the average computation as one-half the reported sample quantitation limit (SQL). The acceptability of qualified data for use in the human health risk assessment will be determined through a review of the IRDMIS qualifiers and the magnitude of the associated uncertainty. Rejected samples will not be included in the computation of averages or statistical data.

Duplicate samples will be averaged prior to computation of the average exposure concentration. In instances where duplicate samples have conflicting results (e.g., detect in the sample, non-detect or estimated data in the duplicate), the value of the detect will be used in the calculation. This method of calculation is conservative and minimizes impact of sample analysis uncertainty on the computed arithmetic averages.

Summary statistics of the analytical data will be generated for each constituent detected in each medium and will include the following:

- Arithmetic average concentrations
- Maximum detected concentration
- 95th percent confidence limit on the mean
- Location of the maximum detected concentrations
- Depth at which the sample was taken
- Number of samples
- Number of detects

Ground water and surface water tables will also include the maximum contaminant level (MCL), maximum contaminant level goal (MCLG), and the number of samples that exceed each.

The selection of contaminants of concern for the expanded human health risk assessment will be based on the following guidelines:

Toxicity data together with detected concentration will be used to assess which chemicals pose the most significant risk by multiplying maximum detected concentrations by the carcinogenic potency factor and inverse of the non-carcinogenic reference dose to obtain the respective risk factors.

Compounds detected in ground water may be eliminated from the risk characterization if they were found in background samples from an upgradient well or detected in field or trip blanks.

Metals may be eliminated from consideration if they are essential human nutrients (calcium, iron, magnesium, potassium and sodium).

Compounds excluded from quantitative evaluation (including inorganics) will be noted and discussed in the text.

8.1.3 Dose-Response Assessment

In the dose response assessment, the toxicity of the contaminants will be reviewed and the toxicity parameters that the EPA prescribes for public health risk assessment will be identified. The two primary sources of toxicity values that will be used for this subtask are the Integrated Risk Information System (IRIS) and the Heath Effects Assessment Summary Tables (HEAST). IRIS reports only those toxicity values that have been verified by a USEPA RfD or Carcinogen Risk Assessment Verification Endeavor (CRAVE) Workgroup. Information in IRIS will supersede all other sources and only if information is not available in IRIS for a chemical of concern will other sources be consulted. When data are not available from IRIS, values will be obtained from HEAST. HEAST summarizes interim (and some verified) toxicity values as well as other chemical-specific toxicological information. If toxicity information is absent in both IRIS and HEART databases, it may be necessary to review EPA criteria documents, and the Agency for Toxic Substances Disease Registry (ATSDR) toxicological profiles for the information. Following EPA headquarters guidance, data will be preferentially taken from these sources in the order listed above.

In many cases, the EPA has developed a cancer potency factor for only a single route of exposure, generally ingestion. EPA guidance dictates use of judgment on the part of the risk assessor in determining whether and how potency factors can be extrapolated from one route to another. Typically, this requires examination of the supporting toxicology literature.

The dose response assessment will include all detected compounds and will result in the generation of a verified set of cancer potency factors for the carcinogens (with EPA weight-of-evidence classifications), and chronic and developmental toxicant reference doses (RfD) and associated uncertainty factors for non-carcinogens. Also included as part of this subtask is the development of general toxicity profiles.

8.1.4 Exposure Assessment

The purpose of the exposure assessment is to identify all plausible, present and future exposure pathways and, for the significant pathways, to estimate the contaminant dose received by humans via these pathways. The exposure assessment will use the guidelines given in Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factor".

During this task, the exposure setting will be characterized by evaluating current and future land use. Then complete pathways of potential human exposure to contaminants from the HHA are identified for quantitative or qualitative analysis. Lastly, exposure doses and exposure point concentrations that will be used to characterize the risk are determined.

A complete exposure pathway consists of the following elements:

- A source and mechanism of release
- An environmental transport medium for the released chemical (pathway)
- A receptor and a point of potential human contact with the contamination

The information collected on the local activity site and the surrounding area will be used to characterize the physical environment and the potentially exposed populations. Current and future exposure pathways are identified that could result in human exposure to the contaminants originating at the site. The pathway selected for quantitative evaluation will be those considered to pose a significant risk to human health.

