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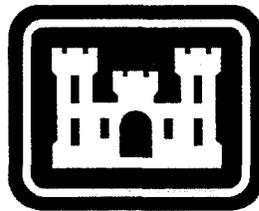
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**Work Plan**

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**Interim Corrective Measure  
Design at Area F  
Redstone Arsenal, Alabama**

Prepared for:



**U.S. ARMY CORPS OF ENGINEERS**  
Savannah District

EPA ID NO. AL2 210 020 742

Contract: DACA 21-91-D-0024

March 25, 1994

**EBASCO ENVIRONMENTAL**  
*A Division of Ebasco Services Incorporated*

EPA ID NO. AL2 210 020 742  
DELIVERY ORDER NO. 0010  
UNDER  
CONTRACT NO. DACA 21-91-D-0024  
EBASCO SERVICES INCORPORATED

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REDSTONE ARSENAL, ALABAMA

APRIL 22, 1993

Prepared Under the Supervision of



Albert D. O'Rear, P.E.

Date: 4/22/1993

Alabama P.E. License No. 16395

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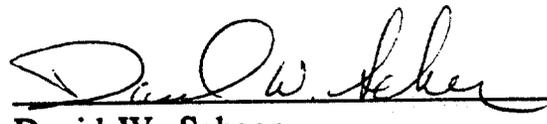
**FINAL WORK PLAN  
INTERIM CORRECTIVE MEASURE DESIGN AT AREA F  
REDSTONE ARSENAL, ALABAMA**

**APRIL 22, 1993**

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## EXECUTIVE SUMMARY

This Work Plan describes the services which the Ebasco Team will provide for the design of the Interim Corrective Measure (ICM) at Area F. Area F consists of three closed disposal impoundments formerly used for the disposal of arsenic-contaminated wastes.

### Field Work

Ebasco will perform a Field Sampling Program to obtain additional field data required to complete the design of the ICM. The further delineation of lateral soil (arsenic) contamination will be determined by shallow soil boring and sampling around the perimeter of Area F. This sampling should define areas of shallow surface soil contamination outside the closed impoundment areas. The Field Sampling Program will also involve a geotechnical investigation of a proposed borrow area to determine suitability of local clays for use as a low permeability layer of the final cap. Disturbed soil samples will be obtained from twelve test pits for identification, compaction and hydraulic conductivity tests. A topographic survey of the borrow area will be performed to gather information for quantity estimates for in-place borrow material. All test pits will be located in a non-contaminated proposed borrow area.

### Design Reports

The results of the Field Program will be analyzed, and the information gathered will be used to prepare Design Reports for the construction of a RCRA multilayer final clay cap over the closed arsenic impoundments, rerouting of a drainage ditch and installation of a fence at Area F. The Design Reports to be prepared include a Topographic Survey, Drawings, Specifications, Cap Design Analysis, and Health and Safety Design Analysis.

Ebasco also will prepare Installation and Maintenance Plans which describe how the ICM will be installed and maintained. These will include a Personnel Training Plan, Maintenance Plan, Installation Quality Control Plan and Site-Specific Health and Safety Plan. Ebasco will submit a detailed cost estimate for ICM installation.

In addition to the Design Reports, I&O Plans, cost estimates and follow-up reports, Ebasco will maintain close coordination with appropriate organizations, attend all required meetings and provide community relations support to the U.S. Army Corps of Engineers and to Redstone Arsenal throughout the duration of design activities.

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## LIST OF ABBREVIATIONS

ADEM	Alabama Department of Environmental Management
AEHA	U.S. Army Environmental Hygiene Agency
BNA	Base/Neutral/Acid Extractables
BTEX	Benzene, Toluene, Ethyl-Benzene, Xylene
CESAS	Savannah District Corps of Engineers
CDAP	Chemical Data Acquisition Plan
CFR	Code of Federal Regulations
C.I.H.	Certified Industrial Hygienist
CO <sub>2</sub>	Carbon Dioxide
DQO	Data Quality Objective
EPA	US Environmental Protection Agency
FSP	Field Sampling Plan
G&M	Geraghty and Miller, Inc.
HASP	Health and Safety Plan
HEA	Health and Environmental Analysis
HSM	Health and Safety Manager
I&O	Installation and Operation
ICM	Interim Corrective Measure
IQCP	Installation Quality Control Plan
IRA	Interim Remedial Action
KW	Kilowatt
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
mg/l	milligrams per liter
MICOM	U.S. Army Missile Command
MSFC	Marshall Space Flight Center
msl	mean sea level
N/A	Not Applicable
NASA	National Aeronautics and Space Administration
NOV	Notice of Violation
NPDES	National Pollutant Discharge Elimination System
NTP	Notice to Proceed
OSWER	Office of Solid Waste and Emergency Response, EPA
PAH	Polynuclear Aromatic Hydrocarbons
P.E.	Professional Engineer
PELA	P.E. Lamoreaux and Associates, Inc.
P.G.	Professional Geologist
PM	Project Manager
ppb	parts per billion
PPE	Personal Protective Equipment
PVC	Polyvinyl Chloride
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RSA	Redstone Arsenal

**LIST OF ABBREVIATIONS (Continued)**

<b>SWMU</b>	<b>Solid Waste Management Unit</b>
<b>TCE</b>	<b>Trichloroethylene or Trichloroethene</b>
<b>TM</b>	<b>Task Manager</b>
<b>USACE</b>	<b>United States Army Corps of Engineers</b>
<b>UV</b>	<b>Ultraviolet</b>
<b>V</b>	<b>Volts</b>
<b>VOC</b>	<b>Volatile Organic Compound</b>
<b>WP</b>	<b>Work Plan</b>

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## SECTION 1.0 INTRODUCTION

1.0.a The U.S. Army Missile Command (MICOM) Environmental Management Office of Redstone Arsenal, Alabama, has tasked the U.S. Army Corps of Engineers (USACE), Savannah District (CESAS) to conduct an interim remedial action (IRA) at Area F, the arsenic waste disposal ponds at Redstone Arsenal. The Interim Corrective Measure (ICM) for this project involves the design and construction of a protective clay cap to isolate the arsenic wastes from the environment.

1.0.b The CESAS has tasked Ebasco Services Incorporated (Ebasco) under the Indefinite Delivery Order Contract DACA 21-91-D-0024 to prepare interim remedial design documents pertaining to the ICM at Area F. The objective of this Interim Corrective Measures Design Work Plan is to describe the tasks which will be conducted during the performance of the project.

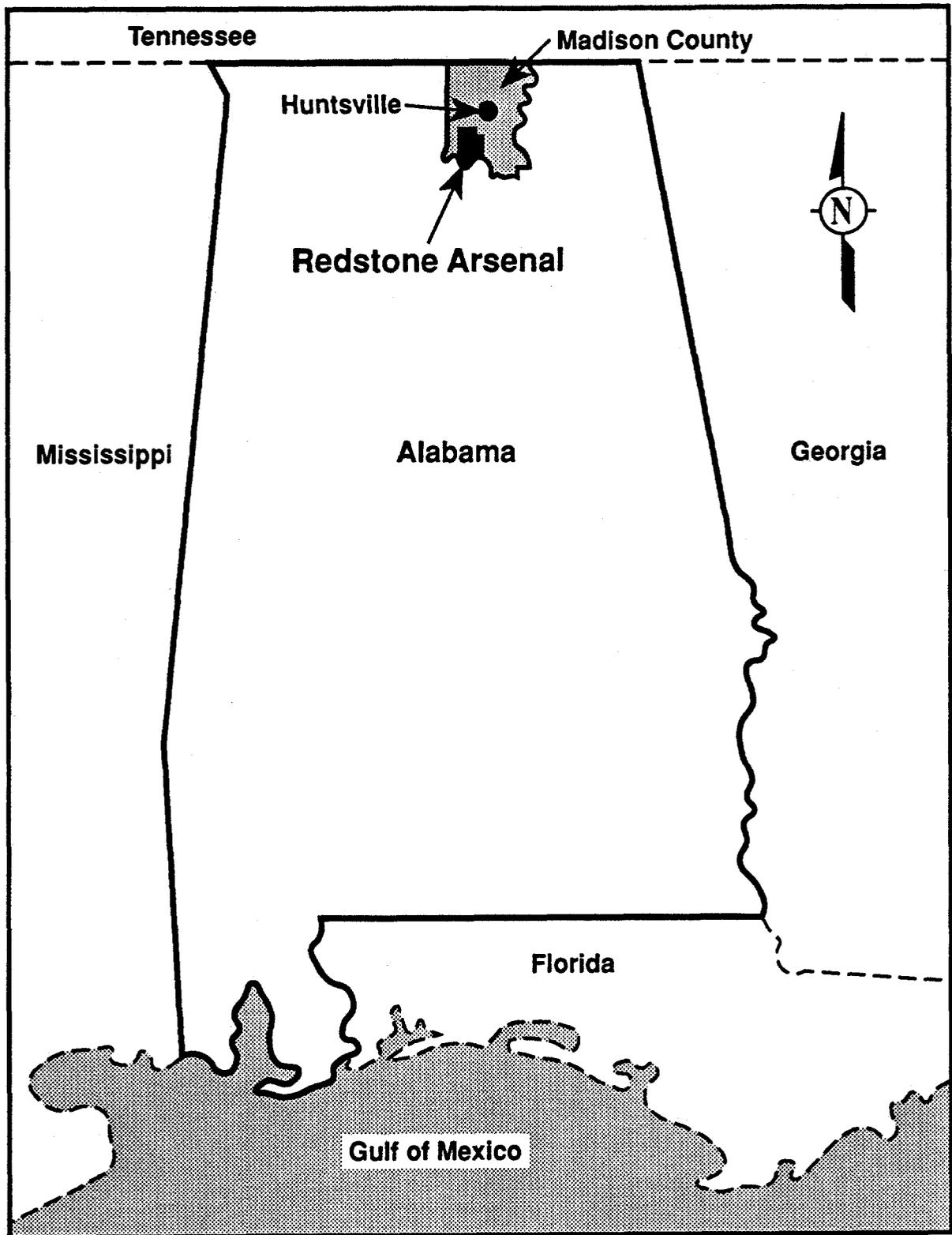
### 1.1 LOCATION

#### 1.1.1 Redstone Arsenal

1.1.1.a Redstone Arsenal (RSA) is located in north central Alabama in the southwestern portion of Madison County as shown in **Figure 1-1: Location of Redstone Arsenal**. RSA is bounded by the City of Huntsville to the north and east, and the Tennessee River to the south. The towns of Madison and Triana are northwest and southwest of the Arsenal, respectively. Principal roadway access to the Huntsville area and RSA is provided by U.S. Highways 72, 231 and 431 and Interstate Highways 65 and 565.

1.1.1.b RSA encompasses approximately 38,300 acres. Of that area, 1,841 acres in the central part of RSA are leased to Marshall Space Flight Center (MSFC) of the National Aeronautics and Space Administration (NASA). The remaining 36,459 acres are controlled by the Department of the Army and support many land use functions. An additional 2,900 acres owned by the Tennessee Valley Authority (TVA) and 4,100 acres of Wheeler National Wildlife Refuge are located within the boundaries of RSA. Approximately 15,500 acres of RSA are woodlands and 9,200 acres are leased for agricultural use. Over 10,200 acres include maintained grassy areas, buildings, roads, and RSA facilities. The area surrounding the Arsenal is mixed containing light industry, residential, commercial and agricultural uses.

1.1.1.c The population of Madison County exceeds 250,000. Huntsville, located to the north of RSA, has a population of approximately 158,000. Approximately 1,000 military families reside in government quarters on RSA and approximately 31,500 government workers and contractors work at the facility.



ICM DESIGN AT AREA F, REDSTONE ARSENAL	
LOCATION OF REDSTONE ARSENAL	
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FIGURE 1-1 LOCATION OF REDSTONE ARSENAL

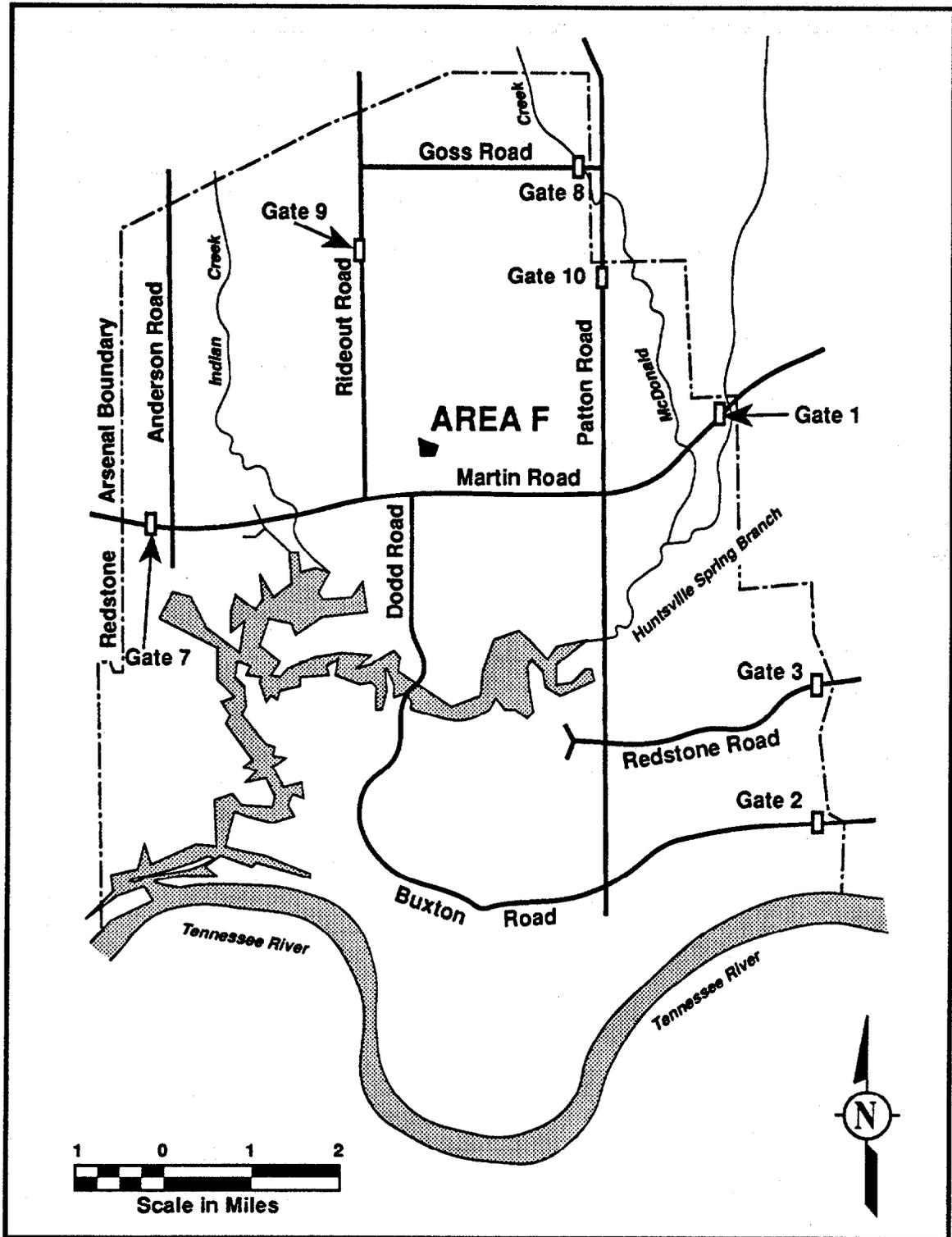
## 1.1.2 Area F

- 1.1.2.a Area F is located in central RSA north of the former Lewisite Manufacturing Plant Area (**Figure 1-2: Location of Area F**) and north of Digney Road. As shown in **Figure 1-3: Area F - Closed Arsenic Impoundments**, Area F is approximately 5 acres in size and consists of 3 ponds which were used to dispose of arsenic-contaminated wastes from the Lewisite manufacturing operations. Rubble and industrial wastes were disposed in the impoundments subsequent to the disposal of arsenic wastes. Arsenic has been encountered in the groundwater at concentrations of approximately 110 parts per billion (ppb).

## 1.2 PHYSIOGRAPHY

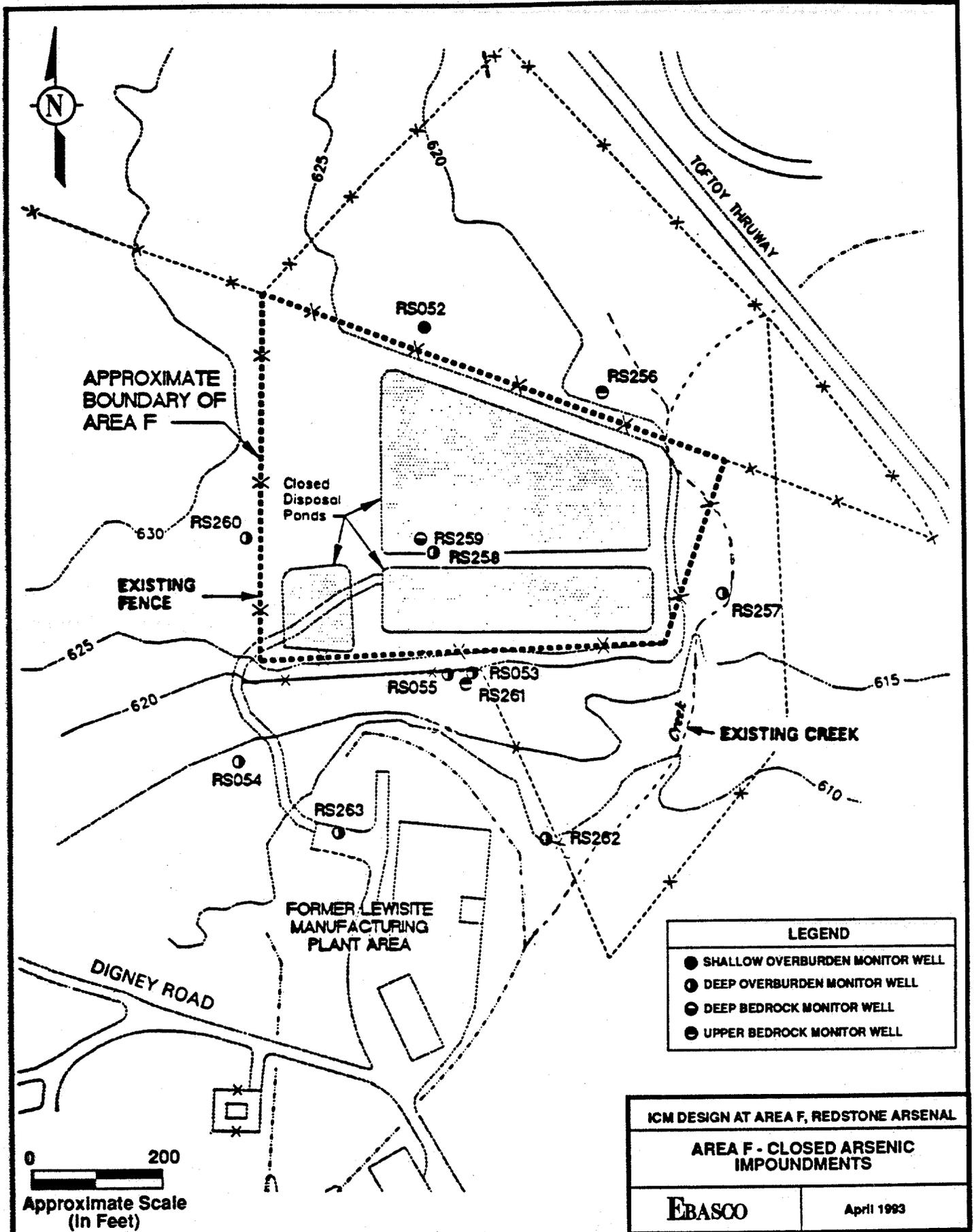
### 1.2.1 Climate

- 1.2.1.a The climate at RSA is mild and temperate with an average annual temperature of 62°F. The average summer temperature is 77°F and the average winter temperature is 47°F. The average annual snowfall is 3 inches and the average annual rainfall is 48 inches. Total monthly precipitation is usually highest in March (5.6 inches) and lowest in October (2.7 inches). The last frost in the spring is typically no later than April 5, and the first frost in the fall occurs around October 31. Floods are common from mid-December to mid-April, although extensive flooding is infrequent. The 100-year flood level of the Tennessee River is at an elevation of 572.5 feet above mean sea level (msl). Moderately dry conditions generally prevail throughout autumn.
- 1.2.1.b Madison County experiences a prevailing southeast wind, but winds from the north and south also are common. The strongest winds are recorded in the winter, while mild winds persist throughout the summer.



ICM DESIGN AT AREA F, REDSTONE ARSENAL	
LOCATION OF AREA F	
EBASCO	April 1993

FIGURE 1-2 LOCATION OF AREA F



**FIGURE 1-3 AREA F - ARSENIC IMPOUNDMENT AREA**

Source: Geraghty & Miller Inc., 1991

**1.2.2 Topography**

1.2.2.a The boundary between the Cumberland Plateau section of the Appalachian Plateau physiographic province and the Highland Rim section of the Interior Low Plateau physiographic province is in central Madison County. RSA is within the Highland Rim province. The topography of RSA is gently rolling with a general slope from north to south toward the Tennessee River. Elevations generally range from 765 feet at the northern Arsenal boundary to 556 feet at the Southern boundary. Topographically high areas are Weeden and Madkin Mountains, reaching a maximum elevation of 1,239 feet. Topographically low areas include valleys and flood plains of the Tennessee River and its tributaries. From previous studies [Ref. 8.13, 8.14], land surface elevations at Area F range from approximately 629 feet above msl in the northwestern part of the site to about 615 feet above msl in the southeastern portion.

**1.2.3 Surface Water**

1.2.3.a The Tennessee River marks the southern boundary of RSA and flows west. Huntsville Spring Branch, McDonald Drainage ditch, and Indian Drainage ditch are major tributaries that flow relatively southward to the Tennessee River. All surface drainage leaving the Arsenal empties into the Tennessee River via these tributaries and other local drainages. Approximately 90 percent of this surface drainage passes through Wheeler Lake, located in the central and southwest portion of RSA, enroute to the River. Additionally, numerous wetlands are associated with the Tennessee River, as well as its drainage ditches and tributaries. Surface water drainage at Area F is to the east toward an intermittent drainage ditch along the eastern boundary of the site. This drainage ditch, which drains into Wheeler Lake, is to be rerouted as part of the ICM.

1.2.3.b The 100-year flood level of the Tennessee River is at an elevation of 572.5 feet above mean sea level [Ref. 8.17]. The entire Area F is topographically above this 572.5 foot elevation.

**1.2.4 Site Geology**

1.2.4.a Soil boring and monitor well data collected during the Geraghty and Miller (G&M) RCRA Facility Investigation (RFI) [Ref. 8.17] and previously collected data [Ref. 8.13] indicate three distinct water-bearing zones: (1) a sandy clay perched water bearing zone, (2) a sandy clay and chert rubble zone at the base of the overburden, and (3) the bedrock Tusculumbia Limestone. The overburden thickness ranges from approximately 36 feet (RS053) to 60 feet (RS257). The upper portion of the overburden consists of a surficial sandy-clay and poorly-sorted, clayey sand with weathered limestone and chert fragments separated by a dense clay layer. The clay layer results in a perched sandy clay water-bearing zone on the northern half of the site. The sandy clay and chert rubble zone at the base of the overburden is the primary water-bearing zone. The elevation of the

Tuscumbia Limestone surface ranges from 543 feet above msl to 576 feet above msl at Area F. The entire limestone thickness was not penetrated during the drilling program of the RFI. The deepest bedrock monitor well was completed to 134 feet below land surface. The surface of the unweathered Tuscumbia Limestone is relatively flat and gently dips to the southeast.

- 1.2.4.b Water-level data and boring logs indicate that the alluvial overburden is laterally continuous and hydraulically connected with the upper strata of the Tuscumbia Limestone bedrock. The overlying clay layer caps the coarser basal sediments causing ground water in both the deep overburden rubble zone and the Tuscumbia Limestone to occur under confined conditions. The hydrogeology at Area F is complex, with shallow perched and deep basal overburden zones overlying upper weathered and deeper bedrock water-bearing zones. The apparent direction of groundwater flow in the basal overburden and shallow bedrock is to the north-northeast with an average hydraulic gradient of 0.004. Excluding water levels at the perched well (RS052), water-level elevations in the overburden ranged from 601.78 feet above msl to 596.27 feet above msl at Area F. The permeability of the overburden is dependent on the amounts of clay, chert, and limestone. Average hydraulic conductivity values ranged from  $1.7 \times 10^{-2}$  cm/sec., to  $2 \times 10^{-4}$  cm/sec.

### 1.3 OPERATIONAL HISTORY

- 1.3.a Area F consists of three closed unlined disposal ponds formerly used for the disposal of arsenic-contaminated wastes generated from the former Lewisite manufacturing operations. Rubble and industrial wastes were disposed of in the impoundments subsequent to the disposal of arsenic wastes. The impoundments were closed, covered and capped in 1977 and planted with grass and pine trees.