The first step in the exposure assessment is the characterization of the populations that may be exposed. This information includes demographic characteristics related to climate, geology, vegetation, soil types, and hydrology. Information gathered during the performance of field work that will aid in the characterization of current and future land use, current and future populations, and activity patterns will be incorporated into the exposure assessment.

The description of the physical setting and the potentially exposed populations, together with the results of the RI field sampling and analysis program, will be used to evaluate the presence of, absence of, or potential for exposure to compounds present at the HHA sites via typical routes of exposure at hazardous waste sites.

The typical routes of exposure that will be evaluated for possible inclusion in the Human Health Risk Assessment are:

- Inhalation of Vapors
- Inhalation of Particulates
- Ingestion of Fugitive Dust
- Ingestion of Sediment On Site
- Ingestion of Sediment Off Site
- Ingestion of Ground Water
- Ingestion of Plants
- Ingestion of Surface Water
- Dermal Contact with Sediment On Site
- Dermal Contact with Sediment Off Site
- Dermal Contact with Ground Water
- Dermal Contact with Surface Water

The evaluation of pathways will be completed for all receptors and both current and future land use. The result of the evaluation will be the identification and rationale for the inclusion or exclusion of exposure pathways that will be quantitatively or qualitatively addressed in the risk

Exposure factors will then be calculated for each compound and receptor, at each exposure point, and for each exposure route, based on conservative assumptions and factors developed in accordance with federal guidance. For exposure routes with multiple receptors, the most conservative pathway, (i.e., pathway that yields the greatest exposure (factor) for the particular medium) will be evaluated. Exposure factors define the contact between an organism and a transport media. The general equation for estimating contact is as follows:

$$E = \frac{CR \times EFD}{BW \times AT}$$

where:
- E = Exposure Factor (volume or mass/kg/day)
- CR = Contact Rate (volume or mass/day)
- EFD = Exposure Frequency Duration (days)
- BW = Body Weight (kg)
- AT = Averaging Time (days)

The exposure factors are then multiplied by the exposure point concentration to yield the average daily dose (ADD). ADDs are calculated as the mass of contaminant taken into the body per unit body weight per unit time, generally in units of mg/kg/day. The ADD received from a potential exposure route is described by the following equation:

$$ADD = E \times EPC$$

where:
- ADD = Average Daily Dose (mg/kg/day)
- EPC = Exposure Point Concentration (mg/volume or mass)
- E = Exposure factor (volume or mass/kg/day)

Exposure point concentrations for oral and dermal human exposure routes will be based on direct contact with the media of concern chemical concentrations obtained from the analysis of samples collected during the RI. No natural attenuation will be assumed to occur for the purpose of calculating future risks. For each of the potential human exposures pathways, current and future exposure scenarios utilizing average and reasonable worst case exposure point concentrations will be evaluated.

8.1.5 Risk Characterizations

The final step in the risk assessment is to integrate information on dose and toxicity with the exposure information to assess the potential for adverse effects to human health. This includes relating the dose of contaminants received to the expected effect and evaluating dose/response relationships. Additionally, a hazard quotient and incremental cancer risk will be determined for each compound associated with a pathway as part of the risk characterization.

The hazard quotient is a measure of a compound's non-carcinogenic health effect. It is computed by dividing the expected/actual dose by the RfD for an individual chemical and an individual exposure pathway. The hazard quotient for each detected chemical are summed within each

exposure pathway by duration of exposure (chronic, subchronic, or short term) to yield a Hazard Index (HI) for each pathway and exposure period. If the HI is less than 1.0, adverse health effects for the exposure are not anticipated. However, a HI greater than 1.0 is not necessarily a cause for concern. If the HI exceeds 1.0., but does not exceed 10, a new sum is required for each target endpoint (i.e. liver/kidney effects). If the endpoint HI still exceeds 1.0 then one must examine the toxicity data, particularly the magnitude of the uncertainty factor, the severity of the effect, and specific health impacts.

Lifetime incremental cancer risks are calculated by multiplying the dose, expressed in units of mass per unit of body weight per day (e.g. mg/kg/day), by the potency factor which is expressed in the inverse units of the dose (i.e. $mg/kg/day)^{-1}$). The result is a dimensionless probability number for individual excess cancer risk based upon a 70 year lifetime of exposure. When exposure occurs over less than a lifetime, doses are averaged over a 70-year lifetime under the assumption that the carcinogenic effects of high does over short time periods are equivalent to the effects of lower doses over longer time periods. While there are metabolic processes that result in this assumption being more or less conservative, regulatory guidance does not currently provide alternative approaches. The aggregate excess cancer risk for each pathway is developed by summing over all of the chemicals.

Quantitative non-carcinogenic and carcinogenic risk estimations under current and future land use will be computed for both the average and reasonable maximum exposure point concentrations. The results of the risk characterization will be presented in tabular and graphical format.

8.1.6 Uncertainties/Limitations

The risk assessment will identify data gaps and uncertainties, and whenever information permits, will indicate how they might have influenced the results. All relevant aspects of the risk assessment will be addressed including sample data characterizing the site; procedures for modeling environmental fate and exposure; uncertainty in developing toxicity parameters, including the use of uncertainty factors and confidence intervals; and extrapolations of toxicity parameters across exposure routes.

8.2 Task 6.0 - Feasibility Study

Analysas Corporation will conduct a feasibility study (FS)for HHA in accordance with EPA Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA. The FS objective is to develop remedial alternatives that address potential unacceptable risks to human health and the envrionment by contaminated media.

The FS will include the development and evaluation of remedial action alternatives that will allow selection of remedial action that: demonstrate short-term effectiveness; demonstrate long-term effectiveness and permanence; reduce toxicity of chemical hazards present, mobility, or volume; can be implemented; are cost-effective; comply with Applicable or Relevant and Appropriate Requirements (ARARs); are protective of human health and the environment; are acceptable to the appropriate regulatory review agencies; and are acceptable to the community. A Proposed Plan, Responsiveness Summary, and Record of Decision shall be performed as part of the FS and be provided as separate deliverables.

While performing the FS, we will follow the EPA guidance for conducting RI/FS and also generally meet the following expectations required by the NCP:

- Development of engineering controls for materials that pose a low-level threat or where treatment is impracticable
- Determination of appropriate combinations of control (i.e. treatment and containment), as appropriate
- Inclusion of institutional controls for mitigation of short-term impacts and/or as a supplement to engineering control
- Employment of innovative technologies where there is a reasonable belief that they may perform as well as, or better than, conventional technologies
- Return of ground water to its beneficial uses within a reasonable time frame
- Use of treatment to address principal threats whereever practical

8.2.1 Subtask 6.1 - Develop and Screen Alternatives

In performing this task, we will develop alternatives for remediation of the ground water and soils by assembling combinations of technologies into groups that address combination of a sitewide basis. The process consists of two general steps as outlined below:

- Iterative Development
- Development of remedial action objectives
- Identification of volumes of ground water and leachate to be remediated
- Identification and screening of remedial technologies and process options
- Evaluation of process options
- Assembling of the selected representative technologies into alternatives
- Alternatives Screening
- Definition of alternatives
- Evaluation of alternatives
- Screening of alternatives

If a situation arises in which numerous waste management options are appropriate and have been developed, we will refine and screen the assembled alternatives to reduce the number of alternatives that will be analyzed in detail.

8.2.1.1 Alternative Development

Develop Remedial Action Objectives: The goal of the remedy selection process is to select remedial alternatives that protect and maintain human health and the environment over time while minimizing untreated wastes. We will develop remedial action objectives using the data collected during the activities in support of this RI/FS. We will continually review these objectives as new

data are collected to ensure that the overall objectives of the FS are met. The remedial action objectives will specify the following for each operable unit:

- Contaminant(s) of concern associated with each medium
- Potential exposure pathways
- Remediation goals

The remedial action objectives for protecting human health will be expressed in terms of the contaminant level and associated exposure routes so that the necessary level of protection could potentially be achieved by reducing exposure or reducing contaminant levels. Preliminary remediation goals will be developed based on readily acceptable information, such as chemical-specific ARARs or other reliable information. These will be modified as necessary, when more information becomes available. Final remediation goals that protect human health and the environment will be based upon ARARs and the health and ecological risk assessments.

Identify Volumes or Areas of Media: During the development of alternatives, we will perform an initial determination of areas or volumes of media to which the general response action must be applied. This initial determination will be made for each medium of interest and, to take into account interactions between the media, the general response actions will be refined after sitewide alternatives have been assembled. As with all steps in the FS, the volumes and areas of contaminated media will be updated as the RI progresses. The volumes and areas to which general response action might be applied will be based on: exposure pathways, nature and extent of contamination, preliminary remediation goals, and action-specific ARARs.