### 1.4 REGULATORY HISTORY AND PREVIOUS STUDIES

- 1.4.a In 1986 the USACE, acting on behalf of RSA, contracted P.E. LaMoreaux & Associates (PELA) to perform a Remedial Investigation/Feasibility-type study. PELA redeveloped four existing monitoring wells, collected and analyzed groundwater samples, performed in-situ permeability tests and collected and analyzed four soil samples. The results of the study are contained in the reports "Confirmation Report, Unit 3 Investigations, Redstone Arsenal, Alabama" (PELA, 1988) [Ref. 8.12] and "Upgrade Confirmation Report and Assessment of Remedial Alternatives for Selected Unit 3 Sites, Redstone Arsenal, Alabama" (PELA, 1989) [Ref.8.14].
- 1.4.b According to the PELA report "Confirmation Report, Unit 3 Investigations, Redstone Arsenal, Alabama", arsenic was detected in groundwater samples collected from all four wells in Area F in December of 1987. Concentrations of arsenic exceeding maximum concentration limits (MCLs) for Primary Drinking Water Standards (0.05 ppm) were detected in samples collected from the two

wells closest to the impoundments (RS053 and RS055). Concentrations of arsenic in all samples collected in 1987 were considerably higher than reported in results of analyses of groundwater samples collected in 1980 by the Army Environmental Hygiene Agency (AEHA). Collected data indicated that the impoundments may be releasing arsenic into the Tuscomb Limestone Aquifer. Results of analyses of sediment from the bottom of the closed impoundments indicated that high concentrations of arsenic were present in the sediment. Additional studies were recommended to determine if the impoundments present a threat to groundwater resources in the area.

- 1.4.c In September 1989, the USACE contracted Geraghty and Miller (G&M) to perform a RCRA Facility Investigation (RFI) at Area F. The purpose of the RFI was to assess the potential for contaminant migration at Area F to the surrounding environment. The RFI was conducted in two phases. Results of the Phase I RFI are contained in the report "Phase I Report, RCRA Facility Investigation at Unit 1, Unit 2 and Selected Unit 3 Areas, Redstone Arsenal, Alabama" [Ref. 8.16]. Results of the Phase II RFI are presented in the draft report "Phase II Addendum, RCRA Facility Investigations at Unit 1, Unit 2, and Selected Unit 3 Areas, Redstone Arsenal, Alabama" [Ref. 8.25].
- 1.4.d Phase I RFI field investigations at the site included test pit excavations; shallow soil sampling; soil borings with shallow and deep soil sampling; sediment and surface water sampling; and monitor well installation and associated groundwater sampling. The Phase II RFI included additional shallow surface soil sampling, soil borings with shallow and deep subsurface sampling, sediment sampling, monitor well installation, and groundwater sampling to help delineate the extent of contamination detected during Phase I. The extent of contamination in the soils at Area F was found to be generally limited to the boundary of Area F. There were a few high arsenic levels in the surface soil south of the site boundary which were attributed to runoff or contamination related to the former Lewsite Manufacturing Plant. The Health and Environmental Assessment exposure pathway analysis showed the probability for contact with most media and exposure to site contaminants to be low. The potential for contact with contaminated surface soils was rated moderate. Access control to the area, including a secured chain link fence, was recommended for Area F.
- 1.4.e Geraghty & Miller, Inc. installed eight new monitoring wells during Phase I and II of the RFI (1990-1992). Along with the existing four monitoring wells, this provided twelve monitoring wells from which water samples were collected to delineate the horizontal and vertical extent of groundwater contamination at Area F.

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**SECTION 2.0 INTERIM CORRECTIVE MEASURE**

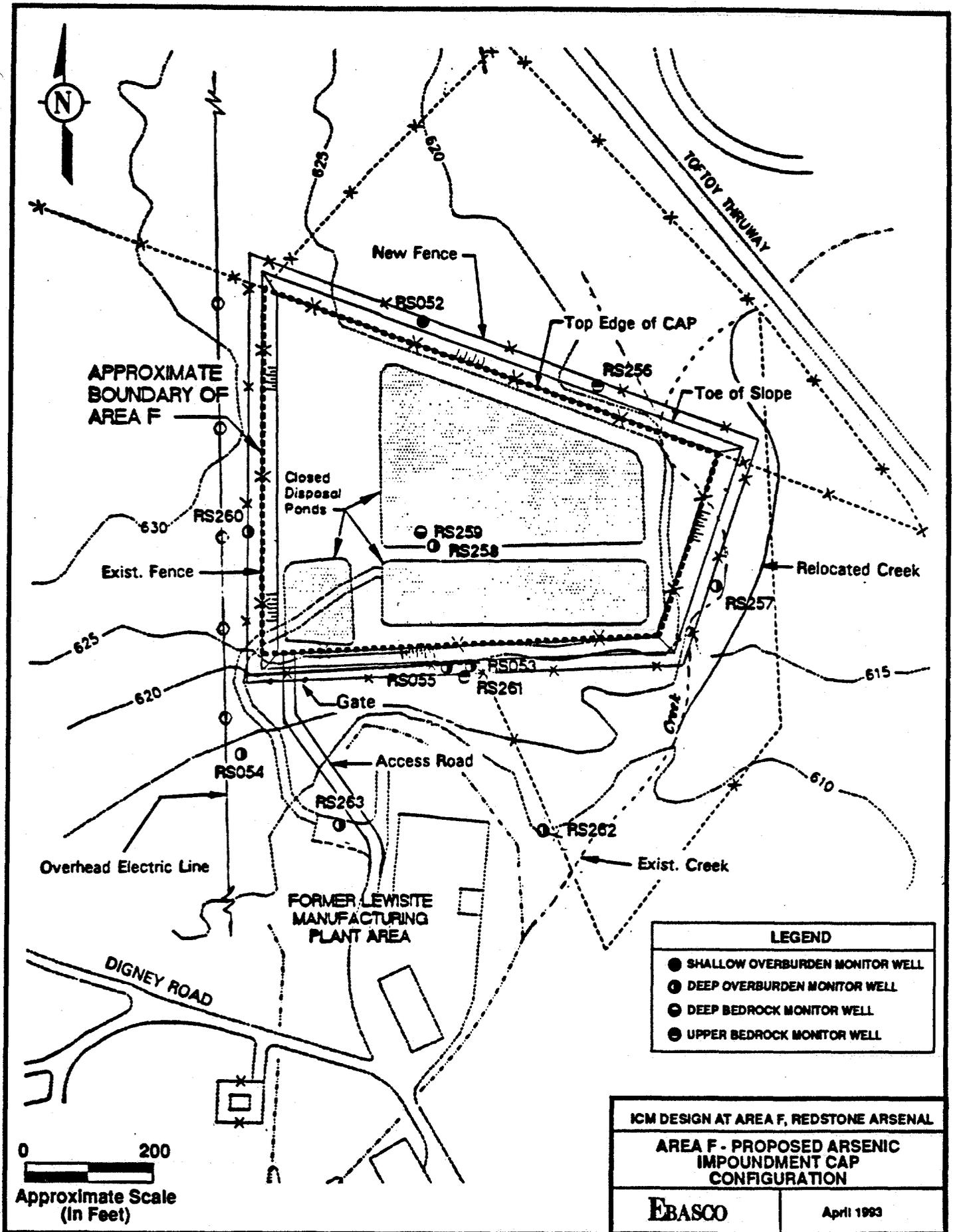
- 2.0.a The goal of the Interim Corrective Measure (ICM) for Area F is to provide interim remediation by inhibiting further contaminant migration. This goal will be accomplished by removing all existing vegetation, constructing a RCRA multilayer clay cap over the site, and diverting an existing drainage ditch away from the impoundments. In addition, access to the site will be restricted by installing a fence around the capped area. These efforts are anticipated to begin within a few months of ICM design completion and construction contractor procurement.
- 2.0.b This ICM Work Plan presents a proposed engineering method for partial remediation and control of contamination at Area F. As described above, the proposed cap is intended to prevent further contamination of groundwater and soil. Remediation of existing groundwater contamination is not included in the ICM, but is being evaluated by others for the final corrective measure at Area F.
- 2.0.c In order to facilitate design of the ICM, Ebasco will perform a Field Program to obtain additional field data at the Area F site. This new task has been added based on the U.S. Environmental Protection Agency's (EPA's) review of Ebasco's Final Area F Work Plan dated 22 April 1993. It is universally agreed among the EPA, USACE, MICOM Environmental Management Office at RSA, and Ebasco that additional information is necessary to design a final cap at the Area F site. Furthermore, the extent of shallow soil contamination outside the designated cap area has not been adequately characterized to determine the best method of remediation of those soils. The scope of the proposed Field Program is discussed in Section 3.1 - Additional Data Requirements of this Work Plan.

**2.1 ARSENIC IMPOUNDMENT CAP**

- 2.1.a A multilayer clay cap will be installed over the closed arsenic impoundments to minimize infiltration of precipitation into the contaminated material and to prevent migration through surface erosion of contaminated material from the site. The cap shall meet all requirements for an EPA recommended RCRA (Subtitle C) hazardous waste cover. The cap will be covered with topsoil and vegetation will be established for erosion control. If enough low permeability clay is not readily available on site, a geosynthetic clay liner may be used in place of a clay composite liner. The approximate size and location of the cap is shown in **Figure 2-1: Area F - Proposed Arsenic Impoundment Cap Configuration.**

**2.2 DIVERSION OF EXISTING DRAINAGE DITCH**

- 2.2.a The existing drainage ditch located near the arsenic impoundments will be relocated to maintain a safe distance from the new cap and from the existing impoundments. The location of the existing culvert under Toftoy Thruway will be maintained. The approximate diversion route is shown in Figure 2-1.



**FIGURE 2-1 AREA F - PROPOSED ARSENIC IMPOUNDMENT CAP CONFIGURATION**

## 2.3 CIVIL DESIGN

2.3.a Civil design will include the drawings and specifications for cap construction, diversion of the existing drainage, temporary roads, surface drainage, grading, borrow area excavation, and fence removal and installation. Criteria for design of these ICM components will include the following:

- A RCRA multilayer clay cap will be installed over the entire fenced area.
- The area will be cleared prior to cap construction.
- The existing fence(s) will be removed prior to cap construction.
- Surface drainage interrupted by construction will be restored and directed away from the cap.
- Erosion control measures will be installed during construction.
- Clay for the cap either will be excavated from a borrow area northwest of Area F or obtained from off-site, depending on availability. An analysis will be performed on substituting a geosynthetic clay liner for the soil if acceptable clay material is not available on RSA.
- Roads will be temporary and are intended to facilitate routine maintenance of the ICM area.
- Tree stumps and roots will be left in place and covered.
- Vegetative above-ground debris will be chipped and stockpiled or transported to a disposal area.
- Inorganic debris will be left in place.
- The existing drainage ditch will be diverted away from the impoundments and the culvert located at the street crossing will remain in place.
- The cap will be topsoiled and grassed.
- All disturbed ground surface areas will be revegetated.
- Fencing will be installed around the perimeter of the cap.

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**SECTION 3.0 TECHNICAL APPROACH TO ICM DESIGN**

3.0.a Ebasco's technical approach to the ICM Design is based upon the design criteria and assumptions presented throughout this section. A summary of these design criteria is presented in **Appendix B**.

**3.1 DESIGN OF THE IMPOUNDMENT CAP**

3.1.a The impoundment cap will be designed and constructed to accomplish the following:

- Minimize migration of precipitation through the contaminated material;
- Function with minimum maintenance;
- Promote drainage; and
- Minimize erosion of the cap material.

The RCRA multilayer clay cap will be designed to be a minimum of 2-feet thick and will be constructed of CL classification soil overlain by a flexible membrane liner (FML). A drainage layer will lie above the FML overlain by a filter which lies beneath the cover/topsoil. Moisture content of the cap material will be between optimum and 3% above optimum. Permeability of the compacted material will be less than or equal to  $1 \times 10^{-7}$  cm/sec. The top surface of the cap will be graded to drain properly and the cap will be covered with 18 inches of cover soil/topsoil and grassed. Maintenance will include grass mowing and repair of the cap to correct effects of settling, subsidence, and erosion. Material available on RSA will be used to the extent possible. Existing soils analytical data obtained by P.E. Lamoreaux and Associates [Refs. 8.12 and 8.14] and Geraghty and Miller [Refs. 8.16 and 8.25] are not sufficient to establish the lateral limits of contamination; therefore, Ebasco will conduct a Field Sampling Program around the existing perimeter fence to better define these limits. Since aerial photographs of the site indicate that the former pond limits were confined to within the existing fence, the entire area within the fence is proposed for capping. The Ebasco Field Program will focus on shallower contamination detected outside the Area F fence during the RFI [Refs 8.16 and 8.25]. Surface or shallow depth soil exterior to the fence that is found to be contaminated during the Field Program will then be included in the ICM. Based on existing information, shallow contamination outside the Area F fence appears localized and most likely will be excavated instead of capped during the ICM.

3.1.b An analysis will be performed on substituting a geosynthetic clay liner for the soil clay liner if natural clays from the proposed borrow areas on RSA cannot meet the hydraulic conductivity requirements. Ebasco will perform laboratory testing on clayey soil from test pits at the proposed borrow area to determine their suitability as a low permeability layer.

### **3.2 SITE PREPARATION**

- 3.2.a Site preparation will include clearing of the area to be capped, removal of the existing fence(s) and diversion of the existing drainage ditch away from the impoundments and the cap. The new drainage route will be excavated, the new downstream end will be tied in, and then the new upstream end will be opened to allow diversion of any flow. As an option, the vegetative organic debris can be chipped/shredded on-site if it is cost effective. Vegetation will be removed to ground level. Inorganic above-grade debris encountered at the site can be disposed of at non-hazardous waste disposal areas unless there is reason to suspect that materials may be hazardous. Hazardous wastes will be properly disposed off-site. In addition, two existing monitor wells, RS258 and RS259 located within the arsenic pond area will need to be abandoned prior to construction of the clay cap.
- 3.2.b If the proposed borrow area on RSA is used, site preparation for the borrow area will include clearing and grubbing and initial surveying of existing elevations.

### **3.3 ACCESS LIMITATION**

- 3.3.a Access to the capped area will be limited by the installation of a 6-foot chain link fence located approximately 10-feet from the toe of the cap side slope. The access road from the former Lewisite Manufacturing Plant area to the cap, provided for light pickups and mowing tractors, will have a locking gate.

### **3.4 CONTRACTING APPROACH**

- 3.4.a Firm fixed price lump sum sealed bids will be obtained on a competitive basis following advertisement in the Commerce Business Daily and issuance of an Invitation for Bids. This approach allows no negotiations or discussions with bidders and assumes that the technical requirements are understood. The contract will include a six month maintenance period (i.e., grassing and patching eroded areas of the Cap) by the contractor before maintenance is turned over to the RSA.

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**SECTION 4.0 HEALTH AND SAFETY PROGRAM**

- 4.0.a The Health and Safety Program for this project is based on activity occurring at the Area F site during design tasks. Project requirements during design will include several site visits by various members of the Enserch Design Team. The purpose of the site visits is to obtain site specific information for the design and will not include intrusive activities. A limited Health and Safety Plan developed for this project will be implemented during these visits. The limited Health and Safety Plan is included as Appendix A of this Work Plan. The Health and Safety Plan to be implemented during the Ebasco Field Program will be submitted under separated cover.
- 4.0.b Design activities will include the development of a Design Analysis Report. The design analysis will include evaluation of the Health and Safety provisions to be required at the Area F site during implementation of the project. Information from the Design Analysis Report will be used to prepare a Site Specific Health and Safety Plan (Task 9) and the Safety, Health and Emergency Response section of the Specifications to be included in the Contract Bid Package. A detailed list of the elements to be addressed in the Site Specific Health and Safety Plan is included in Section 5.9 of this Work Plan.

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**SECTION 5.0 ICM DESIGN SCOPE OF WORK**

5.0.a The purpose of this section of the ICM Design Work Plan is to summarize and clarify the work that will be performed by Ebasco in completing the ICM Design. For some tasks, the kickoff meeting or subsequent communication between CESAS and Ebasco has refocused the design effort to more clearly describe the deliverables required for the satisfactory completion of the ICM. In accordance with the original Statement of Work (SOW), this section is organized into the following thirteen tasks:

1. Work Plan Preparation
2. Topographic Survey
3. Plans and Specifications
4. Design Analyses
5. Personnel Training Plan
6. Maintenance Plan
7. Installation Quality Control Plan
8. Field Sampling Plan (Omitted)
9. Site Specific Health and Safety Plan
10. Service Contract Document
11. Installation Cost Estimate
12. Meetings, Regulatory Coordination and Project Management
13. Public Affairs

5.0.b A description of each task is included in the following sections. All tasks will be performed in accordance with the Savannah District Corps of Engineers "Design Manual for Military Construction" [Ref. 8.1] and Department of the Army "Architectural and Engineering Instructions" [Ref. 8.22].

**5.1 TASK 1 - WORK PLAN**

5.1.a This Interim Corrective Measure Design Work Plan provides some preliminary design basis and describes the work efforts related to implementation of the design project. These efforts will be carried out in Tasks 2 through 13, described in detail in the following sections. A Health and Safety Plan (HASP) is included in **Appendix A** to provide for site visits to collect information used in developing the ICM Design. The HASP will be updated if necessary for any future site activity.

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**5.2 TASK 2 - TOPOGRAPHIC SURVEY**

5.2.a The SOW requires that a site topographic survey be prepared for the ICM Design. The U.S. Army Corps of Engineers is providing computerized topographic survey maps of Area F. Ebasco or its subcontractor will perform field checks of significant survey points. A limited number of surface features may require locating to adequately identify reference points for the location of the proposed ICM clay cap and boundary fence.

5.2.b Ebasco then will provide revised topographic maps of the Area F site in .DWG format. The survey will be provided at a scale of one inch = 100 feet, with 2-foot contour intervals as provided by the USACE.

**5.3 TASK 3 - PLANS AND SPECIFICATIONS**

5.3.a Ebasco will prepare drawings and specifications for installation of the ICM in accordance with the requirements of the Savannah District Corps of Engineers "Design Manual for Military Construction" [Ref. 8.1] and Department of the Army "Architectural and Engineering Instructions" [Ref. 8.22]. It is anticipated that a drawing package will be prepared describing the ICM and will consist of the following general titles:

- Cover Sheet, Contents and Site Location
- Existing Site Conditions
- Site Arrangement
- Site Grading, Drainage and Roads
- Site Layout Coordinate Plan
- Miscellaneous Details (1 of 2)
- Miscellaneous Details (2 of 2)
- Notes

5.3.b Various existing specifications provided by CESAS will be used to prepare specifications specific to the Area F ICM Design. These include Savannah District Corps of Engineers Guide Specifications (CEGS), specifications from the Huntsville Division Corps of Engineers, as well as Construction Specification Institute (CSI) specifications commonly used by Ebasco. Regardless of the source, all specifications for this design will be compiled and adapted into a single format which will be the same as format used in the CEGS. A listing of the specifications expected in the Area F ICM design follows.

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**DIVISION 1: GENERAL REQUIREMENTS**

- 01010 Summary of Work
- 01025 Measurement and Payment and Schedule of Values
- 01050 Field Engineering
- 01065 Safety Health and Emergency Response
- 01300 Submittal Descriptions
- 01305 Submittal Procedures
- 01440 Contractor Quality Control
- 01510 Mobilization/Demobilization
- 01560 Temporary Controls and Environmental Protection
- 01640 Off-Site Transportation and Disposal
- 01700 Project Closeout

**DIVISION 2: SITE WORK**

- 02110 Clearing, Grubbing and Stripping
- 02210 Grading
- 02251 Clay Cap Construction
- 02930 Topsoil and Seeding
- 02238 Crushed Stone Aggregate Surfacing
- 02239 Geotextile
- 02444 Chain Link Fence
- 02723 Rip Rap

- DIVISION 3: NOT USED
- DIVISION 4: NOT USED
- DIVISION 5: NOT USED
- DIVISION 6: NOT USED
- DIVISION 7: NOT USED
- DIVISION 8: NOT USED
- DIVISION 9: NOT USED
- DIVISION 10: NOT USED
- DIVISION 11: NOT USED
- DIVISION 12: NOT USED
- DIVISION 13: NOT USED
- DIVISION 14: NOT USED
- DIVISION 15: NOT USED
- DIVISION 16: NOT USED

5.3.c

The deliverables associated with this task are as follows:

- Draft Plans and Specifications, which will address approximately sixty (60) percent of the total design. This submittal will be more extensive than a conceptual design and will include partially completed drawings and partially completed technical specifications.

- A Draft-Final package which will represent at least ninety (90) percent of the final design. It will incorporate comments from the draft submittal and will include substantially completed drawings and specifications.
- The Final package, or one-hundred (100) percent submittal, which will include copies of bid documents ready to advertise. With the exception of the Service Contract Document (Task 10) and Evaluation Report Maintenance Manual (Task 6), all design work will be complete upon submittal of this deliverable.

#### **5.4 TASK 4 - DESIGN ANALYSES**

##### **5.4.1 System Design Analysis**

5.4.1.a Ebasco will develop a design analysis of the proposed ICM system which addresses the technical and general aspects of the project to ensure that the design will effectively meet the goals of interim remediation. The analysis will include information, calculations, data, and conclusions presented with narrative explanations.

5.4.1.b The technical aspects of design will include the following, which will be based on the information currently available.

- Siting and support requirements.
- Special or abnormal site conditions.
- Physical and chemical parameters.
- Installation methods.
- Calculations, research and technical analyses

5.4.1.c The following non-technical information also will be included:

- Review of applicable regulatory criteria.
- Narrative description of project and scope.
- Statement of the need for and goals of the project.
- Listing of names and credentials of all professionals involved in the design process.

**5.4.2 Health and Safety Design Analysis**

5.4.2.a The Health and Safety Design Analysis (HSDA) will be the basis for preparing the Site-Specific Health and Safety Plan in Task 9 as well as the "Safety, Health and Emergency Response" section of the detailed specification prepared in Task 3. The HSDA will provide the decision-logic for selection of protective measures to be implemented during installation and maintenance of the ICM. Criteria to be considered during preparation of the HSDA include:

- Site-specific chemical, physical, safety and biological hazards that may be encountered for each task/or site operation to be performed at the site.
- Safety features of the ICM to be installed and equipment used for installation.
- Sources and pathways of employee exposure.
- Anticipated on-site and off-site exposure potential levels.
- Requirements for a personal and area sampling plan.
- Anticipated dates and duration of site activities.

**5.5 TASK 5 - PERSONNEL TRAINING PLAN**

5.5.a Ebasco will prepare and implement a plan for training personnel involved in the maintenance of the interim corrective measures. The plan will outline both the introductory and continuing training programs including safety training programs, to prepare personnel to maintain the facility in a safe and efficient manner. The plan will include a brief description on how training will meet actual job tasks. The plan will list the regulations which dictate this training.

**5.6 TASK 6 - MAINTENANCE PLAN**

5.6.a Ebasco will prepare a plan describing equipment, personnel, and services required for maintaining the interim corrective measures in proper condition. A maintenance schedule shall be provided that is appropriate for the ICM.

**5.7 TASK 7 - INSTALLATION QUALITY CONTROL PLAN**

5.7.a Quality Control is "a planned system of inspections and tests performed by the Remedial Action Constructor to directly monitor and control the quality of the construction project" [Ref. 8.10]. The Installation Quality Control Plan (IQCP) will describe the procedures which must be followed by the Remedial Action Contractor to assure quality control during installation of the ICM System at the Area F site.

5.7.b The IQCP will include the following elements:

- Responsibilities and authorities of all organizations and key personnel involved in the installation of the ICM;

- Qualifications of the quality control personnel to demonstrate they possess the training and experience necessary to fulfill their identified responsibilities;
- The observations, tests and inspections that will be used to monitor and control installation quality, and the frequency of performance of these activities;
- Description of the reporting requirements for quality control activities including such items as daily summary reports, schedule of data submissions, inspection data sheets, problem identification and corrective measures reports, evaluation reports, acceptance reports, final documentation. Also describe the provisions for the final storage of all records.

## **5.8 TASK 8 - FIELD SAMPLING PLAN**

5.8.a Based on discussions held during delivery order contract negotiations for the Area F site, Task 8, involving preparation of a Field Sampling Plan, was deleted.

## **5.9 TASK 9 - SITE-SPECIFIC HEALTH AND SAFETY PLAN**

5.9.a This task involves the preparation of a Site-Specific Health and Safety Plan (SSHSP) to be implemented during installation and operation of the ICM at Area F. Certain elements of the SSHSP are contractor specific, such as the names of personnel working on-site and verification of their associated medical records, and must be added or amended by the installation and maintenance contractors prior to the initiation of any field work.