Identify and Screen Remedial Technologies and Process Options: In this step, we will use the FS to reduce the universe of potentially applicable technology types and process options to those that are technically implementable.

Evaluate Process Options: The process options from the FS will be evaluated using the same criteria -- effectiveness, implementability, and cost -- that will be used to screen alternatives prior to the detailed analysis. However, in this evaluation, the criteria will be applied only to technologies and general response actions, and not to the operable unit as a whole. In addition, effectiveness will be weighted more heavily at this stage than either implementabilty or cost. At this point, we will also be evaluating innovative technologies; however, it may not be possible to evaluate these technologies on the same basis as demonstrated technologies because of the lack of information on the effectiveness and cost. Typically, if the innovative technology is considered applicable, it will be carried to the next round of the FS.

Assemble Alternatives: In assembling alternatives, general response actions and the process options chosen to represent the various technologies types for each medium or area will be combined for the site as a whole. To assemble alternatives, we will combine general response actions using different technology types and different volumes of media and/or areas.

8.2.1.2 Screen Alternatives

Before screening, alternatives will be assembled primarily on media-specific consideration and

implementability concerns. A few details of the individual process options will have been identified, including sizing requirements of technologies or remediation time frames. In addition, interactions among media, which may influence remediation activities, will not have been fully addressed. Therefore, at this point we will further define such aspects of the alternatives to form the basis for their evaluation and comparison.

After completing the definition of the alternatives, we will evaluate and screen the alternatives. According to the NCP, alternative screening criteria include: effectiveness, implementability, and cost. Effectiveness refers to the degree to which an alternative reduces toxicity, mobility, and/or volume through treatment; minimizes residual risks; affords long-term protection; complies with ARARs; minimizes short-term impacts; and achieves protection rapidly. Alternatives providing significantly less effectiveness than others may be eliminated.
Implementability focuses on the technical feasibility, administrative feasibility, and availability of alternatives. Alternatives that are technically and administratively infeasible, or that would require equipment, specialists, or facilities that are not available within a reasonable period of time, may be eliminated from further consideration.

Costs of construction, as well as operation and maintenance, will be considered. Alternatives requiring costs that are grossly excessive compared to the overall effectiveness of alternatives may be eliminated. Alternatives providing effectiveness and implementability similar to those of other alternatives, but at greater cost, may also be eliminated.

8.2.2 Subtask 6.2 - Detailed Analysis of Alternatives

The detailed analysis of remedial alternatives consists of the analysis and presentation of the relevant analysis of remedial alternatives consists of the analysis and presentation of the relevant information needed to allow the Army to select a site remedy. During the detailed analysis, each alternative is assessed against the nine evaluation criteria developed to address the CERCLA requirements:

Threshold Factors:
- Overall protection of human health and the environment
- Compliance with ARARs

Primary Balancing Factors:
- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, or volume
- Short-term effectiveness
- Implementability
- Cost

Modifying Considerations:
- State acceptance
- Community acceptance

The results of this assessment will be arrayed to compare the alternatives and identify the key tradeoffs among them. This approach to analyzing the alternatives will provide decision makers with sufficient information to adequately compare the alternatives, select an appropriate remedy for the action sanitary landfill, and demonstrate satisfaction of the CERCLA remedy selection

requirements in the ROD.

Our performance of the detailed analysis will consist of three steps:

- Further definition of each remedial alternative, as necessary
- Assessment of each alternative against the evaluation criteria
- Comparative analysis among the alternatives to access the relative performance of each alternative

These steps are explained further in the following sections.

8.2.2.1 Definition of Alternatives

Each alternative will be reviewed to determine what, if any, additional information would be required to apply the evaluation criteria consistently and to develop order-of-magnitude cost estimates (+50% to -30%). The additional information developed to define the alternatives would include: preliminary design calculations, process flow diagrams, sizing of key process components, preliminary site layouts, and a discussion of limitations, assumptions, and uncertainties concerning each alternative. Description of alternatives will identify the treatment technologies as available or innovative and will provide information on the performance and effectiveness of treatability studies, type of media, waste constituents, and volume of material to be treated by each technology.

8.2.2.2 Assessment of Remedial Alternatives

When the remedial alternatives have been defined, the individual analyses will profile the performance of each alternative against nine evaluation criteria, highlighting the specific strengths and weaknesses of a particular alternative will be assessed are compliance with ARARs and overall protection of human health and the environment. Generally, these are considered threshold criteria; in other words, their evaluation involves describing whether, and how, each alternative either does or does not meet the two criteria.

The five primary criteria, which will be applied next, taking into account technical cost, institutional, and risk concerns, include:

Short-Term Effectiveness - The assessment against this criteria will examine the effectiveness of the alternatives in protecting human health and the environment during the construction and implementation period until response objectives have been met.

Long-Term Effectiveness and Performance - The assessment of the alternatives against this criteria will evaluate the long term effectiveness of the alternatives in protecting human health and the environment after response objectives have been met.

Reduction of Toxicity, Mobility, and Volume - The assessment against this criteria will evaluate the anticipated performance of the specific treatment technologies.

Implementability - The assessment will evaluate the technical and administrative feasibility of alternatives and the availability of required resources.

Cost - This assessment will evaluate the capital and O&M costs of each alternative.

The level of detail required to analyze each alternative against these evaluation criteria will depend on the type and the complexity of the site, the type of technologies and alternatives being considered, and other project-specific considerations.

The final two criteria, state acceptance and community acceptance, will be evaluated to the extent possible, on the basis of the information available at the time of the detailed analysis. Historical involvement of the state and community members with this site will be considered strongly.

The analysis of the individual alternatives with respect to the evaluation criteria will be presented in the FS report as a narrative discussion accompanied by a summary table. The narrative will include, for each alternative, a description of the alternative and a discussion of the individual criteria. The narrative will also include a discussion on how risks to human health and the environment will be reduced (i.e. remediation goals, risk levels, corresponding to remediation goals, points of compliance, areas of attainment, and level of residual risk).

As part of the feasibility study, the contractor shall prepare a Proposed Plan, Responsiveness Summary, and Record of Decision. The Proposed Plan shall contain a summary of the environment conditions at the site as determined during the RI/FS, a description of the remedial alternatives evaluated in the FS, the preferred alternative, a summary of any proposed waivers to the Applicable or Relevant and Appropriate Requirements (ARARs) and a brief analysis that supports the preferred alternative. The Responsiveness Summary shall summarize the elements of community involvement in developing the remedial alternative in the Proposed Plan and responds to each of the significant comments received during the public comment period. This summary shall become part of the Record of Decision. The Record of Decision shall contain a declaration, the decision summary, and the responsiveness summary.

8.2.2.3 Comparative Analysis of Remedial Alternatives

Once the alternative have been described and individually assessed against the evaluation criteria, we will perform a comparative analysis to evaluate the relative performance of each alternative in relation to each specific evaluation criteria. The purpose of this comparative analysis is to identify the advantages and disadvantages of each alternative to one another so that the key tradeoffs can be identified.

The results of the comparative analysis will be documented in the FS report and include a narrative discussion describing the strengths and weaknesses of the alternatives relative to one another with respect to each evaluation criteria and to how reasonable variations of key uncertainties could change the expectations of their relative performance. If innovative technologies are being considered, their potential advantages in cost or performance and the degree of uncertainty in the expected performance will also be addressed.

8.3 Task 7.0 - Community Relations Support

Analysas Corporation will support AEC in the Public Involvement and Response Program for HHA and FTA . This support will consist of attendance and provision of a presentation of work performed at HHA and FTA task at one public meeting. This effort will be based in part on the Public Involvement and Response Plan for Fort Meade Base Closure Parcel Site Inspection and Phase II Remedial Investigation Studies as well as EPA guidance.

As part of the community relations, Fact Sheets will be prepared summarizing the activities of the RI/FS tasks at HHA and FTA, public involvement opportunities, and background on environmental conditions at HHA and FTA. The fact sheets will distributed to the community. If necessary, interviews will be conducted with citizens of the community to support in the selection of the remedial action.

9.0 PROJECT MANAGEMENT

9.1 Organization Structure

A brief description of the responsibilities of the key Analysas staff is found below.

- Mr. Joseph A. Zillo is the Analysas Corporation Contract Manager. Mr. Zillo will interact with Ms. Janet Beavers, the contract administrator for USAEC.

- Ms. Sue Studley is responsible for contract administration. She will review and track monthly costs. She will supported by Mr. Crit Parrot.