5.9.b The SSHSP will be developed from the Health and Safety Design Analysis prepared under Task 4 of the Scope of Work as discussed in Section 5.4 of this Work Plan. The following elements will be included in the SSHSP:

- Staff Organization and Responsibilities
- Description of Project Site
- Hazard Assessment and Risk Analysis
- Identification of Action Levels
- Accident Prevention
- Health and Safety Training/Medical Surveillance Requirements
- Personal Protective Equipment Program
- Environmental Exposure and Personal Monitoring
- Heat/Cold Stress Monitoring
- Site Control/Work Zone Delineation
- Decontamination Procedures

- Emergency Response Plan/Contingency Plan/Spill Control and Countermeasures Plan for On-Site Personnel and Local Affected Population
- Standard Operating Procedures and Work Practices
- Recordkeeping Procedures
- Unexploded Ordnance Safety

**5.10 TASK 10 - SERVICE CONTRACT DOCUMENT**

5.10.a Based on discussions with the Savannah Corps of Engineers, Task 10, involving preparation of a Service Contract Document, has been deleted.

**5.11 TASK 11 - INSTALLATION COST ESTIMATE**

5.11.a Ebasco will prepare a detailed cost estimate for the installation of the designed ICM. The cost estimate will be prepared using the Microcomputer Cost Engineering System (MCASES-Gold) Software provided to Ebasco by the USACE. Chapter A-9, "Cost Estimates" of Volume II of the Savannah District Design Manual for Military Construction [Ref. 8.1] will be used as guidance for preparing the cost estimates.

5.11.b Quantity takeoffs and vendor quotes will be used as the basis for preparing the Installation Cost Estimate. This cost estimate will be submitted with the draft-final and final Design submittals. Accuracy of the cost estimate will be sufficient for use as the Government's Cost Estimate supporting budgeting and procurement. The final Cost Estimate will be submitted to CESAS with the submittal of the final Design Documents as indicated on Table 6-1: Project Schedule.

**5.12 TASK 12 - MEETINGS, REGULATORY COORDINATION AND PROJECT MANAGEMENT****5.12.1 MEETINGS**

5.12.1.a Ebasco will attend up to five meetings, to be held at either RSA or Savannah District Corps of Engineers facilities in Savannah, Georgia. Meetings will average one day each and will be scheduled at the discretion of the CESAS to review project deliverables, meet with regulators, or discuss other matters relative to the Area F ICM Design. Ebasco will maintain minutes of each meeting and forward a written copy to CESAS within 10 calendar days.

**5.12.2 REGULATORY COORDINATION**

5.12.2.a Ebasco will coordinate with the Alabama Department of Environmental Management (ADEM) and the US Environmental Protection Agency (EPA) throughout the project. Contacts will be made early in the design process to identify potential permitting delays or restrictive regulatory limits which may govern basic design criteria. Copies of all final project submittals will be sent to ADEM and EPA for review.

**5.12.3 PROJECT MANAGEMENT**

5.12.3.a This task is internal to Ebasco and involves the overall command of the ICM Design, such as:

- Day-to-day correspondence with CESAS,
- Maintenance of project-specific records and files,
- Schedule and cost management,
- Preparation of monthly progress reports,
- Coordination and management of subcontractors and vendors,
- Meeting minutes preparation,
- Preparation, oversight and approval of project submittals.

**5.13 TASK 13 - PUBLIC AFFAIRS**

5.13.a Ebasco employees and their subcontractors will not provide response to public inquiries regarding site conditions or this contract. All requests for information regarding the site will be directed to the Redstone Arsenal Public Affairs Specialist, Mr. Ed Peters. Contractual information will be referred to the CESAS Contracting Officer. Upon the approval and direction from Redstone Arsenal Public Affairs (RSA PA), Ebasco will conduct site interviews and file reviews, and gather information necessary to develop the Community Relations Plan (CRP). The CRP will be prepared in accordance with Army Regulation (AR) 200-1 for CESAS in close coordination with and for implementation by the RSA PA.

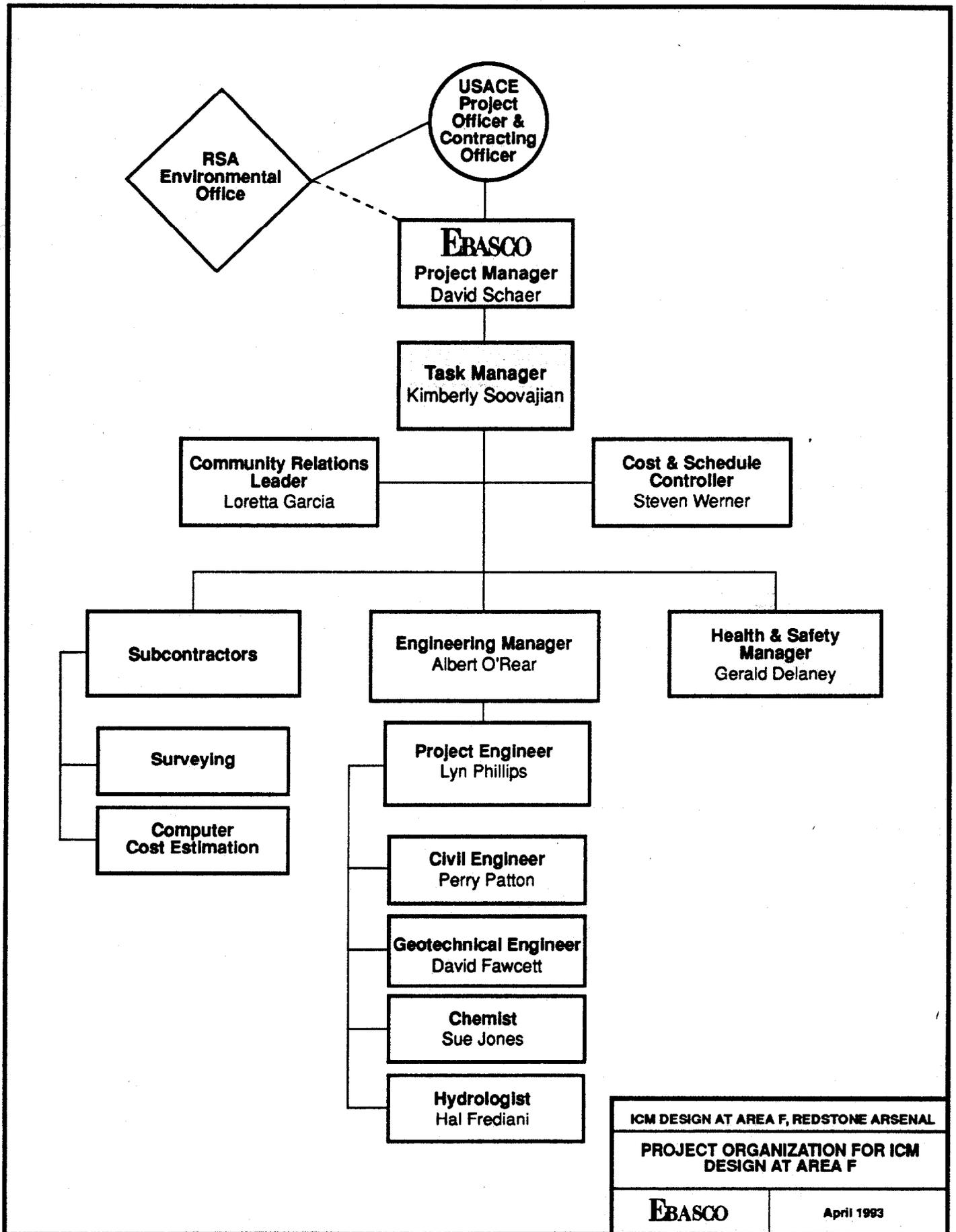
5.13.b The CRP will provide the requisite points of contact as part of the Listing of Public Contacts and Interested Parties. A listing of media resources and contacts, potential public meeting locations and suggested locations for an information repository will also be included as appendices to the CRP. A description of the site, its past history and corrective measures will be included in the CRP with the Community profile and key issues of concern developed during site interviews.

- 5.13.c Ebasco will monitor local newspapers for news media coverage. Any significant news coverage will be brought to the immediate attention of the Savannah District Public Affairs Officer and Project Manager. A scrapbook will be created for all news clippings identified.
  
- 5.13.d A monthly information paper, consisting of a one-page public relations summary will be created from the monthly progress report and presented to the Savannah District Public Affairs Officer.
  
- 5.13.e No news releases or other CRP implementation activities will be prepared by Ebasco under the delivery order Scope of Work.

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**SECTION 6.0 PROJECT MANAGEMENT AND QUALITY CONTROL****6.1 PROJECT ORGANIZATION**

- 6.1.a The organizational structure of the project identifies the interrelationships of the Ebasco Design Team and is shown in **Figure 6-1: Project Organization**. The following paragraphs describe the responsibilities of each leadership position in the project organization. Resumes of all Team members are included in **Appendix C**.
- 6.1.b The Ebasco *Project Manager (PM)*, Mr. David W. Schaer, is responsible for Ebasco's overall performance of the ICM project. He is in charge of meeting the requirements of the contract and establishing an effective organization to complete all activities identified in the scope of work.
- 6.1.c The Ebasco *Task Manager (TM)*, Ms. Kimberly R. Soovajian, is responsible for day-to-day oversight of all activities under the project. She is in charge of assuring that project tasks are completed on schedule and within budgeted costs. She is responsible for reviewing all project submittals for conformance with the approved Statement of Work. The TM maintains close communication with the Client, with supervisors of the various disciplines with the Ebasco Design Team, as well as with all individual team members. The TM directs and supervises Ebasco subcontractors working on the project.
- 6.1.d The Ebasco *Community Relations Lead*, Ms. Loretta A. Garcia, is responsible for coordinating with the USACE and Redstone Arsenal Public Affairs Offices to develop a Community Relations Plan for their implementation during ICM activities. She is responsible for recognizing community needs and identifying media resources which will provide the client guidance in addressing community concerns and providing opportunities for public participation.
- 6.1.e The Ebasco *Cost/Schedule Controller*, Mr. Steven E. Werner, is responsible for identifying and maintaining cost control for all activities under the project; for monitoring the project performance schedule, and for reporting any irregularities to the Project and Task Managers.
- 6.1.f The Ebasco *Engineering Manager*, Mr. Albert D. O'Rear, P.E., is responsible for ensuring the overall quality and accuracy of all engineering documents produced by the Design Team. Mr. O'Rear will schedule internal reviews and perform quality reviews, and is responsible for maintaining adherence to established Ebasco and USACE design procedures. He will be the Registered Professional Engineer of record who will seal the plans and specifications.



ICM DESIGN AT AREA F, REDSTONE ARSENAL  
 PROJECT ORGANIZATION FOR ICM DESIGN AT AREA F  
 EBASCO April 1993

FIGURE 6-1 PROJECT ORGANIZATION

6.1.g The Ebasco *Project Engineer*, Ms. Lyn Phillips, is responsible for coordinating the Design Team disciplines, assembling specifications, plans and other contract documents, and ensuring that the design meets design criteria and goals.

## 6.2 TECHNICAL QUALITY ASSURANCE

6.2.a The Ebasco design team will incorporate various levels of technical quality assurance and control throughout the design process. All calculations that will be incorporated into the Task 4 Design Analysis will be checked by a third-party engineer who is trained and experienced in the subject matter. All design drawings undergo several levels of peer review and require signoff by all staff with input into the drawing. Ultimately, the engineer in responsible charge will ensure review by all engineering disciplines involved in the design. It is Ebasco policy that internal value engineering procedures are followed as part of the quality assurance and control process.

## 6.3 SCHEDULE FOR DESIGN

6.3.a The project schedule is identified in **Table 6-1: Project Schedule**. The submittal dates, indicated in the column "Early Finish," follow an aggressive schedule to achieve timely project completion. Prompt review by and receipt of comments from all designated reviewers is critical to maintain this schedule.



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**SECTION 7.0 LIST OF CONTRIBUTORS**

7.0.a The following is a list of Ebasco Environmental personnel involved in the technical preparation and/or review of this Interim Corrective Measure Design Document. The input function of each member with respect to the document, and the professional title of each member, respectively, also are listed. Resume's of the individuals listed are contained in **Appendix C.**

- |                           |   |  |
|---------------------------|---|--|
| Albert D. O'Rear, P.E.    | - | Professional Engineer Registered in the State of Alabama responsible for document review and approval; Ebasco Regional Chief Environmental Engineering Manager |
| David W. Schaer           | - | Project Manager; Principal Geologist   |
| Kimberly R. Soovajian     | - | Project Task Manager; Environmental Engineer   |
| Steven E. Werner          | - | Project Cost & Schedule Controller; Senior Cost Engineer   |
| Loretta A. García         | - | Community Relations Scope Preparation; Community Relations Specialist  |
| Tammy S. Jackman          | - | Health and Safety Plan (HASP) Preparation; Associate Industrial Hygiene Technician   |
| Gerald L. Delaney, C.I.H. | - | Review/Approval of HASP; Ebasco Regional Health and Safety Manager   |
| Harold A. Frediani, Jr.   | - | Hydrological Evaluation/Design; Principal Environmental Engineer   |
| J. Perry Patton           | - | Project Civil Design; Senior Associate Engineer  |
| Lyn R. Phillips           | - | Project Engineer; Principal Engineer   |
| David A. Fawcett          | - | Project Geotechnical Design; Geotechnical Engineer   |

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**SECTION 8.0 REFERENCES**

- 8.1  
Vol 1 "Design Manual for Military Construction", Second Edition, Volume I of III - General Administrative, and Value Engineering Requirements. US Army Corps of Engineers, Savannah District, June 1989.
- 8.1  
Vol 2 ..., "Volume II of III - Technical Requirements.
- 8.1  
Vol 3 ..., "Volume III of III - Exhibits
- 8.2 "Environmental Effects of Army Actions," Army Regulation 200-2, Department of the Army, December 1988.
- 8.3 "Safety Health Requirements Manual," Engineering Manual 385-1-1, April 1981, Revised October 1987.
- 8.4 Occupational Safety and Health Administration Standards 1910 and 1926.
- 8.5 NIOSH/OSHA/USCG/EPA "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities," October 1985.
- 8.6 ANSI Z-358.1, "Emergency Eyewash and Shower Equipment," 1990.
- 8.7 ANSI Z-88.2, "Practices for Respiratory Protection," 1980.
- 8.8 "Safety and Occupational Health Document Requirements for Hazardous Waste Site Corrective Measures," Engineer Regulations 385-1-92, December 13, 1991.
- 8.9 "Engineering and Design Chemical Data Quality Management for Hazardous Waste Remedial Activities," Department of the Army, Engineer Regulation 1110-263, 1 October 1990.
- 8.10 "Interim Final Guidance on EPA Oversight of Remedial Designs and Remedial Actions Performed by Potentially Responsible Parties," OSWER Directive 9355.5-01, US Environmental Protection Agency, February 1990.
- 8.11 Memorandum, "Minimum Chemistry Data Reporting Requirements for DERP and Superfund HTW Projects," US Army Corps of Engineers, CEMRD-ED-GL, August 1989.
- 8.12 "Confirmation Report - Unit 3 Investigations, Redstone Arsenal, Alabama," Volume I-Text, P.E. Lamoreaux and Associates, Inc, July 1988.
- 8.13 "Remedial Investigation Engineering Report, Redstone Arsenal, Alabama; Unit 1-DDT and Sanitary Landfills and Unit 2-Open Burn/Open Demolition Area," Volume I-Text, P.E. Lamoreaux and Associates, Inc, September 1988.
- 8.14 "Upgrade Confirmation Report and Assessment of Remedial Alternatives for Selected Unit 3 Sites, Redstone Arsenal, Alabama," P.E. Lamoreaux and Associates, Inc, April 1989.

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- 8.15 Draft "Environmental Impact Statement, Redstone Arsenal Base Realignment," Ebasco Environmental, October 1992.
- 8.16 "Identification and Evaluation of Potential Solid Waste Management Units and Areas of Concern, Redstone Arsenal, Alabama," Geraghty and Miller, February 1991.
- 8.17 "Phase I Report, RCRA Facility Investigations at Unit 1, Unit 2, and Selected Unit 3 Areas, Redstone Arsenal, Alabama," Books 1 and 2, Geraghty and Miller, Inc, December 1991.
- 8.18 "Interim RCRA Facility Assessment Report of the Redstone Arsenal Huntsville, Alabama, EPA I.D. NO. AL 7210020742," A. T. Kearney, Inc, September 1989.
- 8.19 "RCRA Facility Investigation Work Plan for RSA-58, RSA-115, RSA-116, RSA-G, and Target Seeker Area, Redstone Arsenal, Alabama," Engineering-Science, Inc, March 1992.
- 8.20 ADEM Letter to Redstone Arsenal dated 27 March 1992.
- 8.21 "Safety and Occupational Health Document Requirements for Hazardous/Toxic Waste (HTW) Activities," US Department of the Army, March 1987.
- 8.22 "Architectural and Engineering Instructions," Department of the Army, March 1987.
- 8.23 "Community Relations in Superfund, A Handbook," OSWER Directive 9230.0-3C, US Environmental Protection Agency, September 1990.
- 8.24 Internal Draft "RCRA Facility Investigation Phase I Report for RSA-58, RSA-115, RSA-116, RSA-129, RSA-G, and Target Seeker Area, Redstone Arsenal, Alabama," Volume I, Engineering Science, Inc., September 1992.
- 8.25 Draft "Phase II Addendum, RCRA Facility Investigations at Unit 1, Unit 2 and Selected Unit 3 Areas, Redstone Arsenal, Alabama," Geraghty and Miller, Inc, October 1992.
- 8.26 "Site Safety Plan, Sites Investigation for S.O.W. IRP-DERP, Redstone Arsenal, Huntsville, Alabama," US Army Corps of Engineers, June 10, 1992.
- 8.27 "Final Design Report for Operable Unit No. 2 - Construction Specifications, Defense Depot, Ogden, Utah," Canonie Environmental, March 1992.

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**MAP LIST**

- M8.1 USGS Topographic Quadrangle - Huntsville, Alabama, 1975
- M8.2 USGS Topographic Quadrangle - Madison, Alabama, 1982
- M8.3 USGS Topographic Quadrangle - Triana, Alabama, 1982
- M8.4 USGS Topographic Quadrangle - Farley, Alabama, 1982
- M8.5 Redstone Arsenal, Alabama - Reservation Map, 1989
- M8.6 Redstone Arsenal, Alabama - Master Plan Basic Information Maps, Sheets 1-17, 1987.
- M8.7 Federal Emergency Management Agency, Flood Insurance Rate Map, Madison County Alabama, Panel Number 300, Effective July 2, 1981.
- M8.8 Federal Emergency Management Agency, Flood Insurance Rate Map, Madison County Alabama, Panel Number 425, Effective July 2, 1981.
- M8.9 Federal Emergency Management Agency, Flood Insurance Rate Map, Madison County Alabama, Panel Number 450, Effective July 2, 1981.

**APPENDIX A**

**SITE-SPECIFIC HEALTH AND SAFETY PLAN FOR RSA ICM DESIGN  
ACTIVITIES**

**SITE-SPECIFIC HEALTH AND SAFETY PLAN FOR  
RSA INTERIM CORRECTIVE MEASURES DESIGN ACTIVITIES**

(Short Form for RCRA walk through, surveying and staking and other special circumstances.  
Approval of HSM (805) 830-4100 must be secured to use this form.)

**SITE: 4 SITES AT REDSTONE ARSENAL, ALABAMA**

**LOCATION: REDSTONE ARSENAL, ALABAMA**

**DATE PREPARED: DECEMBER 11, 1992**

**PREPARED BY: TAMMY JACKMAN/EBASCO  
(NAME/COMPANY)**

**PLANNED SITE VISIT DATE(s):**

**REVISION: 2 (Last Revision dated March 29, 1993)**

**EBASCO SERVICES INCORPORATED, EBASCO SUBCONTRACTORS AND THE UNITED STATES ARMY CORPS OF ENGINEERS DO NOT GUARANTEE THE HEALTH OR SAFETY OF ANY PERSON ENTERING THIS SITE. DUE TO THE HAZARDOUS NATURE OF THIS SITE AND THE ACTIVITY OCCURRING THEREON, IT IS NOT POSSIBLE TO DISCOVER, EVALUATE, AND PROVIDE PROTECTION FOR ALL POSSIBLE HAZARDS WHICH MAY BE ENCOUNTERED. STRICT ADHERENCE TO THE HEALTH AND SAFETY GUIDELINES SET FORTH HEREIN WILL REDUCE, BUT NOT ELIMINATE, THE POTENTIAL FOR INJURY AT THIS SITE. THE HEALTH AND SAFETY GUIDELINES IN THIS PLAN WERE PREPARED SPECIFICALLY FOR THIS SITE AND SHOULD NOT BE USED ON ANY OTHER SITE WITHOUT PRIOR RESEARCH BY TRAINED HEALTH AND SAFETY SPECIALISTS.**

PROJECT NAME: RSA INTERIM CORRECTIVE MEASURE DESIGN

PROJECT NO. DACA21-91-D-0024

**SCOPE OF WORK AND PURPOSE OF VISIT:**

Site visits before and during design to get an overview of the existing site conditions for Sites Unit 1, Unit 2, RSA-G, and Area F. Descriptions of each site is can be found on pages 4-7.

**POTENTIAL SITE VISIT PERSONNEL:**

**RESPONSIBILITY:**

1. Tammy Jackman	Health and Safety Officer
2. Arthur Holcomb	Certified Industrial Hygienist
3. Gerald Delaney	Health and Safety Manager
4. Kimberly Soovajian	Task/Site Manager
5. David Schaar	Project Manager
6. Ken Chen	Site Investigator
7. Victor Owens	Site Investigator
8. Lyn Phillips	Site Investigator
9. Kirk Mays	Site Investigator
10. Albert O'Rear	Professional Engineering Review/Approval
11. Hal Frediani	Site Investigator
12. Thomas Marks	Site Investigator
13. Loretta Garcia	Community Relations
14. Surveying Subcontractor Personnel	Surveying and Staking

**OTHER CONTACTS**

**PHONE NOS.**

N/A

N/A



Turn left (north) onto Memorial Parkway. Follow Memorial Parkway for approximately 7.2 miles. Exit right onto Governors Drive and proceed approximately 0.7 mile. Huntsville Hospital is located on the left at the intersection of Madison Street and Governors Drive (See Figure 2 in Attachment 1).

**Area F:** Exit the Area F Site through the parking lot near Building 4382. Continue on that road until it intersects Toftoy Thruway. Take a right onto Toftoy Thruway going south. Exit to Martin Road East. Proceed through Gate 1 to Memorial Parkway North (veer right onto exit-ramp). Follow Memorial Parkway for approximately 3.5 miles. Exit right onto Governors Drive and proceed approximately 0.7 mile. Huntsville Hospital is located on the left at the intersection of Madison Street and Governors Drive (See Figure 2 in Attachment 1).

**RSA-G:** Take Redstone Road east and exit through Gate 3. Turn left (north) onto Memorial Parkway. Follow Memorial Parkway for approximately 7.2 miles. Exit right onto Governors Drive and proceed approximately 0.7 mile. Huntsville Hospital is located on the left at the intersection of Madison Street and Governors Drive (See Figure 2 in Attachment 1).

FOX Hospital (On-Base, Life threatening emergencies only).

**Unit 1:** Exit the Unit 1 gate and take a right onto Technology Road. Take a left onto Wood Road; Wood Road turns into Mills Road. Turn left onto Martin Road. Go 1.5 miles and turn right (north) onto Rideout Road. Go 3.5 miles and turn right onto Goss Road. Proceed approximately 0.6 mile; FOX Hospital is on the right (See Figure 2 in Attachment 1).

Unit 2: Exit the Unit 2 gate and take a left onto McAlpine Road. Take a right onto Buxton Road. Turn left onto Patton Road going north. Turn left (west) onto Martin Road and continue to Rideout Road. Turn right onto Rideout Road. Go 3.5 miles and turn right onto Goss Road. FOX Hospital is approximately 0.6 mile on the right (See Figure 2 in Attachment 1).

AREA F: Exit the Area F Site through the parking lot near Building 4382. Continue on that road until it intersects Toftoy Thruway. Take a left onto Toftoy Thruway going northwest. Turn right onto Rideout Road and proceed 3.5 miles. Turn right onto Goss Road and go approximately 0.6 mile; FOX Hospital is on the right (See Figure 2 in Attachment 1).

RSA-G: Take a right onto Redstone Road going west. Take a right onto Patton Road and proceed to Martin Road. Turn left (west) onto Martin Road and continue to Rideout Road. Turn right onto Rideout Road. Go 3.5 miles and turn right onto Goss Road. FOX Hospital is approximately 0.6 mile on the right (See Figure 2 in Attachment 1).

#### **INCLEMENT WEATHER PROCEDURES:**

Site activities will be limited to the daylight hours and normal weather conditions. Inclement working conditions include heavy rain, high winds and lightning. Observe daily weather reports, evacuate site in case of inclement working conditions.

#### **SITE BACKGROUND/OVERALL INFORMATION:**

Redstone Arsenal (RSA) is a US Army facility located in Madison County, Alabama. RSA occupies approximately 38,300 acres. It is bounded on the north and east by the city of Huntsville, on the south by Wheeler National Wildlife Refuge and the Tennessee River, and on the west by agricultural, residential and light industrial areas.