- Mr. Richard Tringale, P.E., is the overall Program Manager. He will be responsible for monitoring technical progress, reviewing and approving all work products, and quality assurance on all deliverables before their submission to USAEC. He will provide oversight, monitor financial and schedule control, and institute any necessary corrective action. Mr. Tringale is designated as the Corporate Sponsor for all technical and administrative issues associated with the performance of this task order and will serve as a point of contact for any concerns or recommendations pertaining to the activities being performed by Analysas or their subcontractors.

- Ms. Alison Doherty, C.P.G., is the Task Manager for these delivery orders, reporting directly to Mr. Tringale. As Task Manager, Ms. Doherty is responsible for project staffing and direct management of all staff assigned to these delivery orders; direct financial and schedule control; review and approval of all deliverables; recommending necessary corrective actions to the Program Manager; and continuing liaison with the USAEC Project Officer. Ms. Doherty is responsible for ensuring the USAEC Project Officer is kept apprised of technical progress and of any problems which may arise. Ms. Doherty will coordinate all subcontractor activities in the performance of these task orders. In addition, she will present the findings and results of these studies at the public meeting.

- Mr. Peter Mattejat, P.E., is the Deputy Task Manager. In Ms. Doherty's absence, he will serve as Task Manager and maintain awareness of the day-to-day status of the project. Mr. Mattejat will support and report directly to the Task Manager in performance of the task order. He will be involved in the field investigations and report developments.

- Mr. Michael Mason will be responsible for several tasks. Mr. Mason will be responsible for Quality Assurance, and control of project costs and schedules. In addition to project management, he will provide technical support as the Senior Geologist.

- Mr. R. Steve McKamey, P.E. will provide technical support. Mr. McKamey will report directly to the Task Manager in performance of the task order. Mr. McKamey will be responsible for all technical coordination of work activities performed at Analysas' Oak Ridge Corporate Office.

- Mr. John Dugger will be responsible for all health and safety aspects, as well as providing health and safety oversight as required. Ms. Doherty will serve as the site health and safety officer and will receive guidance from Mr. Dugger as needed.

9.2 Task Performance

Principal technical management will be the responsibility of Alison Doherty. Ms. Doherty is located in Analysas Corporation's Washington, D.C. office, which provides ease of communication with USAEC personnel. Additionally, site visits will be facilitated through the Washington office, due to this proximity to USAEC at Aberdeen Proving Ground, and to Fort George G. Meade. Ms. Doherty will oversee the installation/rehabilitation of ground water monitoring wells; UXO screening; collection of multimedia environmental samples; review of existing data; and analysis of additional data collected during this study. Mr. Mattejat will support Ms. Doherty in the field investigations. Ms. Doherty and Mr. Mattejat will be responsible for the Remedial Investigation (RI) report preparation.

Primary responsibility for the feasibility study (FS) and the FS report will be assigned to Mr. McKamey, at the Analysas office in Oak Ridge, Tennessee. Mr. McKamey will be responsible for the preparation of the baseline risk assessment. Additionally, Mr. McKamey will perform all hydrologic, transport, and pathway exposure modeling in support of the task order.

The analysis of NEPA compliance will be assigned to Mr. William Osburn, CHMM, REM, of the Analysas Corporation Oak Ridge office.

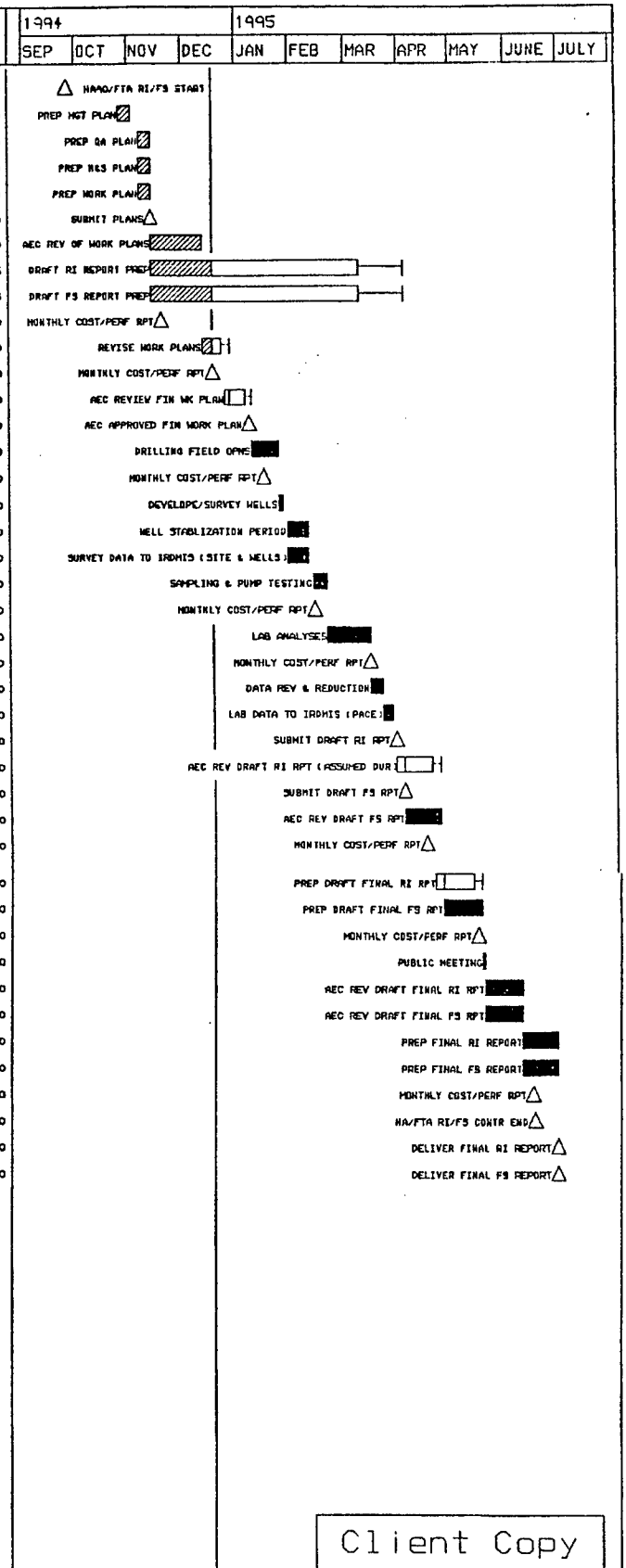
The Health and Safety Plan and all issues pertaining to the health and safety of personnel working on the project will be responsibility of Mr. John Dugger, of the Oak Ridge office.

The Quality Assurance Project Plan and quality assurance of data and documentation will be accomplished by Mr. Mark Simmons. Mr. Simmons will be primarily responsible for the quality assurance of data being input to the Installation Restoration Data Management Information System (IRDMIS) system by Analysas.

Computer-aided design and drawing (CADD) and geographic information system (GIS) support will be under the direction of Mr. George Brumbaugh. Mr. Brumbaugh will provide assistance as needed in the preparation of graphic representations of the site, as well as visualization of remedial alternatives.

Preparation of fact sheets and materials for the public participation process will be the responsibility of Mr. Donald Barksdale.