## **DESCRIPTION AND HISTORY OF UNIT 1:**

Unit 1 consists of approximately 68.5 acres bordered by woods to the north, a closed landfill (Area Q3) to the east; wetlands, Wheeler National Wildlife Refuge and the remediated "old" channel and floodplains of Huntsville Spring Branch to the south; and a NASA test area to the west. The most prominent topographic feature of Unit 1 is the approximately 40-foot-deep excavated drainage ditch that borders its east site. The ditch channels runoff water from Unit 1, Area Q3 to the east, and other areas to the north, towards the wetlands to the south. Unit 1 is composed of two Solid Waste Management Units (SWMUs); the active and closed sanitary landfill and the DDT Waste Soils Landfill.

The sanitary landfill, which occupies approximately 66 acres, has been used since 1973 for disposal of a variety of wastes including typical household waste, waste oil, hospital infectious wastes, construction debris, asbestos, and ash from incinerated paper. Closed portions of the sanitary landfill include disposal trenches oriented east-west and a rubble fill, located in the southern part of Unit 1. The closed landfill consists of three to four disposal trenches that are approximately 25 ft. wide, 400 ft. long, and greater than 20 ft. deep. Wastes disposed in the closed trenches included household waste, paper products, waste oil, and construction debris. The land surface of the closed disposal trenches is hummocky and covered with grass. The ground is unstable and subsurface gas can be observed escaping from the soil.

## **DESCRIPTION AND HISTORY OF UNIT 2:**

Unit 2, consisting of active open burn/open detonation (OB/OD) areas, is located in the southern part of RSA near the Tennessee River. Unit 2 is recognized as a "miscellaneous unit" as regulated under 40 CFR 265, RCRA Subpart X. An application for a RCRA Part B permit for Unit 2 has been submitted and is pending approval by EPA. The OB/OD area is used to dispose and decontaminate explosives and explosive contaminated materials and to dispose of reactive wastes by thermal treatment. The reactive wastes include bulk propellants, propellant-contaminated solvents; and nonhazardous propellant-contaminated waste such as rags and wood

containing 4% or less propellant. Prior to January 1986, solvents and solvent-contaminated materials were routinely incinerated directly on the ground at two open burn pads of the Open Burn Area located on the northwest part of Unit 2. Liquids have not been burned regularly on unprotected ground since 1986.

Propellant-contaminated wastes are currently thermally treated in two elevated open burn pans and one temporary open burn pan located on the northeast corner of Unit 2. Three additional pans are currently being constructed.

Two "contaminated waste burn trenches" located in the southeast part of Unit 2 also were used to incinerate materials contaminated with propellants. The Contaminated Waste Burn Trenches were originally designed for incineration of packaging and pallets used to ship munitions. In 1984, the Army Environmental Hygiene Agency (AEHA) discovered that the trenches had also been used to dump and burn waste solvents from an RSA explosive production area, and such activities were ceased. In 1991, the use of these trenches to incinerate packaging and pallets was ceased. According to RSA personnel, the Contaminated Waste Burn Trenches are no longer used.

#### **DESCRIPTION AND HISTORY OF RSA-G THIOKOL DEGREASER AT BUILDING 7664:**

The Thiokol Degreaser, Building 7664, is within the Thiokol complex located in the southeast section of the Arsenal. The site is east of magazine Road, north of Redstone Road, and west of Line Road. The area of the spill is located adjacent to a crushed rock road and an adjacent grass field. The site is surrounded by structures and elevated steam piping.

In 1989, facility representatives reported a valve malfunction at a degreaser at Thiokol Building 7664. The malfunction resulted in an overflow to a manhole and a reported maximum of 30 gallons of TCE (Trichloroethylene) being discharged to the sanitary sewer system. Subsequent to the spill, TCE was detected in the sanitary sewer and the sewage treatment plant. An air stripper was installed to treat the water in the contaminated sanitary sewer line prior to discharge to the main sewer line. The stripper operated for a period of several months. Thiokol representatives believe that contaminated groundwater was flowing into the clay pipe sanitary

sewer line on the site and that the TCE detected in the air stripper influent was not only related to this recorded spill but the result of other nearby sources. The facility disconnected the contaminated sewer to isolate the TCE source. All water sources within Building 7664 were rerouted to an approved sanitary sewer.

### **DESCRIPTION AND HISTORY OF AREA F:**

Area F, approximately 5 acres in size and located in central RSA, consists of three closed disposal ponds formerly used for the disposal of arsenic-contaminated water generated from Lewisite manufacturing operations. Subsequent to the disposal of arsenic wastes, rubble and industrial wastes were disposed of in the impoundment. RSA field investigations at the site included test pit excavations with associated air monitoring, shallow soil sampling; soil borings with shallow and deep soil sampling; sediment and surface water sampling; and monitor well installation and groundwater sampling. Test pit excavations encountered solid waste and construction debris, overlaying layers of arsenic waste and polynuclear aromatic hydrocarbons (PAH)-contaminated waste that continued to the total depths of the test pits (11 to 12 ft). The hydrogeology at Area F is complex, with shallow perched and deep basal overburden zones overlying shallow weathered and intermediate bedrock water-bearing zones. The apparent direction of groundwater flowing the basal overburden and shallow bedrock is north-northeast.

The nature and extent of contamination in the soils at Area F have been fairly well-defined. A Health and Environmental Analysis (HEA) showed PAHs and metals (primarily arsenic) to be present in the soil/waste samples from the test pits, shallows soils, soil borings, and sediments at concentrations which exceed carcinogenic and systematic criteria, respectively. There does not appear to be groundwater contamination associated with the activities at Area F. One chlorinated hydrocarbon (carbon tetrachloride) was detected in groundwater, but the source of the contamination is not believed to be Area F.

**MAXIMUM DETECTED GROUNDWATER CONTAMINATION:**

RSA G:	TCE - (Trichloroethylene)	120,000 ppb
Unit 2:	TCE	98,000 ppb
	Total Chlorinated Hydrocarbons	151,850 ppb
Unit 1:	TCE	390 ppb
	Total Chlorinated Hydrocarbons	475 ppb
	Total BTEX	853 ppb
	BNA	1,300 ppb
Area F:	Arsenic	100 ppb

**MAXIMUM DETECTED SOIL CONTAMINATION:**

Area F:	Arsenic	40,000 mg/kg
	Total Aromatic Hydrocarbons	298 mg/kg

**HAZARD ASSESSMENT:**

According to the information available in the Remedial Investigation Reports, a low potential exists for exposure due to the chemicals found at the sites.

**STANDARD OPERATING PROCEDURES:** (i.e., basic hygiene, buddy system, no oral contact with any articles when working on site, etc.)

Basic hygiene procedures include common sense practices such as no eating, drinking or smoking on site. Keep hands and equipment away from face, eyes and mouth. Avoid areas where obvious contamination can occur if possible. Do not enter site alone. Maintain visual and audio contact with others at all times. In the event of an incident at the site, an Incident Report and Follow Up form (Attachment 2) will be completed and forwarded to the Ebasco Regional Health and Safety Manager, and copies furnished to the US Army Corps of Engineers Project Manager.

**PERSONAL PROTECTIVE EQUIPMENT (PPE) REQUIREMENTS:**

Minimum - Steel toe/shank shoes or boots, standard field clothes. Hard hats and safety glasses will be worn when applicable (i.e., in areas where there are overhead hazards, when there is a potential of eye injury).

**PPE SELECTION CRITERIA:**

Very low level of possibilities for contact with potentially hazardous substances - site survey inspection will be of short duration.

**PPE DECON/DISPOSAL (IF APPLICABLE):**

N/A

**MONITORING EQUIPMENT AND CALIBRATION INFORMATION:**

N/A

**MONITORING EQUIPMENT SELECTION CRITERIA:**

N/A

**ACTION LEVELS FOR UPGRADING OF PPE AND/OR SITE WITHDRAWAL:**

Site withdrawal for inclement working conditions listed on page 3

**MEDICAL DATA SHEET:**

The brief Medical Data Sheet on the following page can be completed by on-site personnel and will be kept in the Project Support Zone (i.e., uncontaminated area near the project site) during the conduct of site operations. It is in no way a substitute for the Medical Surveillance Program requirements consistent with the Ebasco Corporate Health and Safety Program for Hazardous Waste Sites. This data sheet will accompany any personnel when medical assistance is required or if transport to hospital facilities is required.

**EBASCO SERVICES INCORPORATED**

PROJECT 4 Sites At Redstone Arsenal - Alabama

NAME \_\_\_\_\_ HOME TELEPHONE \_\_\_\_\_

ADDRESS \_\_\_\_\_

AGE \_\_\_\_\_ HEIGHT \_\_\_\_\_ WEIGHT \_\_\_\_\_ BLOOD TYPE \_\_\_\_\_

ALLERGIES \_\_\_\_\_

PARTICULAR SENSITIVITIES \_\_\_\_\_

DO YOU WEAR CONTACTS? \_\_\_\_\_

PROVIDE A CHECKLIST OF PREVIOUS ILLNESSES OR EXPOSURES TO  
HAZARDOUS CHEMICALS: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

WHAT MEDICATIONS ARE YOU PRESENTLY USING? \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

DO YOU HAVE ANY MEDICAL RESTRICTIONS? \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

PHYSICIAN \_\_\_\_\_ TELEPHONE \_\_\_\_\_

**EBASCO**

**MEDICAL DATA SHEET  
REDSTONE ARSENAL, ALABAMA**



**APPROVALS:**

By their signature, following, the undersigned certify that this Health and Safety Plan will be utilized for the protection of the health and safety of workers during the field investigation of the four Redstone Arsenal sites.

**EBASCO ENVIRONMENTAL**

*Sammy Jackman*  
Health and Safety Officer

3/31/93  
Date

*K. Soorajian*  
Site Manager

3-29-93  
Date

*David [unclear]*  
Project Manager

3-29-93  
Date

*[unclear]*  
Manager, Health and Safety, CIH

31 Mar 93  
Date

**ATTACHMENT 1**

**SITE MAPS**

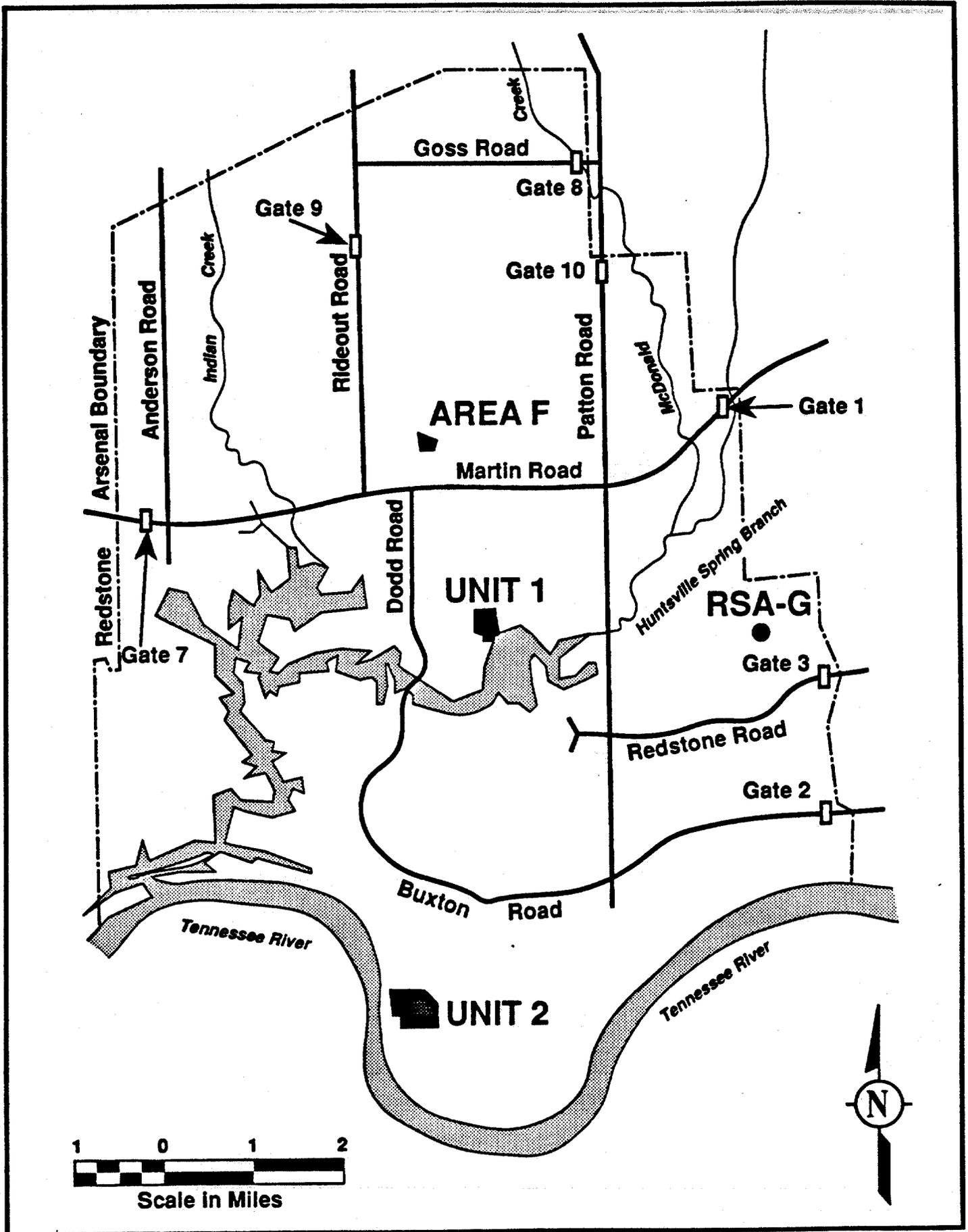
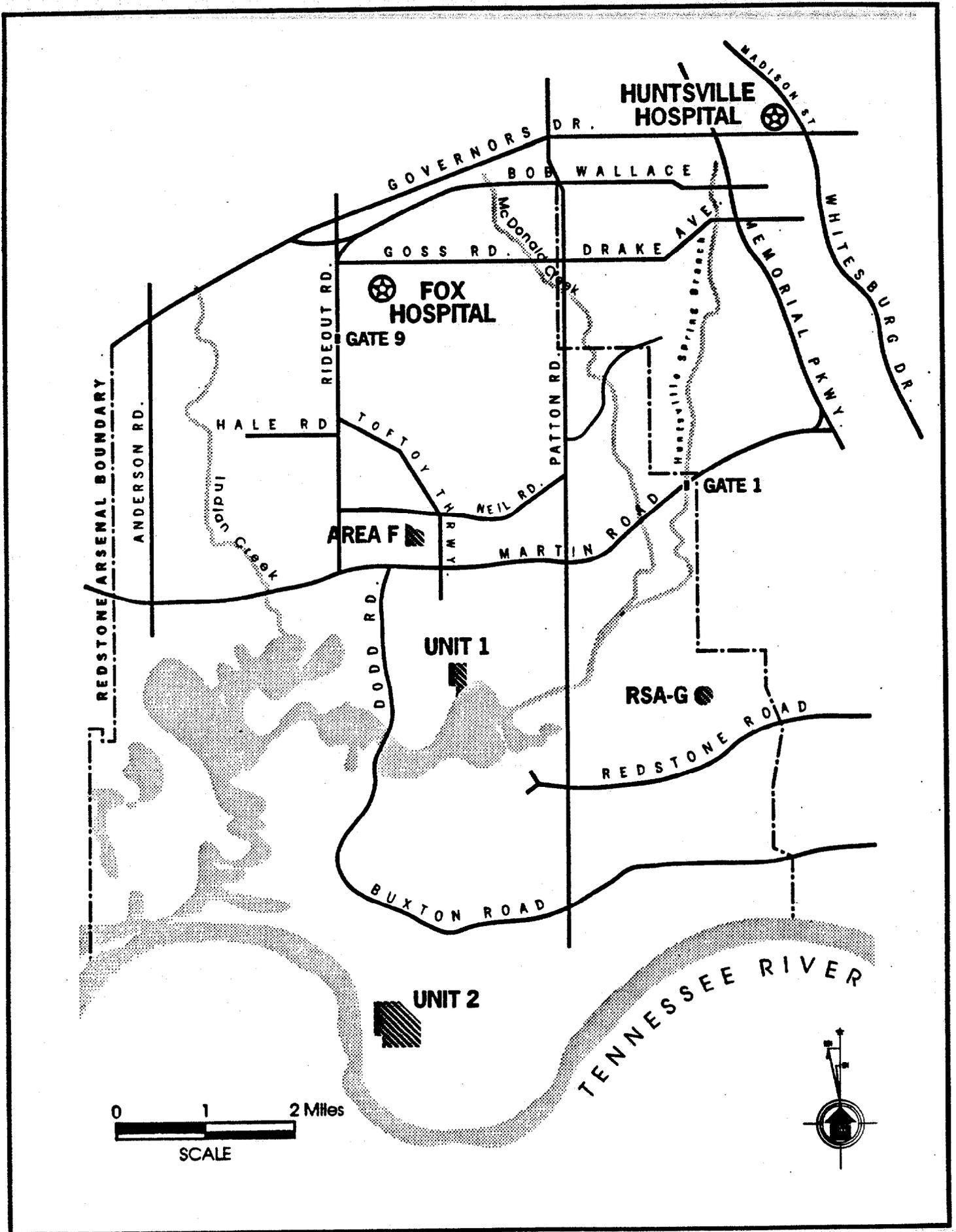


FIGURE 1 LOCATION OF UNIT 1, UNIT 2, AREA F AND RSA-G



**FIGURE 2 HOSPITAL LOCATION MAP - Redstone Arsenal**

**ATTACHMENT 2**

**STANDARD INCIDENT AND FOLLOW-UP FORM**

# INCIDENT REPORT

SITE: \_\_\_\_\_

SITE LOCATION: \_\_\_\_\_

REPORT PREPARED BY: \_\_\_\_\_

Name Printed

Title

## INCIDENT CATEGORY:

(check all that apply)

Injury

Illness

Property Damage

Near Miss

On Site

Chemical

Motor Vehicle

Equipment

Exposure

Mechanical

Electrical

Fire

Other

DATE AND TIME OF INCIDENT: \_\_\_\_\_

## Narrative Report of Incident:

(Provide sufficient detail so that the reader may fully understand the actions leading to or contributing to the incident, the incident occurrence, and actions following the incident. Append additional sheets of paper if necessary).

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INCIDENT REPORT  
(SHEET 2 OF 6)

WITNESSES TO INCIDENT

1. NAME \_\_\_\_\_ COMPANY \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
TELEPHONE NO. \_\_\_\_\_

2. NAME \_\_\_\_\_ COMPANY \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
TELEPHONE NO. \_\_\_\_\_

INJURIES

FIRST INJURED PERSON

Name of Address of Injured: \_\_\_\_\_  
\_\_\_\_\_

SSN: \_\_\_\_\_ Age: \_\_\_\_\_ Sex: \_\_\_\_\_

Years of Service: \_\_\_\_\_ Time on Present Job: \_\_\_\_\_

Title/Classification: \_\_\_\_\_

Severity of Injury or Illness:

\_\_\_ Disabling  
\_\_\_ Fatality

\_\_\_ Non-disabling  
\_\_\_ Medical Treatment

Estimated Number of Days Away from Job: \_\_\_\_\_

Nature of Injury or Illness: \_\_\_\_\_  
\_\_\_\_\_

Classification of Injury:

\_\_\_ Fractures  
\_\_\_ Dislocations

\_\_\_ Heat Burns  
\_\_\_ Chemical Burns

\_\_\_ Cold Exposure  
\_\_\_ Frostbite

**INCIDENT REPORT  
(SHEET 3 OF 6)**

- |  |  |  |
|--|--|--|
| <input type="checkbox"/> Sprains         | <input type="checkbox"/> Radiation Burns               | <input type="checkbox"/> Heat Stroke         |
| <input type="checkbox"/> Abrasions       | <input type="checkbox"/> Bruises                       | <input type="checkbox"/> Heat Exhaustion     |
| <input type="checkbox"/> Lacerations     | <input type="checkbox"/> Blisters                      | <input type="checkbox"/> Concussion          |
| <input type="checkbox"/> Punctures       | <input type="checkbox"/> Toxic Respiratory<br>Exposure | <input type="checkbox"/> Toxic Ingestion     |
| <input type="checkbox"/> Faint/Dizziness | <input type="checkbox"/> Bites                         | <input type="checkbox"/> Respiratory Allergy |
| <input type="checkbox"/> Dermal Allergy  |  |  |

Part of Body Affected: \_\_\_\_\_  
Degree of Disability: \_\_\_\_\_  
Date Medical Care was Received: \_\_\_\_\_  
Where Medical Care was Received: \_\_\_\_\_  
Address (if off-site): \_\_\_\_\_  
If Hospitalized, Name, Address and Telephone No. of Hospital: \_\_\_\_\_

Name, Address and Telephone No. of Physician: \_\_\_\_\_

**SECOND INJURED PERSON**

Name and Address of Injured: \_\_\_\_\_  
\_\_\_\_\_  
SSN: \_\_\_\_\_ Age: \_\_\_\_\_ Sex: \_\_\_\_\_  
Years of Service: \_\_\_\_\_ Time on Present Job: \_\_\_\_\_  
Title/Classification: \_\_\_\_\_

Severity of Injury or Illness:

- |                                    |  |
|------------------------------------|--|
| <input type="checkbox"/> Disabling | <input type="checkbox"/> Non-disabling     |
| <input type="checkbox"/> Fatality  | <input type="checkbox"/> Medical Treatment |

Estimated Number of Days Away from Job: \_\_\_\_\_  
Nature of Injury or Illness: \_\_\_\_\_  
\_\_\_\_\_

**INCIDENT REPORT  
(SHEET 4 OF 6)**

**Classification of Injury:**

- |  |   |  |
|--|---|--|
| <input type="checkbox"/> Fractures       | <input type="checkbox"/> Heat Burns                 | <input type="checkbox"/> Cold Exposure       |
| <input type="checkbox"/> Dislocations    | <input type="checkbox"/> Chemical Burns             | <input type="checkbox"/> Frostbite           |
| <input type="checkbox"/> Sprains         | <input type="checkbox"/> Radiation Burns            | <input type="checkbox"/> Heat Stroke         |
| <input type="checkbox"/> Abrasions       | <input type="checkbox"/> Bruises                    | <input type="checkbox"/> Heat Exhaustion     |
| <input type="checkbox"/> Lacerations     | <input type="checkbox"/> Blisters                   | <input type="checkbox"/> Concussion          |
| <input type="checkbox"/> Punctures       | <input type="checkbox"/> Toxic Respiratory Exposure | <input type="checkbox"/> Toxic Ingestion     |
| <input type="checkbox"/> Faint/Dizziness | <input type="checkbox"/> Bites                      | <input type="checkbox"/> Respiratory Allergy |
| <input type="checkbox"/> Dermal Allergy  |   |  |

Part of Body Affected: \_\_\_\_\_

Degree of Disability: \_\_\_\_\_

Date Medical Care was Received: \_\_\_\_\_

Where Medical Care was Received: \_\_\_\_\_

Address (if off-site): \_\_\_\_\_

If Hospitalized, Name, Address and Telephone No. of Hospital:

\_\_\_\_\_

Name, Address and Telephone No. of Physician:

\_\_\_\_\_

(If more than two injuries, provide information on separate sheet).

**PROPERTY DAMAGE**

**Brief Description of Property Damage:**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Estimate of Damage: \$ \_\_\_\_\_

**INCIDENT REPORT  
(SHEET 5 OF 6)**

**INCIDENT LOCATION**

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**INCIDENT ANALYSIS**

**Causative agent most directly related to accident (object, substance, material, machinery, equipment, conditions):**

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**Was weather a factor? \_\_\_\_\_  
Unsafe mechanical/physical/environmental condition at time of incident (be specific): \_\_\_\_\_**

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**Unsafe act by injured and/or others contributing to the incident (be specific, must be answered): \_\_\_\_\_**

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**Personal factors (improper attitude, lack of knowledge or skill, slow reaction, fatigue): \_\_\_\_\_**

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**On Site Incidents:**

**Level of personal protection equipment required in Site Safety Plan:**

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**Modifications: \_\_\_\_\_**

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**Was injured using required equipment?: \_\_\_\_\_**

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**INCIDENT FOLLOW-UP**

**Date of Incident:** \_\_\_\_\_

**Site:** \_\_\_\_\_

**Brief Description of Incident:** \_\_\_\_\_

\_\_\_\_\_

**Outcome of Incident:** \_\_\_\_\_

\_\_\_\_\_

**Physician's Recommendations:** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Date Injured Returned to Work:** \_\_\_\_\_

**ATTACH ANY ADDITIONAL INFORMATION TO THIS FORM**

**APPENDIX B**

**SUMMARY OF INTERIM CORRECTIVE MEASURE CRITERIA**

## Appendix B Design Criteria Summary

### Civil Design

#### Roads

- Surface course will be compacted granular material.
- Subgrade will be compacted soil. Geotextile will be used if required by site conditions.
- Design of paving will be in accordance with applicable technical manuals issued by HQ USACE and the requirements set forth in the "Design Manual for Military Construction" Second Edition, June 1989, USACE.