ACTIVITY NUMBER	DESCRIPTION	EARLY START	LATE FINISH	RESP	DUR/ TOT FLT	PCT CMP
HA10000	HA90/FTA RI/FS START	27SEP94A		ADSM	0/	100
HA10270	PREP HGT PLAN	27OCT94A		ADSM	5/	100
HA10280	PREP QA PLAN	08NOV94A		ADSM	5/	100
HA10290	PREP H&S PLAN	08NOV94A		SM	5/	100
HA10300	PREP WORK PLAN	08NOV94A		AD	5/	100
HA10305	SUBMIT PLANS	15NOV94A		AD	0/	100
HA10310	AEC REV OF WORK PLANS	15NOV94A		SM	10/	100
HA10240	DRAFT RI REPORT PREP	15NOV94A	04APR95	ADSM	97/18	25
HA10460	DRAFT FS REPORT PREP	15NOV94A	04APR95	ADSM	97/18	25
HA10190	MONTHLY COST/PERF RPT	21NOV94A		MGAD	0/	100
HA10312	REVISE WORK PLANS	13DEC94A	27DEC94	AD	5/2	50
HA10200	MONTHLY COST/PERF RPT	19DEC94E	14DEC94L	MGAD	0/-2	0
HA10317	AEC REVIEW FIN WK PLAN	26DEC94	10JAN95	SM	10/2	0
HA10327	AEC APPROVED FIN WORK PL	09JAN95	10JAN95	SM	0/2	0
HA10320	DRILLING FIELD OPNS	11JAN95	25JAN95	AD	10/0	0
HA10210	MONTHLY COST/PERF RPT	17JAN95E	13JAN95L	MGAD	0/0	0
HA10325	DEVELOPE/SURVEY WELLS	26JAN95	27JAN95	DRLR	2/0	0
HA10330	WELL STABLIZATION PERIOD	30JAN95	10FEB95	AD	10/0	0
HA10340	SURVEY DATA TO IRDMIS (S	30JAN95	10FEB95	AD	10/0	0
HA10350	SAMPLING & PUMP TESTING	13FEB95	21FEB95	AD	6/0	0
HA10220	MONTHLY COST/PERF RPT	15FEB95E	14FEB95L	MGAD	0/0	0
HA10360	LAB ANALYSES	22FEB95	14MAR95	AD	15/0	0
HA10230	MONTHLY COST/PERF RPT	15MAR95E	14MAR95L	MGAD	0/0	0
HA10370	DATA REV & REDUCTION	15MAR95	21MAR95	AD	5/0	0
HA10380	LAB DATA TO IRDMIS (PACE	22MAR95	28MAR95	LAB	5/0	0
HA10400	SUBMIT DRAFT RI RPT	31MAR95	04APR95	AD	0/3	0
HA10410	AEC REV DRAFT RI RPT (AS	31MAR95	25APR95		15/3	0
HA10470	SUBMIT DRAFT FS RPT	05APR95	04APR95	AD	0/0	0
HA10480	AEC REV DRAFT FS RPT	06APR95	25APR95		15/0	0
HA10240	MONTHLY COST/PERF RPT	17APR95E	14APR95L	MGAD	0/0	0
HA10420	PREP DRAFT FINAL RI RPT	21APR95	16MAY95	ADSM	15/3	0
HA10490	PREP DRAFT FINAL FS RPT	26APR95	16MAY95	ADSM	15/0	0
HA10250	MONTHLY COST/PERF RPT	15MAY95E	12MAY95L	MGAD	0/0	0
HA10430	PUBLIC MEETING	17MAY95	17MAY95	AD	1/0	0
HA10440	AEC REV DRAFT FINAL RI R	19MAY95	08JUN95		15/0	0
HA10510	AEC REV DRAFT FINAL FS R	18MAY95	08JUN95		15/0	0
HA10450	PREP FINAL RI REPORT	09JUN95	24JUN95	ADSM	15/0	0
HA10520	PREP FINAL FS REPORT	09JUN95	24JUN95	ADSM	15/0	0
HA10260	MONTHLY COST/PERF RPT	15JUN95E	14JUN95L	MGAD	0/0	0
HA19999	HA/FTA RI/FS CONTR END	16JUN95E	15JUN95L	SM	0/0	0
HA10530	DELIVER FINAL RI REPORT	30JUN95	29JUN95	ADSM	0/0	0
HA10540	DELIVER FINAL FS REPORT	30JUN95	29JUN95	ADSM	0/0	0



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Ambrose Corporation, Environmental Services Division
150 Lafayette Drive, Suite 410, Oak Ridge, TN 37830

RUN DATE 19DEC94
START DATE 27SEP94
DATA DATE 19DEC94
FINISH DATE 29JUN95

FT GEORGE MEADE RI/FS
HANGER 90 & FIRE TRNG AREA
for the
ARMY ENVIRONMENTAL CENTER

SURETRAK

FT MEADE RI/FS

EXHIBIT 10-1: PROPOSED SCHEDULE

After receipt of public comments on the FS and proposed Plan, we will support the Army in the selection of remedial alternatives for the HHA. The decision will be documented in the Record of Decision (ROD). The ROD will include the following information:

- Certification that the remedy selection process was carried out in accordance with CERCLA and, to the extent practicable, with the NCP.

- Description of the technical parameters of the remedy, specifying treatment, engineering, and institutional components as well as remediation goals.

- A consolidated source of information for the public, about the site and the chosen remedy, including rationale for the selection.

11.0 REFERENCES

Arthur D. Little, Inc. Final Technical Work Plan, Feasibility and Remedial Investigation/Site Inspection Addendum. Fort George G. Meade, Maryland. December 1992.

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U.S. Environmental Protection Agency (EPA). Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual - Interim Final. September 1989.

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