#### Drainage

- Surface drainage will be routed around and away from the cap.
- Storm drainage system will comprise ditches, swales and culverts.
- The storm drainage system will be designed to accommodate the 1 hour duration, 10 year frequency storm as a minimum.
- Storm drainage design will be in accordance with the technical requirements set forth in the "Design Manual for Military Construction", Second Edition, June 1989, USACE.

#### Earthwork

- Site grading will be designed to minimize erosion and to control direct stormwater runoff.
- Dust and erosion control will be implemented during earthwork activities.
- Vegetation will be established on all disturbed areas and on the cap.
- All existing vegetation will be removed and trees cut off at grade.
- Cap material will be clay soil, CL or CH Classification, with a maximum permeability of  $1 \times 10^{-7}$  cm/sec when compacted.
- Compaction of cap material will be 93% of Standard Proctor maximum dry density, as defined by ASTM D 698 with moisture content between optimum and 3% above optimum.
- Top soil will be spread 6-inches deep on the cap to support vegetation.

- Earthwork design will be in accordance with State and Local codes and the technical requirements set forth in the "Design Manual For Military Construction", Second Edition, June 1989, USACE.

#### Fencing

- All fencing and gates will be galvanized steel chain link fencing.

#### Contracting Approach

- Firm fixed price lump sum Invitation for Bids. Contract will include a six month maintenance of the Site.

**APPENDIX C**

**RESUMES OF EBASCO DESIGN TEAM MEMBERS**

**DAVID W. SCHAER, P.G.**  
Principal Geologist

***SUMMARY OF EXPERIENCE (Since 1977)***

Total Experience - Fourteen years experience in performing and managing remedial investigations, feasibility studies, site inspections and economic minerals exploration.

***Education*** - B.S., Geology, MESA State College, 1977  
AAS, Civil Engineering Technology, MESA State College, 1975

***Courses*** - Volcanic Rocks and Their Vent Areas - Mackey School of Mines  
Tailings Ponds and Their Impoundments, Colorado State University  
40 Hour Health and Safety Training for Hazardous Waste Site, 1985  
Principals of Groundwater Hydrology, NWWA, 1992

***Registrations*** - North Carolina No. 236  
South Carolina No. 446  
Florida No. 495  
Tennessee No. 544  
Wyoming (in progress)

***REPRESENTATIVE EBASCO EXPERIENCE (Since 1987)***

Principal Geologist/Hydrogeology Supervisor

Supervises a group of professional geologists/hydrogeologists and chemists. Responsible for job cost control and overhead accounts, in addition to making intragroup decisions.

Technically responsible for design, implementation and managing of remedial investigations for government agencies and industrial facilities. Tasks typically include preparing and implementing work plans for remedial investigations, site inspections and baseline environmental surveys for determining the presence or absence of contaminated soils and water.

Projects Include:

U.S. EPA Region IV - Sangamo Weston Site, Pickens County, South Carolina. Site Manager for an EPA Superfund Project that was designed to assess the effects of PCB contamination at several county landfills. Responsible for planning and managing the overall project and coordinating project activities with the EPA and state officials. This project was completed on schedule with a cost savings of \$40K from the budget of \$160K.

**DAVID W. SCHAER, P.G. (Continued)**

Georgia Pacific Corporation, Spartanburg, South Carolina. Project Manager responsible for providing client with integrity/inspection of five solid waste management units at GP's container plant to determine the environmental impact caused by each individual SWMU. Tasks included providing the client with a report suitable for submission to the EPA documenting the investigations findings. Additional tasks include the removal and thermal treatment of contaminated soils.

U.S. EPA - Tri-City Industrial Disposal Site, Bullitt County, Kentucky. Site Manager for an EPA Superfund RI/FS Project. Responsible for planning and managing both the remedial investigation and the feasibility study for the entire project and coordinating project activities with the EPA and state officials. These responsibilities included assisting the EPA at public meetings with technical responses to concerns voiced by the community.

U.S. EPA - Whitehouse Waste Oil Pits Site, Duval County, Florida. Responsible as Site Manager for planning and investigating bioremediation and solidification/stabilization technologies that could be used in support of a remedial action. A portion of this project included obtaining data sufficient to prepare a risk assessment and providing the EPA with a final risk assessment.

U.S. EPA - Zellwood Groundwater Contamination Site, Orange County, Florida. Responsible as Site Manager for assisting the EPA with a soil solidification/stabilization project. Additional responsibilities included planning, managing and implementing a groundwater monitoring system for monitoring the solidified product and investigating the extent of existing groundwater contamination to support a remedial design for groundwater remediation.

U.S. EPA - Picillo Farm Site, Coventry, Rhode Island. Remedial Investigation Task Leader on a RI/FS project which focused on assessing the areal extent of contamination attributable to six years of illegal bulk dumping of toxic and hazardous wastes. Tasks included developing and coordinating the plans for a field investigation for soils, surface waters, and the groundwater system.

U.S. EPA - Bluff Road Site, Columbia, South Carolina. Project Task Leader on a remedial investigation/feasibility study to assess the environmental impact caused by unregulated disposal of hazardous materials.

Teledyne-Brown Engineering/U.S. Army Missile Command - Redstone Arsenal, Huntsville, Alabama. Technical Lead responsible for the design of a monitoring plan for soils and groundwater to determine any environmental impacts associated with the destruction of Pershing missile motors at two sites in the western United States. Tasks included preparing detailed field plans for State and Federal agencies review.

Georgia Pacific Corporation, Atlanta, Georgia. Project Leader on a baseline environment survey of an existing plant which was being considered for purchase by the client. Tasks included supervision of field sampling, well installation, and preparation of final reports.

**DAVID W. SCHAEER, P.G. (Continued)**

**PRIOR EXPERIENCE**

**Versar Inc., Manager of Technical Services.** Responsible as technical manager for all remedial investigations and feasibility tasks associated with an EPA technical support contract (TES 7). Duties included providing EPA with independent cost analysis for remedial alternatives identified in feasibility studies generated by primary responsible parties. Additional duties included presenting feasibility studies alternatives, and EPA preferred methods at public meetings.

**Project Geologist, Camp Dresser and McKee**

Responsible for all aspects of groundwater monitor systems and supervision of field crews conducting remedial investigations. Other responsibilities included project planning and report preparation.

**Superfund Projects Include:**

Municipal Landfill, North Miami, Florida. Hollingsworth Solderless Terminal, Fort Lauderdale, Florida; Mowbray Engineering Company, Greenville, Alabama (Celanese-Shelby Fiber Operations), Shelby, North Carolina; Coleman-Evans Wood Preserving Company, Whitehouse, Florida; Newsom Brothers/Old Reichold, Columbia, Mississippi; Bypass 601 Groundwater Contamination, Concord, North Carolina; Hipps Road Landfill, Duval County, Florida; Maxey Flats Nuclear Disposal, Hillsboro, Kentucky and Perdido Groundwater Contamination, Perdido, Alabama.

**Oak Ridge National Laboratory, Geologist.** Team leader responsible for planning and conducting field radiological surveys to investigate potential hazardous radioactive contamination. Prepared final reports from field-generated data for the Department of Energy's uranium mill tailings removal act.

**Bendix Field Engineering Corporation, Staff Geologist.** Project Geologist for remedial action programs dealing with the study of radioactive tailing piles. Duties included interpretation, sampling of tailings and installation of monitor wells. Also, as part the Bendix Exploration staff, conducted exploration drilling programs in the western United States. Planned and supervised the completion of, and lithologically logged, 54,000 feet of rotary and core test holes. Conducted comprehensive geochemical, geophysical, and reconnaissance mapping surveys as part of grass roots exploration programs in the Basin and Range Province of Nevada, California, and southeastern Utah.

**Idaho Mining Company, Exploration Geologist.** Conducted drilling programs in Colorado and Utah for mining exploration and development. Planned, supervised, and provided lithological and geophysical logging of more than 300 rotary test holes.

***SELECTED PUBLICATIONS***

**Publications**

- Schaer, D. W., 1981. A Geological Summary of the Owens Valley Drilling Project, U. S. Department of Energy, Open File Report GJBX-128(81).
- Schaer, D. W., 1984. Monticello Remedial Action Project Site Analysis Report, Geological Investigation Section, U. S. Department of Energy, Open File Report GJ10.
- Morrison, Schaer, Daniels, 1984. Minerals Evaluation of a Denied Area, Classified Document.

**KIMBERLY R. SOOVAJIAN**  
Environmental Engineer

***SUMMARY OF EXPERIENCE***

Over four years of experience in applications related to environmental compliance of solid and hazardous waste projects, including regulatory and licensing activities for the government sector. Ms. Soovajian is responsible for preparing Engineering Reports for Remedial Investigations under DERP, Environmental Assessments and Environmental Impact Statements under NEPA, Preliminary Assessments under CERCLA, Contamination Assessments, RCRA Part A and Part B permitting.

*Education:* BS, Civil Engineering, Syracuse University, 1988.

*Registrations:* E-I-T/1988/New York

*Courses:* 40-hour Hazardous Waste Operations Training Course  
Ebasco Hazardous Waste Operations Cross Training Course  
Ebasco Project Managers Training, 1992

*Professional Affiliations:* Society of American Value Engineers  
Society of American Military Engineers  
Chi Epsilon National Civil Engineering Honor Society  
American Society of Civil Engineers

***REPRESENTATIVE EBASCO EXPERIENCE***

City of Atlanta Department of Water: Project Manager of Hemphill; developed the scope of work to assess level of soil and groundwater contamination. Contaminants of concern include TCE, PCE, TCA and polyaromatic hydrocarbons. Field sampling supervision and engineering report preparation.

U.S. Army Corps of Engineers, Huntsville Division: Site Manager and Site Health and Safety Officer for topographic survey of areas suspected of chemical ordnance contamination. She conducted an archives search to determine the potential for UXO contamination, conducted a risk assessment, prepared an engineering report of findings, and prepared work plans for remediation of the contaminated areas.

U.S. Army Corps of Engineers, Huntsville Division: Preparation of environmental assessment pertaining to interim remedial treatment of fuel contaminated soil and ground water at Defense Fuel Supply Point, Ozol, CA.

## **KIMBERLY R. SOOVAJIAN (Continued)**

**U.S. Army Corps of Engineers, Huntsville Division: Preparation of RCRA Part A and Part B permit applications for munition deactivation furnaces at seven Army installations.**

**NASA, Marshall Space Flight Center: Determination of environmental baseline conditions at the entire facility and subsequent preparation of an environmental resource document.**

**The University of Alabama in Huntsville and U.S. Army MICOM: Preparation of supplemental environmental assessment for the addition of an Aero-Optics laboratory and photographic laboratory to the Aerophysics Test Facility on Redstone Arsenal, AL.**

### ***PRIOR EXPERIENCE***

As an Environmental Engineer with Stone & Webster Engineering, Boston, MA, Ms. Soovajian managed preparation of environmental reports for the Federal Energy Commission and NY Public Service Commission and was responsible for permitting on federal, state and local levels of over 200 miles of pipeline in northeast U.S. She has been primarily responsible for the environmental impact assessments of large scale engineering and utility projects on water quality, ecological resources, topography, and other environmental resources.

Ms. Soovajian was assigned as an Environmental Inspector of construction and has participated in and testified at numerous public hearings.

Experience in Waste Management includes: Assisting in the development of Environmental Impact Statement for the ongoing New York City Sludge Management Project; siting studies for long-term sludge disposal; site assessments to identify potential hazardous waste sources at candidate construction site, and review of state-of-the-art and proven sludge processing and disposal technologies applying various site/ technology constraints.

As an Engineering Aide for New York State Electric and Gas, Binghamton, NY, Ms. Soovajian designed weir to mitigate thermal plume effects of power plant cooling water discharge to meet NPDES permit requirements; coordinated contractors and vendors, prepared bid package and conducted prebid meeting site visits; and prepared numerous cost estimates and wrote technical specifications.

**ALBERT D. O'REAR, SR., P.E.**  
Regional Engineering Manger

***SUMMARY OF EXPERIENCE***

Mr. O'Rear is a Registered Professional Engineer with over 25 years experience in siting and other geotechnical engineering aspects of electric power generating stations and light to heavy industrial/commercial projects. He has nineteen years experience in waste management facility design.

*Education* - Graduate Courses in Civil Engineering, 1970  
Bachelor of Civil Engineering, Georgia Institute of Technology, 1969  
40-Hour Health and Safety Training for Hazardous Waste Site

*Registrations* - Professional Engineer in Alabama, Georgia, Kentucky, North Carolina, Florida, South Carolina, Oklahoma, Mississippi, Louisiana, Missouri, Tennessee, Texas, and Washington

***REPRESENTATIVE EBASCO EXPERIENCE***

Mr. O'Rear is the Regional Manager of Engineering for Ebasco's Southeast region with overall responsibility for remedial design tasks on EPA Superfund and other hazardous waste sites. His project management tasks include work plan preparation with budget/schedule forecasts and direction of technical and administrative activities during preparation of site remediation contract design packages. He provides claims prevention review of contract packages and project bid evaluations.

Mr. O'Rear's other responsibilities include laboratory testing and physical properties of soil and construction materials; impervious liner systems including compacted soil, bituminous and concrete paving and synthetic liner materials; physical layout and evaluation of subsurface investigation programs and interpretation of laboratory data; structural design and evaluation of hydraulic structures including liquid waste disposal and holding ponds, sedimentation ponds and municipal water supply dams and spillway systems; and design of shallow and deep foundation systems for structural support including spread footings, driven and cost-in-place piling and drilled piers.

**ALBERT D. O'REAR, SR., P.E. (Continued)**

As Project Engineer for Remedial Design and Remedial Action at the Crystal City Airport, Texas, Superfund site, Mr. O'Rear was responsible for design elements included RCRA cell for deposition of pesticide contaminated soils and demolition debris. He provided engineering support to Construction Management personnel during Remedial Action, which was completed in June 1990 on schedule and under budget.

For the USEPA - Region IV, Mr. O'Rear was responsible for all Remedial Design activities on Superfund sites for the REM and ARCS programs in EPA Region IV. His remedy elements have included: groundwater pump/treat, bioremediation of contaminated soils, thermal treatment, stabilization and solidification, gas collection systems, and containment in landfills. He provided design/engineering support to the EPA on 15 Superfund sites in 5 EPA Region IV states.

As Engineer, Mr. O'Rear was responsible for Feasibility Study and Remedial Design for a fuel spill at the Lone Star Army ammunition Plant in Texarkana, Texas for the USACE-Huntsville District.

Mr. O'Rear was responsible for the remedial design for cleanup of petroleum contaminated sites throughout Central and South Florida for Florida Department of Environmental Regulation. His experience in remedial measures for soil include soil ventilating, thermal treatment, excavation, aeration and land forming farming of BTEX contaminated soil. His experience includes groundwater remedial measures to pump/treat and floating product recovery systems. Sixty-five sites were assigned to EBASCO through May 1990.

**LYN R. PHILLIPS, P.E.**  
Civil/Structural Engineer

***SUMMARY OF EXPERIENCE***

Total Experience - Registered Professional Engineer with 15 years experience in structural and general civil design, construction and management on hazardous waste remediation, electric power generation, and pulp and paper industry projects.

*Education* - Georgia Institute of Technology, 1977

*Registrations* - Professional Engineer - Georgia, Florida

***REPRESENTATIVE EBASCO PROJECT EXPERIENCE (Since 1977)***

Experience includes structural steel, reinforced concrete, and general civil design; preparation of job specifications, design criteria and procedures; coordination of inspection and testing programs; quality assurance reviews; field engineering; project management.

Projects Include:

Geiger Site, Charleston County, South Carolina - US EPA ARCS IV Program. Functioned as site manager for this remedial design project, which includes soil and groundwater investigations and remediation. Groundwater is to be extracted, treated, and released to surface water; soil is to be treated by solidification/stabilization and/or thermal treatment methods.

Hollingsworth Solderless Terminal Company Site, Fort Lauderdale, Florida - US EPA REM III Program. Functioned as site manager for the project which involves review of remedial design documents, procurement activities, and remedial action oversight. Remedial action includes VOC contaminated soil and groundwater remediation. Soil is to be treated in-situ; groundwater is to be extracted from the aquifer, pumped through stripping towers until "clean", and then reinjected.

Sikes Disposal Pits, Crosby, Texas - Texas Water Commission. Functioned as staff engineer on the proposal for the remedial action at this site which involves excavation of contaminated material, incineration, disposal of ash on-site, treatment of surface water, and discharge into an adjacent river. Responsible for earth work quantity calculations.

**LYN R. PHILLIPS, P.E. (Continued)**

***PRIOR EXPERIENCE (3 years)***

600-MW Coal Fired Unit 1, Killen Electric Generating Station, Manchester, Ohio - Dayton Power and Light Company. Functioned as staff engineer on the design of this power plant. Responsible for miscellaneous structural steel framing and reinforced concrete design; design of structures for the coal barge unloading facility; design of earthwork, including sheet piling and drainage structures, at the ash pond and the river front area; field engineering prior to and during start-up operations.

Dravo Engineering Companies, Inc./Sandwell Swan Wooster, Inc.  
Atlanta, GA

**Structural Engineer**

Responsible for all aspects of design of buildings and miscellaneous facilities for pulp and paper industry clients, including layout of main building systems (framing, bracing, foundations) and design of individual elements; layout and design of pipe bridges, coal and biomass handling system structures; on-site engineering support to construction. Also responsible for maintaining updated project documents; interfacing with clients, construction forces, and other engineering disciplines; coordination of work within the project group.

**LORETTA A. GARCIA**  
Community Relations

***SUMMARY OF EXPERIENCE (Since 1979)***

**Total Experience** - Thirteen years experience including community relations plans and programs, quality assurance activities, land use/rezoning presentations, radiological emergency response planning, evacuation time estimate studies, environmental assessments and report preparation, and toxicological research.

**Education** - BS/Natural Resources and Environmental Science, Purdue University, 1979  
Graduate course on Geology of Tropical Marine Environments, University of Miami (FL) Rosensteil School of Marine and Atmospheric Sciences, 1977

**Courses** - "Dealing with Upset Citizens and the Public," Workshop sponsored by University of Nebraska-Lincoln, Center for Leadership Development, 1991

***REPRESENTATIVE EBASCO EXPERIENCE (Since 1986)***

**Community Relations/Environmental Planner**

Responsible for community relations planning and programs for hazardous waste projects; socioeconomics and land use identification including rezoning; radiation emergency response planning at and around nuclear power plants; support to environmental assessments and permitting; and quality assurance compliance on siting studies for private utility and federal agencies.

**Projects Include:**

**EPA Region IV - ARCS IV and REM III Superfund Projects.** Prepared community relations plans and programs, fact sheets, public notices, and arranged for public meetings and press briefings for remedial investigation and implementation phases of numerous Superfund hazardous waste site cleanups in Florida, Kentucky, Tennessee, North Carolina, South Carolina and Connecticut. Performed project closeout responsibilities which included file reviews and audits for final preparation and submittal of hard copy and microfiche files.

**Federal Energy Regulatory Commission - Mobile Bay, Southern Natural and Gateway Offshore Gas Pipeline Projects.** As part of a comprehensive EIS, identified the affected federal, state and local jurisdictional governments, agencies, public interest groups, libraries, newspapers, parties in the proceeding and interested individuals to receive a "Notice of Intent" to prepare the draft EIS. Prepared a coded and sortable mailing list for mailing label creation.

## **LORETTA A. GARCIA (Continued)**

**Public Service of New Hampshire - Seabrook Station.** Provided licensing reviews and presented legal issues on draft emergency response plans and procedures of two states in an effort to support award of an operating license for Seabrook Station nuclear plant in New Hampshire.

**Florida Power & Light Company - Martin Coal Gasification/Combined Cycle Expansion Project, Indiantown, Florida.** Quality Assurance Coordinator for the monitoring and program established to meet state and federal environmental licensing requirements. Prepared QA Plan and Procedures, performed audits, inspections and training of personnel. Also responsible to Project Management for coordination of socioeconomic, land use and environmental preservation studies required to meet county requirements for rezoning in compliance with Site Certification Application requirements.

**Clean Power Cogeneration, Inc. - Air Blown Integrated Gas Combined Cycle Demonstration Project, Tallahassee, Florida.** Quality Assurance and Document Development coordinator. Responsible for preparing QA plan and procedures to include technical discipline coordination, as well as develop document style guides and identify administration needs in order to produce the Plan of Study, Volume of Environmental Information and Site Certification Application for a demonstration IGCC unit at an existing generating station site in Florida.

**Black & Veatch, Engineers/Architects - Oglethorpe Power Corporation Combustion Turbine Project Limnology Study.** As Quality Assurance Specialist, developed the QA plan and procedures and coordinated the reviews and responsibilities of the environmental QA leads. Provided QA training to project personnel and assured implementation of the program through periodic monitoring of documentation and scheduled audits.

**Confidential Client - Various mine site feasibility analyses in southeast Georgia.** Responsible for technical review and coordination of state regulatory and licensing updates and client impacts.

**Georgia Power Company - Vogtle Nuclear Plant.** Performed quality assurance verification and review of the Vogtle Nuclear Plant operations assessment program (OAP) in preparation of a low-power license application including database and file reviews with multi-discipline interface.

**Florida Power & Light Company - Turkey Point Unit 4.** Conducted work as part of an extensive project quality assurance program. Established 28-volume support document collection for presentation to the U.S. NRC of activities determining root cause and affect analysis, and mitigation of a reactor containment boric acid leak at Turkey Point Unit 4 nuclear power plant.

**LORETTA A. GARCIA (Continued)**

***PRIOR EXPERIENCE (7 Years)***

**Ambic Environmental Sciences, Inc., Philadelphia, PA (Summer 1986)**

**Research Assistant - Prepared research and literary review for presentation to legal staff on toxicity, carcinogenicity, safety and occupational hazards of polynuclear aromatic hydrocarbons (PAHs) and specific volatile organic compounds (VOCs) discovered at a site in litigation. Included database searches on DIALOG and BRS data files.**

**Stone & Webster Engineering Corporation, Boston, MA (1979-1986)**

**Prepared radiological emergency response plans for the states of New Jersey and Maryland and counties and municipalities in the 10-mile emergency planning zone. Responsibilities included meeting with and assessing state and local agencies' capabilities and resources, identification and designation of notification and protective actions warranted for public safety in fulfillment of federal and state regulations, and directed planning team members in the preparation of the planning documents. Prepared and developed sections of these plans and developed and updated implementing procedures for state and local agencies involved.**

**Prepared the evacuation time estimate study for two nuclear power plants affecting the states of Ohio, Kentucky, Pennsylvania, and Maryland. Included field work and data acquisition to determine affected permanent and transient populations, and evacuation roadway network definition for coding and input into the NETVAC2 computer evacuation simulation model.**

**Coordinated engineering tasks with construction and quality assurance representatives to meet Project 2 (P2) computer scheduling commitments for N-5 certification stamp on ASME III piping in 260 systems. Modified P2 computer sub-program for tracking piping status to outstanding materials and work responsibility. Hired and trained data entry and records management staff.**

**Identified critical pathways of outstanding nonconformance and disposition reports (N&Ds) and Engineering and Design Change Reports (E&DCRs) for client presentation. Supported Engineering Assurance in meeting auditing directives on record maintenance of site, corporate, and nuclear safety training of engineering personnel.**

**Responsible for preparation of environmental report sections on: surface water use of the lower Mississippi River and on Long Island Sound; land uses along a 120-mile transmission line corridor in Louisiana; archaeological and historical site identification and description along the same corridor; visual impacts by a plant site. Drafted aquatic ecology section.**

**SUE K. JONES, REPA**  
Environmental Chemist

***SUMMARY OF EXPERIENCE (Since 1979)***

Total experience - Work experience consists of thirteen years of environmental chemistry experience. This background covers hands-on laboratory analyses of a wide variety of environmental and industrial samples and supervisory level management of laboratory activities.

***Education*** -B.S., Villa Maria College, 1979 - Biology/Chemistry

***Member*** - American Chemical Society, National Registry of Environmental Professionals

***Courses*** - 40 Hour Health and Safety Training for Hazardous Waste Site, 1988  
REM III Supervisory Training, 1989  
8 Hour Health and Safety Refresher, 1990  
Numerous Hazardous Waste Seminars and Conferences

***REPRESENTATIVE EBASCO PROJECT EXPERIENCE (Since 1988)***

Environmental Chemist

Ms. Jones performs as Technical Lead on many hazardous waste and environmental projects. This involves writing and reviewing FSAPs, QAPPs, subcontractor laboratory bid specifications, and other technical documents. Also consults with Project Managers regarding sampling and analysis protocols. Coordinates all non-CLP laboratory analysis.

REM III Program. Coordinated all laboratory support services provided by the REM team members. The analytical level of support for this project was in excess of 3 million dollars in lab fees over a 4 year period. Performed audits on mobile laboratory operations at Superfund sites.

EPA Regions I, III, and V. Data validation experience for Regions I and III consists of more than 400 hours of Contract Laboratory Program (CLP) protocol validation. Designed mobile lab specifications for the ARCS V program which was chosen out of three as the prototype lab trailer for the Region.

## **S. K. JONES (Continued)**

State of Georgia and Gwinnett County. Serves as laboratory liaison for the Underground Storage Tank (UST) programs for these two clients. This involves writing technical specifications for all laboratory activities and analyzing reported results. Writes Health and Safety Plans for field activities and serves as Health and Safety Officer for these sites. Performs well searches as part of Corrective Action Plans.

Army Corps of Engineers. Is Technical Lead for ongoing UST and hazardous waste sites that involves compiling all analytical data, evaluating it for usability, and writing Chemical Data Acquisition Plans, Work Plans, and Engineering Reports. Five sites are currently in progress in this program. Was Technical Lead on Part B Permit Applications at 20 sites across the country and developed waste characterization and analysis plans for these sites. These sites involved open burning and/or open detonation of waste munitions. Also prepared Part B Permit Applications for the United States Military Academy at West Point, Crane Army Ammunition Activity, and the NASA facility at Wallops Island.

FPL. Developed a Hazardous Waste/Materials Minimization Plan which included creating a database of all hazardous materials presently used or in design specifications and utilizing a hazard ranking system to prioritize minimization efforts.

Penelec. Developed contractor bid specifications for all environmental aspects of demolition of a coal-fired power plant. The environmental concerns included asbestos, fly-ash, and PCBs.

United States Postal Service and Various Clients. Has performed real-estate transfer audits to comply with various environmental regulatory and internal requirements.

### ***Prior Experience (8 years)***

Metallurgical Engineers, Div. of ATEC Associates (1987)

Ms. Jones was engaged to re-initiate activities of the chemistry laboratory at this division. She was responsible for planning and design of the laboratory and for all instrument and equipment maintenance and performance. She was also responsible for the hiring, training, and supervision of laboratory technicians.

## **S. K. JONES (Continued)**

One of Ms. Jones' principal tasks was to obtain certification of the laboratory by the American Association of Laboratory Accreditation and the State of Florida. To accomplish this, she composed and implemented a Quality Assurance/Quality Control Manual that was used by all three divisions of the Company, and successfully completed on-site evaluations by both agencies as well as analyses of performance evaluation samples. Ms. Jones was responsible for tracking all quality control activities and summarizing the information in graphs and charts.

### **Dunn Laboratories (1980-1987)**

Ms. Jones obtained extensive background in the analysis of environmental and industrial samples. Because of the variety of the work load, Ms. Jones was called upon to develop new methods or modify existing methods.

Ms. Jones regularly performed laboratory analyses of potable water using EPA-approved methodology. She also analyzed wastewater for its conformance to N.P.D.E.S. permitting limitations and assisted clients in completing permit applications and reporting. Ms. Jones has extensive experience in the analysis of solid waste for the determination of its hazardous characteristics, such as ignitability, corrosivity, reactivity, and E P Toxicity metals using the methods in SW-846. This testing was done for some clients as part of delisting petitions or for informational purposes prior to disposal. Ms. Jones also analyzed debris obtained from fire and/or explosion scenes to determine presence of accelerants.

**STEPHEN E. WERNER**  
Senior Cost Engineer

***SUMMARY OF EXPERIENCE (Since 1979)***

Mr. Werner provides pricing and financial analysis support to various levels of management, ensuring cost proposal compliance with applicable Cost Accounting Standards, and Federal Acquisitions Regulations. He has over ten years experience in the government contracts arena, providing programmatic support to various cost-reimbursable and fixed-price contracts. His experience also includes the planning, scheduling and cost control of engineering and construction projects.

*Education:* MBA/1984/Contracts Management  
BS/1981/Business/Finance

*Certifications:* Twice certified in Cost/Schedule Control Systems Criteria (C/SCSC)

***REPRESENTATIVE EBASCO EXPERIENCE***

Mr. Werner has provided cost and schedule administration support to delivery order and project managers on firm-fixed price A-E services contracts with U.S. Army Corps of Engineers' Mobile, Savannah, and Tulsa Districts and the Huntsville Division.

Mr. Werner also supports Ebasco's tasks including assignments for remedial investigations. Primavera schedules and cost estimates are established early in the project and are used to monitor each task for schedule and cost status and to evaluate the overall contract performance.

As a Cost Control Analyst with Rexham Aerospace & Defense in Huntsville, Mr. Werner was responsible for the development and maintenance of a project control database for the U.S. Navy five-inch Guided Projectile contract; conceptualized and implemented a baseline control system and appropriate policies and procedures, and served as a Deputy for the program manager.

Mr. Werner was a Project Control Administrator for TRW Defense Systems Group. His responsibilities included the cost/schedule control, performance measurement, and business management of a number of cost-reimbursable and fixed price contracts with the U.S. Army Strategic Defense Command, Missile Intelligence Agency, and NASA. Mr. Werner ensured compliance with DoD Directives 7000.1 and 7000.2 (PMS, C/SCS), and successfully passed AFPRO and DCAA audits on his projects.

**STEPHEN E. WERNER (Continued)**

As a Buyer (Solid Rocket Booster/Space Shuttle Program) for United Technologies/United Space Boosters, Inc., Mr. Werner was responsible for subcontract administration of SRB Battery hardware, consultant contracts, and assisted in administering several cost-reimbursable subcontracts in excess of \$10 million. He also played a lead role in RFP evaluation, cost/price analysis of contract changes, negotiations, and other procurement-related transactions.

Mr. Werner provided program control expertise and software applications support to the Joint Technical Fusion Program Office, a \$1 billion joint U.S. Army/Air Force effort developing automated tactical command and control intelligence systems. Develops, analyzes, and maintains master/detailed schedules utilizing the Critical Path Method (CPM) while integrating cost/performance data, such as spend plans, CPR reports, and Baseline Cost Estimates, provides decision support analyses to all levels of military/contractor insight to the program office.

**GERALD L. DELANEY, C.I.H.**  
Regional Health and Safety Manger

***SUMMARY OF EXPERIENCE***

Mr. Delaney has over 25 years of progressively responsible experience in safety, industrial hygiene, environmental engineering and project management for hazardous and toxic waste and environmental programs. He provided program oversight for the Department of the Army in both the occupational health and environmental health arenas.

***Education:*** MS/1966/Environmental Engineering  
BCE/1964/Civil Engineering

***Registrations:*** 1980/Certified Industrial Hygienist

***REPRESENTATIVE EBASCO EXPERIENCE***

As Industrial Hygiene Consultant to the Army Surgeon General, LTC Delaney provided oversight of the Army's industrial hygiene program worldwide. As Director for Industrial Hygiene at the U.S. Army Environmental Hygiene Agency (USAEHA) Col Delaney managed a worldwide industrial hygiene support program which supported DERP, IRP, and the Kuwait Oil Fire Health Risk assessment.

As Director for Environmental Quality/Environmental Health Engineering at the U.S. Army Environmental Hygiene Agency, Col Delaney managed oversight of USAEHA support of the Army's DERP, IRP and all hazardous waste projects worldwide. He oversaw the USAEHA and the Agency for Toxic Substances and Disease Registry (ATSDR) interface on all hazardous waste projects/sites which the ATSDR evaluated. He developed and presented the 8-Hour annual OSHA update to employees requiring annual recertification within the Hazardous Waste Division at the USAEHA.

As Commander, U.S. Army Pacific Environmental Health Engineering Agency, Sagami, Japan, he directed studies and laboratory services in environmental health, environmental pollution, environmental sanitation, industrial hygiene, medical entomology, radiological health, and toxic and hazardous waste disposal, for all U.S. Army and selected DoD installations in the western pacific area of operations.

As Project Officer at U.S. Army Medical Laboratory, Ft. Baker, CA, he conducted radiation protection surveys and industrial hygiene surveys at U.S. Army facilities throughout the western United States and Alaska.

As Industrial Hygienist at USAEHA, he conducted comprehensive industrial hygiene studies at U.S. Army facilities worldwide.

**TAMMY S. JACKMAN**  
Environmental Scientist

***SUMMARY OF EXPERIENCE***

Ms. Jackman has approximately 2 1/2 years of environmental experience including: preparation of Site Specific Health and Safety Plans, Hazard Analysis, Accident Prevention Plans and Safety Design Analysis; conducted environmental sampling, safety inspections of buildings, and food and solid waste sanitation surveys; served as Health and Safety Officer for field work; and participated in laboratory research of respirators.

***Education:*** BS/Environmental Health Science, Indiana State University, 1991

***Courses:*** 40 Hour Health and Safety Training for Hazardous Wastes, 1992, 8 Hour Supervisory/Refresher, and 24 Hour Cross Training

***REPRESENTATIVE EXPERIENCE***

Has prepared numerous Site Specific Health and Safety Plans for a variety of hazardous waste sites. These plans cover all safety and health issues which pose hazards to workers and the precautions to take to prevent injury, illness or death from these hazards.

Dugway Proving Grounds Closure Plan for Solid Waste Management Units, Dugway, Utah -Served as Health and Safety Technician, conducted air monitoring and assisted in groundwater sampling.

Camp Shelby Health and Safety Plan for Open Burn/Open Detonation Unit, Hattiesburg, Mississippi - Prepared Site Specific Health and Safety Plan, served as Health and Safety Officer for field investigation and assisted in collection of water and soil samples.

***PRIOR EXPERIENCE***

Health and Hospital Corp., Marion County, Indianapolis, Indiana - Inspected privately and publicly owned buildings to maintain adequate sanitation and public health; inspections included minimum standards for basic equipment and facilities for light, ventilation and thermal conditions for safety from fire and accidents, for the use and location and amount of space for human occupancy, and for an adequate level of maintenance.

Public Health Service/Indian Health Service, Zuni, New Mexico - Assisted environmental health personnel in injury prevention control strategies; conducted food surveys; participated in institutional health comprehensive surveys and epidemiological investigations; performed solid waste sanitation surveys; administered rabies vaccinations.

**TAMMY S. JACKMAN (Continued)**

National Institute for Occupational Safety and Health, Morgantown, West Virginia -  
Conducted in-house laboratory research projects pertaining to personal protective  
equipment, engineering controls, injury prevention equipment, safety problems and  
safety standards; assisted in analyzing and interpreting research findings; participated in  
a field study.

**DAVID A. FAWCETT**  
Project Engineer

***SUMMARY OF EXPERIENCE (Since 1984)***

Total experience - Six years experience in environmental assessment/remediation and geological/geotechnical projects. Environmental focus has been in areas of underground storage tank (UST) corrective action, technical specification preparation, construction management and regulatory compliance. Geotechnical focus has been in subsurface explorations for large construction projects, earthen dams and structural distress analysis.

*Education* - Geological Engineering, BS/Engineering, Purdue University, 1986

*Certification* - EIT  
Health and Safety training for hazardous waste site work in accordance with 29 CFR 1910.120, 1990  
OSHA 8-hour hazardous waste refresher/supervisory training, 1990, 1991, 1992  
Environmental Chemistry for Engineers, Advanced Chemistry Laboratories, 1990  
Underground Storage Tanks, 1989  
Environmental Training Update, 1989  
Environmental Site Assessment, 1988  
Liability and Loss Prevention, 1988  
Professional Training Program, 1988

***EXPERIENCE***

Ebasco Environmental, Norcross, Georgia  
Geological Engineer, July 1992 through present

**Atlanta Hemphill Reservoir, Atlanta, Georgia** - Operations leader for the assessment of soil/groundwater contamination adjacent to the City of Atlanta drinking water supply. Responsibilities consisted of preparation of health and safety plan, development of work plan, supervision of drilling/excavating subcontractors, soil/groundwater sampling, interpretation of drilling and analytical data, report preparation.

**Georgia EPD, Atlanta, Georgia** - Project leader for site investigations and corrective action plans involving soil/groundwater remediation at sites funded by the Georgia Underground Storage Tank Trust Fund. Projects include free product recovery systems, pump and treat systems and an active bioremediation facility.

**DAVID A. FAWCETT (Continued)**

**American Containment Services, Inc., Marietta, Georgia**  
Project Engineer, March 1992 - July 1992

Provided project engineering and technical support for various environmental assessment and site remediation projects. Projects consisted of UST releases and hazardous waste sites. Typical projects consisted of UST closures/assessments, product recovery, on-site remediation of hydrocarbon contaminated soils and design of waste containment systems.

**Law Engineering, Atlanta, Georgia**  
Project Engineer, April 1987 - March 1992

**Savannah River Site, Akin South Carolina** - Project Engineer for the seismic cone penetration exploration at the proposed site of a new nuclear reactor. Responsible for the overall successful completion of the field activities including: oversight of subcontractors, data quality control, documentation of non-conformances, data collection and report preparation.

**Mayfair Mall, Milwaukee, Wisconsin** - Resident Engineer responsible for a \$500,000 project involving the assessment and remediation of hydrocarbons released below the mall structure. The project consisted of removal and restoration of structural components to gain access to contamination. Responsibilities consisted of work plan preparation and implementation, budget, schedule, Department of Natural Resources interface, supervision of construction subcontractor responsibilities, inspection functions, review of contractor payments and project report preparation.

Project Engineer for site assessments, groundwater characterizations, UST closures and site remediations for more than 40 sites throughout the eastern U.S. This work was performed for national clients with multiple sites and small to medium size industrial clients.

Project Engineer for more than 50 geological/geotechnical projects in the Southeast. Responsibilities consisted of development and execution of exploratory field methods, including soil sampling, rock coring, geophysical testing methods, laboratory program design, data interpretation and report preparation.

**DAVID A. FAWCETT (Continued)**

**Atlanta Testing and Engineering, Atlanta, Georgia**  
**Geotechnical Engineer, June 1986 - April 1987**

Provided geotechnical engineering field services for various active and proposed construction projects. These services consisted of foundation inspections, subgrade testing and contractor oversight.

**Virginia Electric Power Company, Richmond, Virginia**  
**QA/QC Inspector, Summer Internship - June 1984**

**Bath County Pumped Storage Project, Virginia** - Provided oversight of the contractor performing construction of a 100 meter high earthen dam. Responsibilities consisted of observing and documenting contractor's activities.

**HAROLD A. FREDIANI, JR., P.E., P.H.**

Principal Environmental Engineer

*Education* - MEC/Sanitary Engineering, Cornell University, 1971  
BSCE/Civil Engineering, Cornell University, 1970

*Member* - Professional Engineer, States of New York, Georgia, Florida, Texas,  
Kentucky, Tennessee, Virginia, and Pennsylvania  
Professional Hydrologist, American Institute of Hydrology

**WORK EXPERIENCE - Summary**

1989-Present Supervisor, Systems Engineering Group, Ebasco  
Environmental, Atlanta, GA  
1980-1988 Principal Environmental Engineer, Envirosphere Company,  
Atlanta, GA  
1976-1979 Senior Hydrothermal Engineer, Envirosphere Company, N.Y.,  
N.Y.  
1971-1976 Hydraulic Environmental Engineer, Stone and Webster  
Engineering Corporation, Boston, MA

**WORK EXPERIENCE - RECENT**

Technical Lead, Plant Engineering and Physical Sciences, Polk County Site Project,  
Florida Power Corporation.

Project Manager, Hazardous Waste Minimization Study, Air Force Plant No. 6,  
Lockheed Aeronautical Systems Company.

Technical Lead, Water Resources Permitting, Conemaugh Station FGD Project,  
Pennsylvania Electric Company.

Project Environmental Engineer, Lauderdale Repowering Project, Florida Power and  
Light Company

Senior Technical Lead, Surface Water Hydrology, Martin Coal Gasification Combined  
Cycle Project, Florida Power and Light Company

## HAROLD A. FREDIANI, JR., P.E., P.H. (Continued)

### APPLICABLE WORK EXPERIENCE - DETAILED

Mr. Frediani has over twenty-one years of experience, primarily in the fields of hydrology, hydrothermal and water quality analysis, and related civil operations, associated with industrial projects. His expertise is centered upon computer-assisted analysis of engineering and licensing problems and optimization of their solutions. His experience encompasses the following areas.

#### Licensing Activities

Preparation of heat dissipation system, surface water hydrology, and thermal discharge impact assessment sections of environmental reports and environmental impact statements, preparation of NPDES permit applications, preparation of non-biological portions of Section 316 (PL 92-500) demonstrations, and preparation and presentation of expert testimony with respect to surface water hydrology and thermal discharges at public hearings. This experience includes a six-month temporary assignment in the licensing group at the Power Plant Engineering Department of Florida Power and Light Company, including NPDES permit, state industrial waste water permit, and dredge and fill permit analysis; and solid and hazardous waste management analysis, including PCBs, asbestos, coal combustion by-product management, and oil-fired plant sludge management.

#### Water and Waste Management

Conceptual mass balance including estimates of quantity and quality of water requirements and solid and liquid discharges from boilers, demineralizers, cooling towers and ponds, ash handling systems, potable and sanitary water systems, and runoff control systems.

#### Thermal and Chemical Plume Extent Predictions

Mathematical and physical modeling of both surface and subsurface discharges, analysis of regulatory criteria, predictions of compliance or noncompliance and verification through field measurements.

#### Surface Water Hydrology/Water Quality

Field program planning and execution, literature searches, data reduction and data analysis such as flood and low flow frequency analysis, quality parameter analysis, temperature analysis, dispersion analysis, rainfall/runoff analysis, and hydrothermal impact assessment.

## HAROLD A. FREDIANI, JR., P.E., P.H. (Continued)

### Site Feasibility and Alternative Studies

Conceptual layout, quantity takeoff, and cost estimates for heat dissipation systems, solid waste disposal areas, highways, rail lines, plant drainage systems, and makeup and blowdown lines; cooling pond and/or makeup reservoir analysis including design area and volume, dam location and cost, dike location and cost, and stage-area-capacity curves; and full-scale alternative cooling systems analyses including once-through discharge vs closed cycle cooling towers, ponds, and sprays with the comparison including capital costs, operating and maintenance costs, and backpressure and capability penalties.

### Publications

Frediani, H A and Smith, N, 1977. Mathematical model for spray cooling. Transactions of the ASME Journal of Engineering for Power, April.

Frediani, H A, 1978. Application of mathematical spray cooling model. Second Conference on Waste Heat Management and Utilization, Miami, Florida, December.

Frediani, H A, 1981. Installation of closed cycle cooling system to reduce impact of existing once-through cooling system. Third Conference on Waste Heat Management and Utilization, Miami, Florida, May.

Frediani, H A and Boyd, R H, 1985. Estimation of water quality parameter concentrations for a coal-fired power plant. ASCE Conference on Water Quality Issues at Fossil Power Plants, Detroit, Michigan, October.

Frediani, H A; Jones, S K; Masters, K G and Palmer P K, 1992. Improvement of Detection Limits for Water Quality Sampling by Evaporative Concentration. VIII International Conference on Chemistry for Protection of the Environment, Lublin, Poland, September.

**J. PERRY PATTON, IV**  
Civil Engineer

***SUMMARY OF EXPERIENCE (Since 1988)***

Total Experience - Civil Engineer with 4 years experience in County Infrastructure systems. He has 7 months experience in engineering support, analysis, design, layout and sampling for hazardous waste remediation projects.

*Education* - BS/Physics, University of the South, Sewanee, 1986  
BS/Civil Engineering, Georgia Institute of Technology, 1988

*Registrations* - E.I.T/1988/Georgia  
PE (Taking Georgia Exam in April of 1993)

*Courses* - 40-Hour Hazardous Waste Operations and Emergency Response  
Training Course, 1992

*Professional Affiliations* - American Society of Civil Engineers

***REPRESENTATIVE EBASCO PROJECT EXPERIENCE***

Times Beach Remediation Site - Times Beach, Missouri (EPA Superfund Site). Assisted in preparation of preliminary and final design plans and specifications. Performed plan layout, quantity takeoff/cost estimating, design of remediation haul route and reviewed design drawings for Dioxin-contaminated site.

Gwinnett County Road Improvement Program - Gwinnett County, Georgia. Project Engineer and Utility Coordinator on the Bond and Sales Tax Road Improvement Program (A comprehensive program with more than 100 improvement projects including: major roadway widening and realignment projects; intersection improvement and turn lane addition projects and bridge replacement projects). Responsibilities included supervision/inspection of all construction on drainage structures, retaining walls, bridges, earthwork and asphalt paving to ensure compliance with State and County specifications; coordination of field testing services (geotechnical and quality control), engineering drawing reviews, earthwork calculations, preparation of monthly pay statements and "as-built" drawings, and resolving engineering/construction problems in the field.

## **J. PERRY PATTON, IV (Continued)**

As a utility coordinator on both programs, organized communications between State and County personnel, public and private utilities, engineering design firms and construction contractors from preliminary design through construction on over sixty projects. Responsibilities for each project included managing construction plan markups by utilities, participation in preconstruction conferences, coordinating utility company and highway contractor work to minimize construction delays due to conflicting operations, monitored right-of-way acquisitions, review and revising of construction plans to best resolve utility conflicts, and mediation between property owners, contractors, and utilities to settle claims and site problems.

Pennsylvania Electric Company - Homer City Power Plant, Unit 2. Participated in the performance of an electrostatic precipitator upgrade investigation. Responsibilities included examination of all structural members, connections and other components for signs of structural distress or failure; recommendation of necessary repair/replacement work, and compilation of measurements into a report for the client.

## BORROW PIT PROCEDURES

### 1. CONSERVATION OF TOPSOIL.

Topsoil shall be removed without contamination with subsoil and spread on areas already graded and prepared for topsoil, or when so specified, topsoil shall be transported and deposited in stockpiles convenient to areas that are to receive application of the topsoil later, or at locations indicated or specified. Topsoil shall be stripped to a depth of 4 inches and, when stored, shall be kept separate from other excavated materials and stockpiled free of roots, stones, and other undesirable materials.

### 2. EXCAVATION.

The Contractor shall perform excavation to the lines, grades, and elevations indicated or specified. Satisfactory excavated materials shall be transported to and placed in fill or embankment areas within the limits of the work shall be excavated below grade and replaced with satisfactory materials as directed. Surplus satisfactory excavated material not required for fill or embankment shall be disposed of in areas approved for surplus material storage or designated waste areas. Unsatisfactory excavated material shall be disposed of in designated waste or spoil areas. During construction, excavation and filling shall be performed in a manner and sequence that will provide proper drainage at all times.

### 3. BORROW MATERIAL.

Borrow material shall be selected to meet the requirements and conditions for the particular fill or backfill for which it is to be used. Borrow material shall be obtained from sources on the reservation as directed by the Contracting Officer.

### 4. OPENING AND DRAINING OF EXCAVATION AND BORROW PITS.

The Contractor shall notify the Contracting Officer sufficiently in advance of the opening of any excavation or bottom pit. Topsoil shall be excavated as directed from the borrow area to a depth of 4 inches and stockpiled. (Topsoil shall be kept separated from other excavated materials and shall be piled free of roots and other undesirable material.) Except as otherwise permitted by the Contracting Officer, borrow pits and other excavated areas shall be excavated in such a manner as will afford adequate drainage. After the borrow excavation is completed the Contractor shall neatly trim the distributed areas and evenly distribute the previously stockpiled topsoil over the surface of the borrow area and seed to match existing vegetation.

### 5. PROTECTING SERVICE LINES AND UTILITY STRUCTURES.

All service lines and utility structures uncovered or encountered during all classes of excavation, including borrow, construction of embankments, and backfilling shall be safeguarded and protected from damage, and supported if necessary as directed by the Contracting Officer. Service lines and utility structures damaged by the contractor shall be repaired at no additional expense to the Government.

## 6. APPLICATION OF FERTILIZER AND LIME.

6.1 Fertilizer shall be distributed uniformly at the rate of 60 pounds of nitrogen, 120 pounds of phosphorous and 60 pounds of potassium per acre, which is equivalent to 1500 pounds per acre of 4-8-4, over the areas to be seeded and shall be incorporated into the soil to a depth of at least 3 inches by disking, harrowing, or other methods acceptable to the Contracting Officer. The incorporation of fertilizer may be a part of the tillage operation specified above.

6.2 Lime. Immediately following or simultaneously with the incorporation of the fertilizer, lime shall be distributed uniformly at the rate of 800 pounds per acre and shall be incorporated into the soil to a depth of at least 3 inches by disking, harrowing, or other acceptable methods. The incorporation of the lime along with the fertilizer may form a part of the tillage operations specified above.

6.3 Leveling. Any undulations or irregularities in the surface resulting from tillage, fertilizing, or other operations shall be leveled out before seeding operations are begun and shall have a minimum of 4 inches of top soil at all locations.

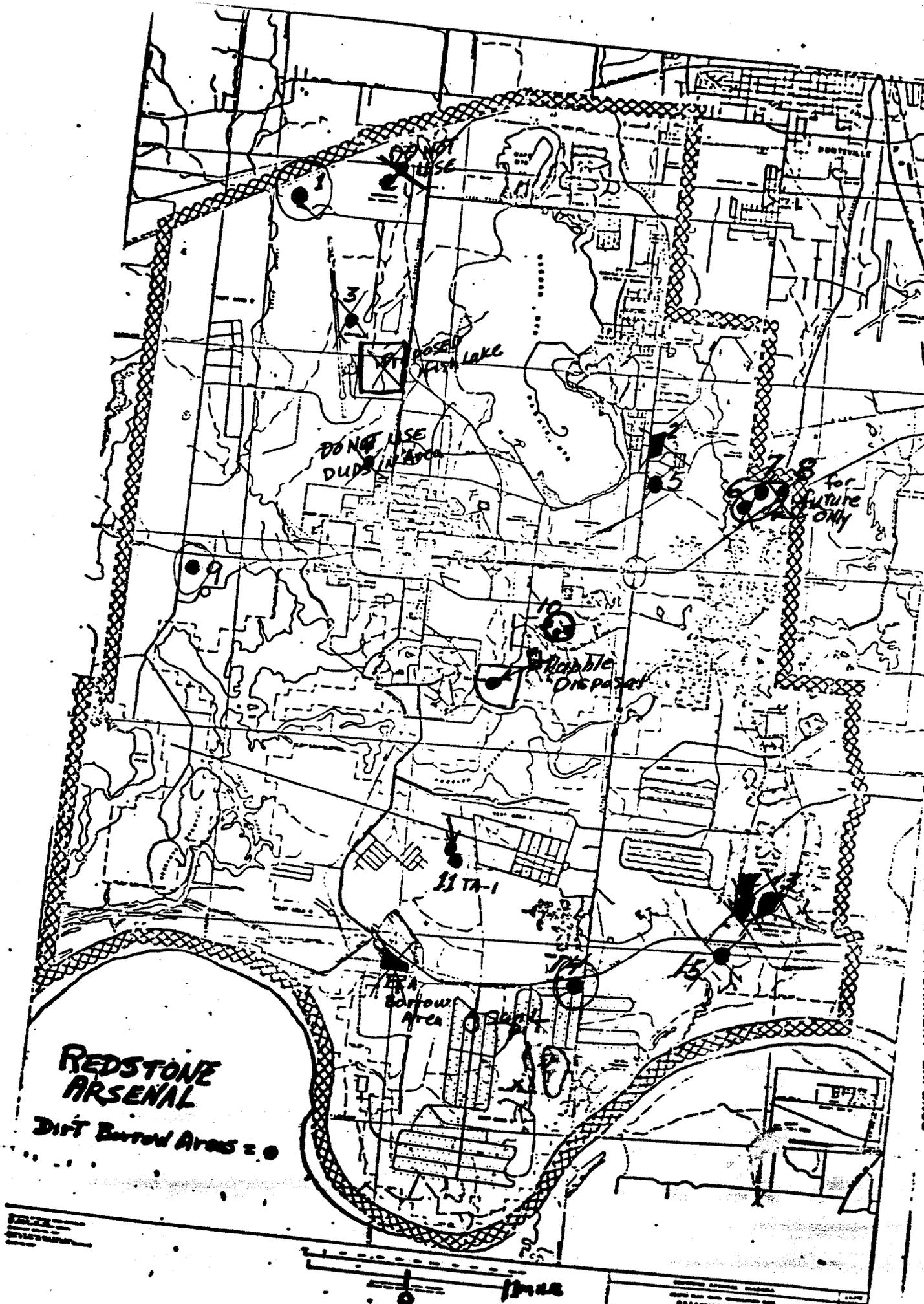
## 7. PLANTING SEED.

7.1 General. Seeding shall be accomplished as specified hereinafter. Generally seeding will follow the completion of construction operations as required for site improvement. The Contractor will be responsible for coordinating the planting operations with other construction work to avoid damage to planted areas. Any damaged areas shall be repaired by the Contractor at his own expense if resulting from his failure to coordinate the planting operation. The seed shall be broadcast either by hand or approved sowing equipment. The seed shall be uniformly distributed over the designated areas. Half the seed shall be sown with the sower moving in one direction, and the remainder shall be sown with the sower moving at right angles to the first sowing. The seed shall be covered to an average depth of 1 inch by means of a brush harrow, spike tooth harrow, chain harrow, cultipacker, or other approved device. When conditions are such, by reason of drought, high winds, excessive moisture or other factors, that satisfactory results are not likely to be obtained, the work will be stopped by the Contracting Officer and shall be resumed only when directed. If inspection during seeding operations or after there is a show of green indicates that areas have been skipped, the Contracting Officer may require the sowing of additional grass on these areas. Common hulled bermuda shall be sowed at the rate of 30 pounds per acre between 1 April and 1 September inclusive.

7.2 Reseeding. Areas that require reseeding will be designated by the Contracting Officer at least 15 days prior to the period specified for reseeding. Reseeding shall be completed within 25 days or such longer period as may be allowed by the Contracting Officer. Reseeding shall be accomplished as hereinbefore specified.

8. REPAIR.

If at any time before completion and acceptance of the entire work covered by this contract, any portion of the surface becomes gullied or otherwise damaged following seeding, or the seedlings have been winter killed or otherwise destroyed, the affected portion shall be repaired to reestablish the condition and grade of the soil prior to seeding and shall then be reseeded as specified in paragraph:  
PLANTING SEED.



**REDSTONE ARSENAL**  
 Dirt Buried Areas : ●

DO NOT USE  
 DUGOUT AREA

Rubble  
 Disposal

11 TA-1

Borrow  
 Area

for  
 future  
 use  
 ONLY

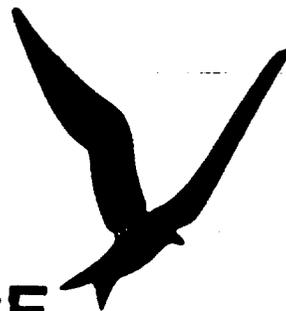
REPRODUCED AT GOVERNMENT EXPENSE

SCALE  
 1" = 1 MILE

1 MILE

RESERVATION MAP

FAX HEADER SHEET



ENVIRONMENTAL  
MANAGEMENT OFFICE

AMSMI-RA-EH-EQ

U.S. ARMY MISSILE COMMAND  
REDSTONE ARSENAL, ALABAMA 35898-5340

DATE:

8-31-93

TOTAL PAGES  
(Including Lead Sheet)

14

TO:

NAME: Juan Torres PEREZ

OFFICE SYMBOL: CSAS-EN-GH

PHONE NUMBER: \_\_\_\_\_

FAX NUMBER: 917-652-5311

FROM:

NAME: Bill Schroder

OFFICE SYMBOL: AMSMI-RA-EH-EQ

PHONE NUMBER: 876-8607

FAX NUMBER: (205) 876-0887

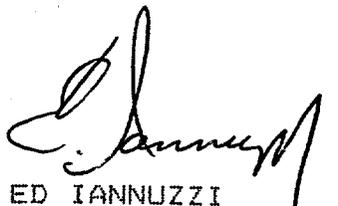
COMMENTS: Master Planning Comments on  
3 separate area F Documents  
F cover letter Call me if  
you cant follow Thanks Bill  
we need the EA

31 Aug 93

MEMORANDUM FOR AMSMI-RA-EH-EQ

SUBJECT: Review of 60% Design of Interim Remedial Treatment for Area F (Arsenic Impoundment Area) at RSA

1. Subject document was reviewed as requested. Comments are attached (Encl 1).
2. The Southern Bypass will not be impacted by this project.
3. Siting approval has been initiated. The siting package will be sent to AMC for final approval upon receipt of the necessary environmental documents.
4. The POC for attached comments is Ms. Diane Bowers, 955-0296.



ED IANNUZZI  
Acting Chief, Master Planning and  
Major Construction Office

<b>RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS</b> For use of this form, see AR 25-30; the proponent agency is ODISC4.	Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE 30 Aug 93
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TO: (Forward to proponent of publication or form) (Include ZIP Code) AMSMI-RA-EH-EQ	FROM: (Activity and location) (Include ZIP Code) AMSMI-RA-EH-MP
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**PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS**

PUBLICATION/FORM NUMBER Interim Corrective Measure Design of Area F	DATE July 14, 1993	TITLE Installation & Maintenance Plan
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ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON <small>(Provide exact wording of recommended change, if possible).</small>
1	A-1	1.1.b	5			This sentence should be reworded. - The TVA & Wheeler acreage is not a addition to the 36,459 as the total would be greater than 38,300 acres.
2	A-1	1.1.c	8			What kind of cap was used in 1977?
3	A-6	1.2.b	5			Figure B-3 is referenced, but is not included.
4	B-2	3.1.a	1			This should be reworded that routine maintenance will be done <u>at least</u> once a month for six months following end of construction, especially since it's turned over to RSA after 6 months. Also, any sodding done will have to be watered at least weekly.
5	B-3	3.3.1.b	1			Any soil used/brought in must be certified free of fire ants. This is required by the Installation Fire Ant Control Plan. Soil should be free of objects larger than 1 inch in diameter
6			9			

\*Reference to line numbers within the paragraph or subparagraph.

TYPED NAME, GRADE OR TITLE DIANE M. BOWERS	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION 955-0296	SIGNATURE Diane M. Bowers
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<b>RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS</b> For use of this form, see AR 25-30; the proponent agency is ODISC4.	Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE <b>30 Aug 93</b>
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TO: (Forward to proponent of publication or form) (Include ZIP Code) <b>AMSMI-RA-EH-EQ</b>	FROM: (Activity and location) (Include ZIP Code) <b>AMSMI-RA-EH-MP</b>
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**PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS**

PUBLICATION/FORM NUMBER	DATE <b>July 14, 1993</b>	TITLE <b>Installation &amp; Maintenance Plan</b>
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ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON <small>(Provide exact wording of recommended change, if possible).</small>
7	B-3	3.3.1.c	2			Area should be fertilized using 16-16-16 commercial mixed grade type fertilizer. This is needed to insure germination & growth
8	B-4	3.3.2.a	2			Rip rap or other suitable erosion control material.
9		3.4.u				Add the following: "All pesticides (including herbicides) must be approved by the Installation Pest Management Coordinator (IPMC). Use of pesticides must be done by a certified applicator. Copies of the certification must be provided to the IPMC. Application of pesticides must be documented on DD1532 and submitted to the IPMC." This is required by AR 420-76
10	D-11	18	3			2500 lb/ac lime to a depth of 6 inches is needed to insure growth
11	D-12	19	4			change Note to read: "Note: No slopes shall be $\geq 3:1$ ."

\*Reference to line numbers within the paragraph or subparagraph.

TYPED NAME, GRADE OR TITLE <b>DIANE M. BOWERS</b>	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION <b>955-0296</b>	SIGNATURE <i>Diane M. Bowers</i>
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<b>RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS</b> For use of this form, see AR 25-30; the proponent agency is ODISC4.	Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE 30 Aug 93
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TO: (Forward to proponent of publication or form) (Include ZIP Code) AMSMI-RA-EH-EQ	FROM: (Activity and location) (Include ZIP Code) AMSMI-RA-EH-MA
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**PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS**

PUBLICATION/FORM NUMBER	DATE July 14, 1993	TITLE Installation and Maintenance Plan
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ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON <small>(Provide exact wording of recommended change, if possible).</small>
12	D-12	21	3			See previous note change - No slopes shall be $\geq 3:1$ . Slopes of 3:1 or greater promote erosion & unsafe for equipment
13	E-12	4.2.6.c	10			Change 2nd sentence to read: "Grasp the tick behind the mouthparts and pull gently." Add the following after second sentence. "A slow steady pressure encourages the tick to withdraw its mouthparts. Do not squeeze the tick body during removal, as this will cause the tick body fluids into the bite."
14		4.2.6.d	1			Change sentence to read "... rash, flu-like chills, ..."
15						A section should be added on spider bites, with emphasis on brown recluse & black widow. Section should include statements about not reaching into places you can't see such as

\*Reference to line numbers within the paragraph or subparagraph.

TYPED NAME, GRADE OR TITLE  DIANE M. BOWERS	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION  955-0096	SIGNATURE  Diane M. Bowers
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	TO: (Forward to proponent of publication or form) (Include ZIP Code) <b>AMSMI-RA-EH-EQ</b>	

FROM: (Activity and location) (Include ZIP Code) <b>AMSMI-RA-EH-MP</b>
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**PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS.**

PUBLICATION/FORM NUMBER	DATE <b>July 14, 1993</b>	TITLE <b>Installation &amp; Maintenance Plan</b>
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ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON <i>(Provide exact wording of recommended change, if possible).</i>
15	(cont)					among rocks etc. Section should also state if a person believes they are bitten by either of these spiders they should go to HSO and if possible, take the spider with them so it can be identified.

\*Reference to line numbers within the paragraph or subparagraph.

TYPED NAME, GRADE OR TITLE <b>DIANE M. BOWERS</b>	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION <b>955-0296</b>	SIGNATURE <i>Diane M. Bowers</i>
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TO: (Forward to proponent of publication or form) (Include ZIP Code) <b>AMSMI-RA-EH-EQ</b>	FROM: (Activity and location) (Include ZIP Code) <b>AMSMI-RA-EH-MP</b>
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**PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS**

PUBLICATION/FORM NUMBER <b>Interim Corrective Measure Design at Area F</b>	DATE <b>July 14, 1993</b>	TITLE <b>Construction Specifications</b>
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ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON <small>(Provide exact wording of recommended change, if possible).</small>
1	01025-12	S.1.a.				Include the statement that fill soil and topsoil shall be certified free of fire ants. This is required by the Installation Fire Ant Control Plan.
2	01560-2	3.1.1	3			After first sentence add the statement: "This design will be coordinated with the Installation Ecologist and Installation Land Manager." This is necessary since these people are responsible for land use, appearance, erosion control, etc.
3	01560-3	3.1.3	3			Change first sentence to read "... a condition satisfactory to the Installation Ecologist and Installation Land Manager." These 2 people have the expertise to determine if the work is acceptable & it is part of their duties at RSA.
4			8			Change sentence to read "... quality approved by the Installation Ecologist and Installation Land Manager." Justification same as for Item #3.
5			10			Change last sentence to read "... mulched as approved by the Installation Ecologist and Installation Land Manager and as directed by the Contracting officer." Justification same as Item #3

\*Reference to line numbers within the paragraph or subparagraph.

TYPED NAME, GRADE OR TITLE <b>DIANE M. BOWERS</b>	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION <b>955-0296</b>	SIGNATURE <i>Diane M. Bowers</i>
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<b>RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS</b> For use of this form, see AR 25-30; the proponent agency is ODISC4.	Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE <b>30 Aug 93</b>
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<b>TO:</b> (Forward to proponent of publication or form) (Include ZIP Code) <b>AMSMI-RA-EH-EQ</b>	<b>FROM:</b> (Activity and location) (Include ZIP Code) <b>AMSMI-RA-EH-MP</b>
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**PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS**

PUBLICATION/FORM NUMBER	DATE <b>July 14, 1993</b>	TITLE <b>Construction Specifications</b>
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ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON <small>(Provide exact wording of recommended change, if possible).</small>
6	01560-3	3.1.5	4			Insert sentence "Restoration shall be approved by the Installation Ecologist and Installation Land Manager." Justification same as Item #3
7	01560-4	3.3.2	4			Add the following clause to the end of the first sentence "... after coordination with the Installation Ecologist and Installation Land Manager." Justification same as Item #3
8	01560-4	3.3.4				Add the following sentence "Any potential impacts to fish and wildlife and their minimization/remediation must be approved by the Installation Ecologist and Installation Land Manager." Justification same as Item #3
9	01563-1	1.1.2				Add the following to the sentence: "... Section after coordination and approval by the Installation Ecologist and Installation Land Manager." Justification same as Item #3

\*Reference to line numbers within the paragraph or subparagraph.

TYPED NAME, GRADE OR TITLE <b>DIANE M. BOWERS</b>	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION <b>955-0096</b>	SIGNATURE <i>Diane M. Bowers</i>
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FROM: (Activity and location) (Include ZIP Code) AMSMI - RA - EH - MP
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ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON <small>(Provide exact wording of recommended change, if possible).</small>
10	01563-2	1.3.1	2			Insert the following in the first sentence: "... acceptance by the Installation Ecologist and Installation Land Manager, his..." Justification same as Item #3.
11	02210-3	2.2.3	5			Change the last sentence to read as follows "... objects larger than one inch in diameter and shall be certified free of fire ants." This is necessary to insure maintenance and to comply with the Installation Fire Ant Control Plan
12	02900-1	1.3.2	2			Change the first sentence to read: "... granted by the Contracting Officer after coordination with and approval by the Installation Ecologist and the Installation Land Manager." Justification same as Item #3.

\*Reference to line numbers within the paragraph or subparagraph.

TYPED NAME, GRADE OR TITLE DIANE M. BOWERS	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION 955-0296	SIGNATURE Diane M. Bowers
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ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON <small>(Provide exact wording of recommended change, if possible).</small>
13.	02900-2	2.2	1			Fertilizer should be 16-16-16. This is necessary to insure germination & growth
14	02900-3	2.5.1	2			Add to the first sentence "... and certified free of fire ants." This is required by the Installation Fire Ant Control Plan.
15		2.6	5			Insert before last sentence "All sod shall be certified free of fire ants." This is required by the Installation Fire Ant Control Plan.
16	02900-5	3.1.5	2			Change first sentence to read "... objects larger than one inch in thickness..." This is necessary to insure maintenance
17.	02900-6	3.2.2	2,3			Change first sentence to read: "... at a rate of 2,500 pounds per acre... to a depth of at least 6 inches..." This is necessary to insure germination & growth

\*Reference to line numbers within the paragraph or subparagraph.

TYPED NAME, GRADE OR TITLE DIANE M. BOWERS	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION 955-0296	SIGNATURE Diane M. Bowers
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PUBLICATION/FORM NUMBER	DATE	TITLE
	July 14, 1993	Construction Specifications

ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON <i>(Provide exact wording of recommended change, if possible).</i>
18	02900-7	3.3.1	12			<p>Change sentence to read "All slopes will be 4 3:1. In any area where storm water runoff is anticipated to be concentrated, erosion control tactics such as tackifier, erosion control mats, rip rap etc. shall be used."</p> <p>Slopes <math>\geq</math> 3:1 promote erosion problems. Doubling the seeding rate will not prevent the problem - it will only result in twice as much seed being washed away.</p>
19	02908-9	3.6				<p>Add a statement that sodded areas must be watered at least on a weekly basis.</p> <p>This is necessary for sod establishment.</p>

\*Reference to line numbers within the paragraph or subparagraph.

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
DIANE M. BOWERS	955-0296	Diane M. Bowers

<b>RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS</b> For use of this form, see AR 25-30; the proponent agency is ODISC4.	Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE <b>30Aug93</b>
	TO: (Forward to proponent of publication or form) (Include ZIP Code) <b>AMSMI - RA - EH - EQ</b>	

FROM: (Activity and location) (Include ZIP Code) <b>AMSMI - RA - EH - MP</b>
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ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON <i>(Provide exact wording of recommended change, if possible).</i>
20	02900-9	3.7	3			Add to the first sentence "... and for sodded areas until sod is established and does not need frequent watering." This is needed to insure sod establishment.
21	02900-11	3.8.5.1	1,2			Change first sentence to read "... at a rate of 1200 pounds per acre ... to a depth of <del>at least</del> 4 inches." This is necessary to insure seed germination and growth.
22			3-5			Delete last sentence. With above treatment, a second application is unnecessary. Application as indicated in item 21, together with liming, will insure best soil quality.

\*Reference to line numbers within the paragraph or subparagraph.

TYPED NAME, GRADE OR TITLE <b>DIANE M. BOWERS</b>	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION <b>955-0296</b>	SIGNATURE <i>Diane M. Bowers</i>
--	---	-------------------------------------

<b>RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS</b> For use of this form, see AR 25-30; the proponent agency is ODISC4.	Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE 30 Aug 93
	TO: (Forward to proponent of publication or form) (Include ZIP Code) AMSMI-RA-EH-EQ	

FROM: (Activity and location) (Include ZIP Code) AMSMI-RA-EH-MP
--

**PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS**

PUBLICATION/FORM NUMBER Interim Corrective Measure Design at Area F	DATE July 14, 1993	TITLE System Design Analysis
--	-----------------------	---------------------------------

ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON <small>(Provide exact wording of recommended change, if possible).</small>
1	3-2	3.1.d	10			Insert sentence "No slopes shall be $\geq 3:1$ ." Slopes $\geq 3:1$ are unstable, not safe for machines, & erosion prone
2	3-4	3.2.4.c	5			Insert sentence "Topsoil shall not be stockpiled for longer than 6 months." This is necessary to maintain soil quality.
3		3.2.5.a				Add statement "No ditch slopes shall be $\geq 3:1$ ." "Locations and extent of rip rap or other erosion control material shall be coordinated with and approved by the Installation Ecologist & Installation Land Manager." The letter is necessary as these 2 are responsible for erosion control on the installation
4		3.2.7.a	5			Reword the sentence to read "The side slope in the vicinity of ramp will be $< 3:1$ ." Any slope steeper than this is prone to erosion & mass failure. Equipment is unsafe if $3:1$ or greater

\*Reference to line numbers within the paragraph or subparagraph.

TYPED NAME, GRADE OR TITLE DIANE M. BOWERS	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION 955-0296	SIGNATURE Diane M. Bowers
---	--	------------------------------

**RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS**

For use of this form, see AR 25-30; the proponent agency is ODISC4.

Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).

DATE

30 Aug 93

TO: (Forward to proponent of publication or form) (Include ZIP Code)

AMSMI-RA-EH-EQ

FROM: (Activity and location) (Include ZIP Code)

AMSMI-RA-EH-MP

**PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS**

PUBLICATION/FORM NUMBER

DATE

July 14, 1993

TITLE

System Design Analysis

ITEM NO.

PAGE NO.

PARA-GRAPH

LINE NO.\*

FIGURE NO.

TABLE NO.

RECOMMENDED CHANGES AND REASON  
(Provide exact wording of recommended change, if possible).

5

3-5

3.3.1.b

10

Change sentence to read  
"Side slopes of the cap are designed to be a ratio of less than a ratio of 3-horizontal to 1-vertical (3:1) for several reasons:"

The reasons listed are false for slopes  $\geq 3:1$ . This is documented in a number of publications. If these references are needed, they can be obtained from the Installation Ecologist.

6.

Attachment 2, Submitted Summary should also list pesticide labels, applicator certification, & form DD 1532. This information is required by AR 420-76

7.

2

2.0.d.

1

Change first sentence to include also installation of sod. This is mentioned later & should be included as part of the objectives.

\*Reference to line numbers within the paragraph or subparagraph.

TYPED NAME, GRADE OR TITLE

DIANE M. BOWERS

TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION

955-0296

SIGNATURE

Diane M. Bowers

<b>RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS</b> For use of this form, see AR 25-30; the proponent agency is ODISC4.		Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE <b>30 AUG 93</b>
TO: (Forward to proponent of publication or form) (Include ZIP Code) <b>AMSMI-RA-EH-EQ</b>		FROM: (Activity and location) (Include ZIP Code) <b>AMSMI-RA-EH-MP</b>	

**PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS**

PUBLICATION/FORM NUMBER						DATE	TITLE
						July 14, 1993	System Design Analysis
ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON <small>(Provide exact wording of recommended change, if possible).</small>	
8	10	4.12	12.			Update the name of the POC for Redstone Arsenal Environmental office	
9	11					Add section 4.13 to read as follows: " 4.13 DD1532. The DD 1532 shall be submitted to the Installation Pest Management Coordinator as required by AR 420-76 for use of any pesticides (herbicides, insecticides, etc.) during the project. "	
<del>10</del> 10	12	5.0				Add the following document: "17. DD 1532 . . . . . 10 <sup>th</sup> day of following month" - Required by AR 420-76	

\*Reference to line numbers within the paragraph or subparagraph.

TYPED NAME, GRADE OR TITLE <b>DIANE M. BOWERS</b>	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION <b>955-0296</b>	SIGNATURE <i>Diane M. Bowers</i>
--	---	-------------------------------------

**EBASCO ENVIRONMENTAL  
ATLANTA OFFICE**

**FAX COVER SHEET  
FAX NO. (404) 662-2408**

**DATE:** 25 MARCH 93

**TO:** BILL SCHRODER

**FAX NO.:** (205) 876-0887

**COMPANY:** MICON ENV.

**FROM:** KIM SOOVIJIAN

**PHONE NO.:** (404) 662-2438

**DEPT. NO.:** 941

**CHARGE NO.:**  
404-662-2408

**NUMBER OF PAGES (INCLUDING COVER):** 4

**COMMENTS:**

BILL - IN RESPONSE TO YOUR COMMENTS ON THE 4  
WORK PLANS, I HAVE COMPLETELY REVISED THE  
DIRECTIONS TO BOTH FOX HOSPITAL & HUNTSVILLE  
HOSPITAL. I WOULD APPRECIATE YOUR REVIEW  
FOR ACCURACY PRIOR TO SUBMITTAL. THANKS

IF YOU DID NOT RECEIVE ALL OF THE PAGES OR IF THERE ARE ANY PROBLEMS WITH THE  
DOCUMENT, PLEASE CALL (404) 662-2405.



Unit 2: Exit the Unit 2 gate and take a left onto McAlpine Road. Take a right onto Buxton Road. Take a left onto Patton Road and go approximately 1½ miles. Take a right onto Redstone Road and exit through Gate 3. Turn left (north) onto Memorial Parkway. Follow Memorial Parkway for approximately ~~3~~ miles. Exit right onto Governors Drive and proceed approximately 0.7 mile. Huntsville Hospital is located on the left at the intersection of Madison Street and Governors Drive (See Figure 2 in Attachment 1).

10.5  
~~7.5~~

Area F: Exit the Area F Site through the parking lot near Building 4382. Continue on that road until it intersects Toftoy Thruway. Take a right onto Toftoy Thruway going south. Exit to Martin Road East. Proceed through Gate 1 to Memorial Parkway North (veer right onto exit-ramp). Follow Memorial Parkway for approximately ~~4.5~~ miles. Exit right onto Governors Drive and proceed approximately 0.7 mile. Huntsville Hospital is located on the left at the intersection of Madison Street and Governors Drive (See Figure 2 in Attachment 1).

10.5

RSA-G: ~~Take Redstone Road east and exit through Gate 3.~~ Turn left (north) onto Memorial Parkway. Follow Memorial Parkway for approximately ~~3~~ miles. Exit right onto Governors Drive and proceed approximately 0.7 mile. Huntsville Hospital is located on the left at the intersection of Madison Street and Governors Drive (See Figure 2 in Attachment 1).

10.5

FOX Hospital (On-Base, Life threatening emergencies only).

Unit 1: Exit the Unit 1 gate and take a right onto Technology Road. Take a left onto Wood Road; Wood Road turns into Mills Road. Turn left onto Martin Road. Go 1½ miles and turn right (north) onto Rideout Road. Go 3½ miles and turn right onto Goss Road. Proceed approximately 0.6 mile; FOX Hospital is on the right (See Figure 2 in Attachment 1).

Unit 2: Exit the Unit 2 gate and take a left onto McAlpine Road. Take a right onto Buxton Road. Turn left onto Patton Road going north. Turn left (west) onto Martin Road and continue to Rideout Road. Turn right onto Rideout Road. Go 3½ miles and turn right onto Goss Road. FOX Hospital is approximately 0.6 mile on the right (See Figure 2 in Attachment 1).

AREA F: Exit the Area F Site through the parking lot near Building 4382. Continue on that road until it intersects Toftoy Thruway. Take a left onto Toftoy Thruway going northwest. Turn right onto Rideout Road and proceed 3½ miles. Turn right onto Goss Road and go approximately 0.6 mile; FOX Hospital is on the right (See Figure 2 in Attachment 1).

RSA-G: Take a right onto Redstone Road going west. Take a right onto Patton Road and proceed to Martin Road. Turn left (west) onto Martin Road and continue to Rideout Road. Turn right onto Rideout Road. Go 3½ miles and turn right onto Goss Road. FOX Hospital is approximately 0.6 mile on the right (See Figure 2 in Attachment 1).

**INCLEMENT WEATHER PROCEDURES:**

Site activities will be limited to the daylight hours and normal weather conditions. Inclement working conditions include heavy rain, high winds and lightning. Observe daily weather reports, evacuate site in case of inclement working conditions.





# ENVIRONMENTAL MANAGEMENT OFFICE

AMSMI-EQ  
REDSTONE ARSENAL

2 of 2



## DOCUMENT REVIEW COMMENTS

DOCUMENT TITLE		FROM	REVIEWER NAME	DATE	PHONE
Draft W.P. AREA F		EDASCO	M. W. SCHROEDER	3/9/93	876-8607
ITEM NO.	PAGE NO.	PARAGRAPH	COMMENTS		
5	2-1	2.0a	The existing Creek is a normally Dry Surface drainage Ditch - rewrite to reflect this		
6	2-1	2.2a	see item 5 above		
7	2-1	2.3a	What about removal of the existing fence? This needs to be included in the work plan.		
8	2-1	2.2a	I believe this figure to show Echo Street too close to the lagoons. This must be a 1940 MAP, there aint no hard top roads this close to the site.		
9	fig 2-1		See item 8 above.		
10	2-3	5th	See item 5 above		
11	3-1	3.1a	Where does the Contractor intend to get the clay for the Cap? This needs to be discussed also		
12	3-1	3.2a	Disposal of trees, fence, etc needs to be considered also. What is the contractor going to do with it after grubbing & clearing?		
13	5-8	5.12.2a	Last sentence see item 5 above. 404 permit is doubtful for this project. Did anybody really get out and look at this site?		
14	Appendix A pg 2 & 3	Hospital Routes	Same mistakes are made here as in UNIT 1 & UNIT 2 & BSA-G work plan 5. See item 1 above		
15	6-3	6.3	take out & "including the state & Federal Regulators"		



# ENVIRONMENTAL MANAGEMENT OFFICE

AMSMI-EQ  
REDSTONE ARSENAL

1 of 2



## DOCUMENT REVIEW COMMENTS

DOCUMENT TITLE DRAFT Work Plan Area F	FROM EBASCO	REVIEWER NAME M. W. SCHROEDER	DATE 3/9/93	PHONE 876-8607
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ITEM NO.	PAGE NO.	PARAGRAPH	COMMENTS
1	Exc Sum	3	This paragraph should be omitted or rewritten to fit the proposed ICM. Checks should be made by the contractor to make sure what they write is accurate <u>before</u> its sent out, even in a draft. I'm tired of reading the same old mistakes.
2	1-1	1.0a	1st sentence should be "The MICOM Environmental office at Redstone" 2nd sentence: ICM will provide a protective CAP to isolate the Arsenic wastes <del>from the environment</del> from the environment. See Item 1 above
3	1-7	1.7a	1st sentence absolutely false! see item 1 above 2nd " " " " " " " 3rd sentence rewrite: In 1986 - Re-usage - - -
4	1-B	1.4b	1st sentence rewrite to make some sense out of it This whole paragraph is screwed up! who wrote this anyway?

FAX HEADER SHEET



**ENVIRONMENTAL  
MANAGEMENT OFFICE**

**AMSMI-RA-EH-EQ**

**U.S. ARMY MISSILE COMMAND  
REDSTONE ARSENAL, ALABAMA 35898-5340**

**DATE:**

3/10/91

**TOTAL PAGES  
(Including Lead Sheet)**

3

**TO:**

**NAME:** Juan Torres - Perez

**OFFICE SYMBOL:** CEAS-EN-611

**PHONE NUMBER:** \_\_\_\_\_

**FAX NUMBER:** 912-652-5311

**FROM:**

**NAME:** Bill Schroder

**OFFICE SYMBOL:** AMSMI-RA-EH-EQ

**PHONE NUMBER:** \_\_\_\_\_

**FAX NUMBER:** (205) 876-0887

**COMMENTS:** Comments to RSA-F

DRAFT Work Plan 9 March 93

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

FAX HEADER SHEET



**ENVIRONMENTAL  
MANAGEMENT OFFICE**

**AMSMI-RA-EH-EQ**

**U.S. ARMY MISSILE COMMAND  
REDSTONE ARSENAL, ALABAMA 35898-5340**

**DATE:**

4/29/93

**TOTAL PAGES  
(Including Lead Sheet)**

2

**TO:**

**NAME:** Juana Torres-Perez

**OFFICE SYMBOL:** CESAS-EN-6H

**PHONE NUMBER:** \_\_\_\_\_

**FAX NUMBER:** 912-652-5311

**FROM:**

**NAME:** Bill Schroder

**OFFICE SYMBOL:** AMSMI-RA-EH-EQ

**PHONE NUMBER:** \_\_\_\_\_

**FAX NUMBER:** (205) 876-0887

**COMMENTS:** AREA F ICM April 22

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



# ENVIRONMENTAL MANAGEMENT OFFICE

AMSMI-EQ  
REDSTONE ARSENAL



## DOCUMENT REVIEW COMMENTS

DOCUMENT TITLE <i>ICM Area F April 22</i>	FROM <i>EBASCO</i>	REVIEWER NAME <i>M. W. SCHRODER</i>	DATE <i>4/29/93</i>	PHONE <i>876-8607</i>
--	-----------------------	--	------------------------	--------------------------

ITEM NO.	PAGE NO.	PARAGRAPH	COMMENTS
<i>1</i>	<i>5-8</i>	<i>5.12.2.a</i>	<i>add to last line: These Submittals will be sent only when a signed cover letter from The Deputy Post Commander, US Army Missile Command, Redstone Arsenal, AL is attached. NOTE: This is a requirement from the US EPA Region II &amp; ADEM.</i>

REDSTONE ARSENAL AREA F  
DRAFT WORK PLAN  
REVIEW COMMENTS AND RESPONSES

COMMENTS FROM: M. W. SCHRODER  
DATE: 9 MARCH 1993

- Item No. 1, Executive Summary, Paragraph 3

RSA Comment

*This paragraph should be omitted or rewritten to fit the proposed ICM. Checks should be made by the Contractor to make sure what they write is accurate before its sent out, even in a Draft. I'm tired of reading the same old mistakes.*

Ebasco Response

Paragraph 3 has been revised. Please note that it was in our original scope to prepare all of the documents which were listed, including the three additional reports after a one year period.

- Item No. 2, Page 1-1, Paragraph 1.0.a

RSA Comment

*First sentence should be "The MICOM Environmental Office at Redstone. Second sentence: ICM will provide a protective CAP to isolate the arsenic wastes from the environment. See Item 1 above.*

Ebasco Response

Paragraph 1.0.a has been revised accordingly.

- Item No. 3, Page 1-7, Paragraph 1.4.a

RSA Comment

*First sentence absolutely false! See Item 1 above. Second sentence absolutely false! See Item 1 above. Third sentence rewrite: In 1986...the USACE...*

Ebasco Response

The first and second sentences have been deleted. The third sentence has been rewritten.

- Item No. 4, Page 1-8, Paragraph 1.4.b

RSA Comment

*First sentence rewrite to make some sense out of it. This whole paragraph is screwed up! Who wrote this anyway?*

Ebasco Response

The information contained in this paragraph was obtained from PELA's 1988 report. We have reworded the first two sentences.

- Item No. 5, Page 2-1, Paragraph 2.0.a

RSA Comment

*The existing Creek is a normally dry surface drainage ditch - rewrite to reflect this.*

Ebasco Response

Section 2.0 has been reworded accordingly.

- Item No. 6, Page 2-1, Paragraph 2.2.a

RSA Comment

*See Item 5 above.*

Ebasco Response

Section 2.2 has been reworded accordingly.

- Item No. 7, Page 2-1, Paragraph 2.3.a

RSA Comment

*What about removal of the existing fence? This needs to be included in the Work Plan.*

Ebasco Response

Section 2.3 now includes a discussion of fence removal.

- Item No. 8, Page 2-1, Paragraph 2.2.a

RSA Comment

*I believe this figure to show Echo Street too close to the lagoons. This must be a 1940 map. There ain't no hard top roads this close to the site!*

Ebasco Response

Figure 2-1 has been replaced with a more recent figure.

- Item No. 9, Figure 2-1

RSA Comment

*See Item 8 above.*

Ebasco Response

See response to Item No. 8.

- Item No. 10, Page 2-3, 5th Paragraph

RSA Comment

*See Item 5 above.*

Ebasco Response

Bullet 1 of paragraph 2.3.a has been reworded to reflect the drainage ditch.

- Item No. 11, Page 3-1, Paragraph 3.1.a

RSA Comment

*Where does the Contractor intend to get the clay for the CAP? This needs to be discussed also.*

Ebasco Response

Clay material will be obtained from the closest, least expensive source. If material is available from Redstone Arsenal, that information will need to be given to bidders with the Invitation for Bids.

- Item No. 12, Page 3-1, Paragraph 3.2.a

RSA Comment

*Disposal of trees, fence, etc. needs to be considered also. What is the Contractor going to do with it after grubbing and clearing?*

Ebasco Response

All above grade debris can be disposed at non-hazardous waste disposal areas. As an option, the vegetative organic debris can be chipped/shredded on site if it is less expensive. Vegetation will be removed to ground level.

- Item No. 13, Page 5-8, Paragraph 5.12.2.a

RSA Comment

*Last sentence, see Item 5 above. 404 permit is doubtful for this project. Did anybody really get out and look at this site?*

Ebasco Response

Reference to the Section 404 Permit has been deleted.

- Item No. 14, Appendix A, Page 2 & 3, Hospital Routes

RSA Comment

*Same mistakes are made here as in Unit 1, Unit 2, and RSA-G Work Plans! See Item 1 above.*

Ebasco Response

The description of hospital routes has been completely revised.

• Item No. 15, Page 6-3, Paragraph 6.3

RSA Comment

*Take out: "including state and federal regulators".*

Ebasco Response

This phrase has been deleted.

REDSTONE ARSENAL AREA F  
DRAFT WORK PLAN  
REVIEW COMMENTS AND RESPONSES

COMMENTS FROM: ERIC C. HALPIN  
DATE: 22 MARCH, 1993

- Item No. 1, General

Comment

*Several areas of the Draft Work Plan indicate that the Contract will be completed in a Request For Proposal format (ref. para. 3.4). This differs from the requirements addressed in the Statement of Work for the subject project. The AE should resolve and correct the discrepancies.*

Ebasco Response

The Work Plan has been changed to reflect the use of the Invitation for Bid format.

- Item No. 2, Limits of Waste

Comment

*The AE should consider performing additional investigations to determine the areal limits of the existing solid wastes. Since intrusive explorations are presently not permitted, the AE should investigate use of geophysical methods (such as ground penetrating radar, etc...) and review aerial photographs to help better define the limits. This information could be used to decrease the size, and thus the costs, of the cap.*

Ebasco Response

The limits of the cap encompasses the entire existing site as defined by the existing fence and approximates the limits of the former Arsenic disposal ponds as shown on aerial photographs available from RSA. The only anticipated decrease in cap size, by limiting the cap to pond areas only, would be in the NW corner of the site. Geophysical testing to define the limits of the pond debris and fill material and the assumed arsenic contamination was considered and was found to cost more than to cap the NW area of the site ( $\approx$  1 Acre).

• Item No. 3, Design

Comment

*The AE is reminded that an approved erosion control plan and NPDES permit are required for the subject project.*

Ebasco Response

The erosion control plan for the completed cap will be included in the maintenance plan; the erosion control plan for the construction of the cap will be included in the technical specifications. The project involves rerouting of a normally dry drainage ditch and will involve no point discharges. As such, an NPDES permit should not be required.

• Item No. 4, Fence

Comment

*Can the existing fence be preserved and/or reused by revising the limits of the new work as suggested above? If a new fence is required, it should be located such that future investigations and remedial actions will not require the construction of yet another fence.*

Ebasco Response

The existing fence is in disrepair and is not suitable for reuse. Ebasco does not have information pertaining to any future actions which would require additional fence construction.

• Item No. 5, Venting

Comment

*Does the present site contain any type of venting, natural or otherwise? Will the ICM address venting?*

Ebasco Response

There is no evidence of venting currently at the site. Ebasco does not see the need for venting as a result of the cap installation; as no decomposing organics are known to exist in the pond area that will produce gases.

● Item No. 6. Wetlands

Comment

*Has an environmental impact statement been completed for the subject site? Is there a wetlands delineation in reference to the existing creek?*

Ebasco Response

Ebasco has not been provided with an existing Environmental Impact Statement (EIS) for this site if it exists. The "existing creek" is actually a drainage ditch which, according to RSA personnel, is normally dry and does not exhibit wetland characteristics.

● Item No. 7. Section 3.1

Comment

*Design of Clay Cap: Specification of cap materials should be based on specific information gathered from on-post borrow areas (classification and compaction tests), if such sources are available. If borrow must be obtained off-post, then the location and availability of local sources should be investigated in order to determine the economic feasibility of the clay cap design and to accurately prepare the MCASES cost estimate.*

Ebasco Response

The MICOM Environmental Management Office at RSA is investigating potential locations on-post for clay borrow areas; however, geotechnical testing of these areas is not known. Information available at the time of cost estimate preparation will be utilized by Ebasco as appropriate. Locating borrow areas; however, will be the responsibility of the Contractor.

● Item No. 8. Section 3.1

Comment

*What is the basis for the 93% compaction requirement and is this an upper or lower limit?*

Ebasco Response

The 93% compaction is a lower limit. The permeability requirements for the cap material is the governing factor and clay material, when compacted to 93% of the maximum dry density, typically exhibits permeability of  $1 \times 10^{-7}$  cm/sec or lower.

Item No. 9, Section 5.3

Comment

*The specifications for the earthwork on this project should be tailored to the specific work to be accomplished. Section 02221 referenced in the outline is a guide specification used for military building construction and will have limited application to the subject work. Section 02210, GRADING, contains requirements for earthwork which should be coordinated with Section 02251, CLAY CAP CONSTRUCTION, or eliminated, as appropriate.*

Ebasco Response

The preliminary listing of earthwork technical specifications has been modified.

REDSTONE ARSENAL AREA F  
DRAFT WORK PLAN  
REVIEW COMMENTS AND RESPONSES

COMMENTS BY: FRED MOSER  
DATE: 19 MARCH, 1993

- Item No. 1, Figure 2-1

Comment

*Add wells installed by Geraghty and Miller in Area F during their Phase I and II site investigations. RS256, RS257, RS258, RS260, RS261, RS262, RS263, were added in Phase I. RS259 was added in Phase II. Add legend and symbols used by Geraghty and Miller for the 4 types of wells installed.*

Ebasco Response

Figures 1-3 and 2-1 have been changed to include these wells and the appropriate legend.

- Item No. 2, Figure 2-1

Comment

*Two of the wells added by Geraghty and Miller are within the disposal area and will have to be abandoned prior to placement of the clay cap. RS258 is a deep overburden well while RS259 is a deep bedrock monitor well.*

Ebasco Response

The design will include the abandonment of all wells in the area to be capped that are not required for groundwater sampling. Paragraph 3.2.a has been changed to include well abandonment.

- Item No. 3, Figure 2-1

Comment

*Two wells north of the disposal area are currently shown at the toe of the cap (RS052 and RS256). These wells are the only existing monitoring wells north of the disposal areas and must be preserved. The design of the cap must include protection of these wells from damage by mowers. Access to the wells must be provided for routine sampling of ground water.*

Ebasco Response

These two wells are beyond the toe of slope of the cap, but inside the perimeter fence. Steel bollards (3) will be installed around these wells for protection against mowers.

- Item No. 4, Appendix B - Civil Design Drainage, Third Bullet

Comment

*Explain selection of 1 hour duration, 10 year frequency storm.*

Ebasco Response

This criteria was obtained from the Savannah District Corps' Design Manual for Military Construction, Volume II, paragraph 2.4.1.5.a.

- Item No. 5, Appendix C - Resumes

Comment

*Add Resumes of Hal Frediani (Hydrologist) and Perry Patton (Civil Engineer).*

Ebasco Response

Resumes have been added.

# EBASCO

---

April 23, 1993

Commander  
US Army District, Savannah  
ATTN: CESAS-EN-GH (Ms. Juana Torres-Perez)  
100 West Oglethorpe Avenue  
Savannah, Georgia 31402-0889

SUBJECT: A-E CONTRACT DACA21-91-D-0024, INTERIM  
CORRECTIVE MEASURES DESIGN FOR AREA F  
FINAL INTERIM CORRECTIVE MEASURE DESIGN WORK PLAN

Dear Ms. Torres-Perez:

Enclosed are three copies of the Final ICM Design Work Plan for Area F. Also enclosed are copies of the Review Comments and Responses related to the Draft Area F Work Plan. Upon approval of this Final Work Plan, we will provide a floppy diskette containing the text files, in Word Perfect version 5.1.

At that time, we would ask for your written acknowledgement that the subject Work Plan has been satisfactorily completed by Ebasco in accordance with the Delivery Order Contract Statement of Work.

If you have any questions or comments regarding this submittal, please feel free to call me at (404) 662-2439 or Kim Soovajian at (404) 662-2438.

Sincerely,



David W. Schaer  
Project Manager

Enclosures

CF: RSA, ATTN: AMSMI-RA-EH-EQ (W. Schroder)  
USACE, Missouri River, ATTN: CEMRD-EP-C (D. Williams)  
USACE, South Atlantic, ATTN: CESAD-PM-H (R. Connell)  
USACE, Mobile, ATTN: CESAM-EN-FE  
USATHAMA, ATTN: CETHA-IR-P (K. Wilson)

FAX HEADER SHEET



**ENVIRONMENTAL  
MANAGEMENT OFFICE**  
AMSMI-RA-EH-EQ

U.S. ARMY MISSILE COMMAND  
REDSTONE ARSENAL, ALABAMA 35898-5340

DATE:

3/29/93

TOTAL PAGES  
(Including Lead Sheet)

4

TO:

NAME: KIM SOOUANIAN

OFFICE SYMBOL: EBA50

PHONE NUMBER: \_\_\_\_\_

FAX NUMBER: 404-662-2408

FROM:

NAME: BILL SCHRODER

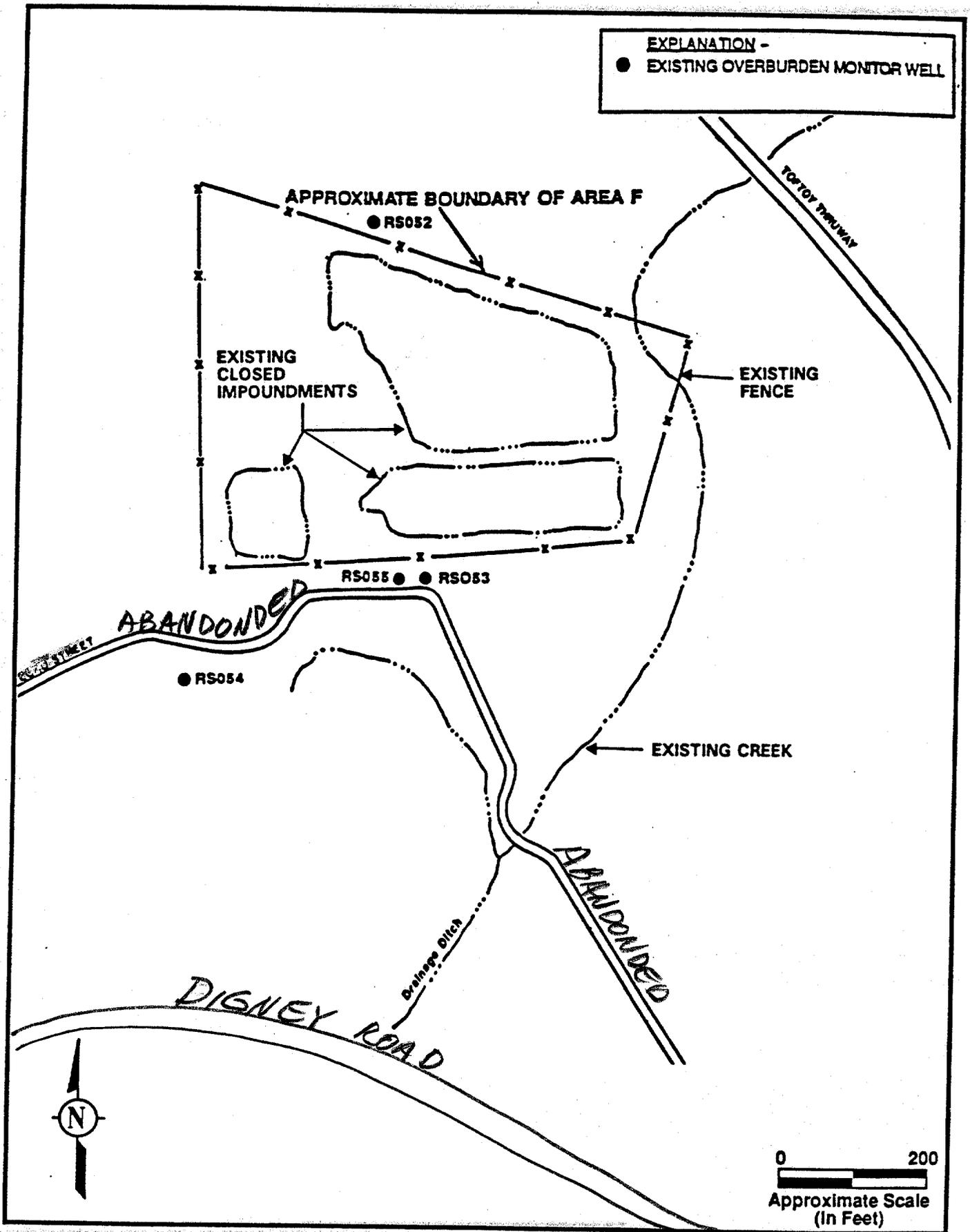
OFFICE SYMBOL: AMSMI-RA-EH-EQ

PHONE NUMBER: \_\_\_\_\_

FAX NUMBER: (205) 876-0887

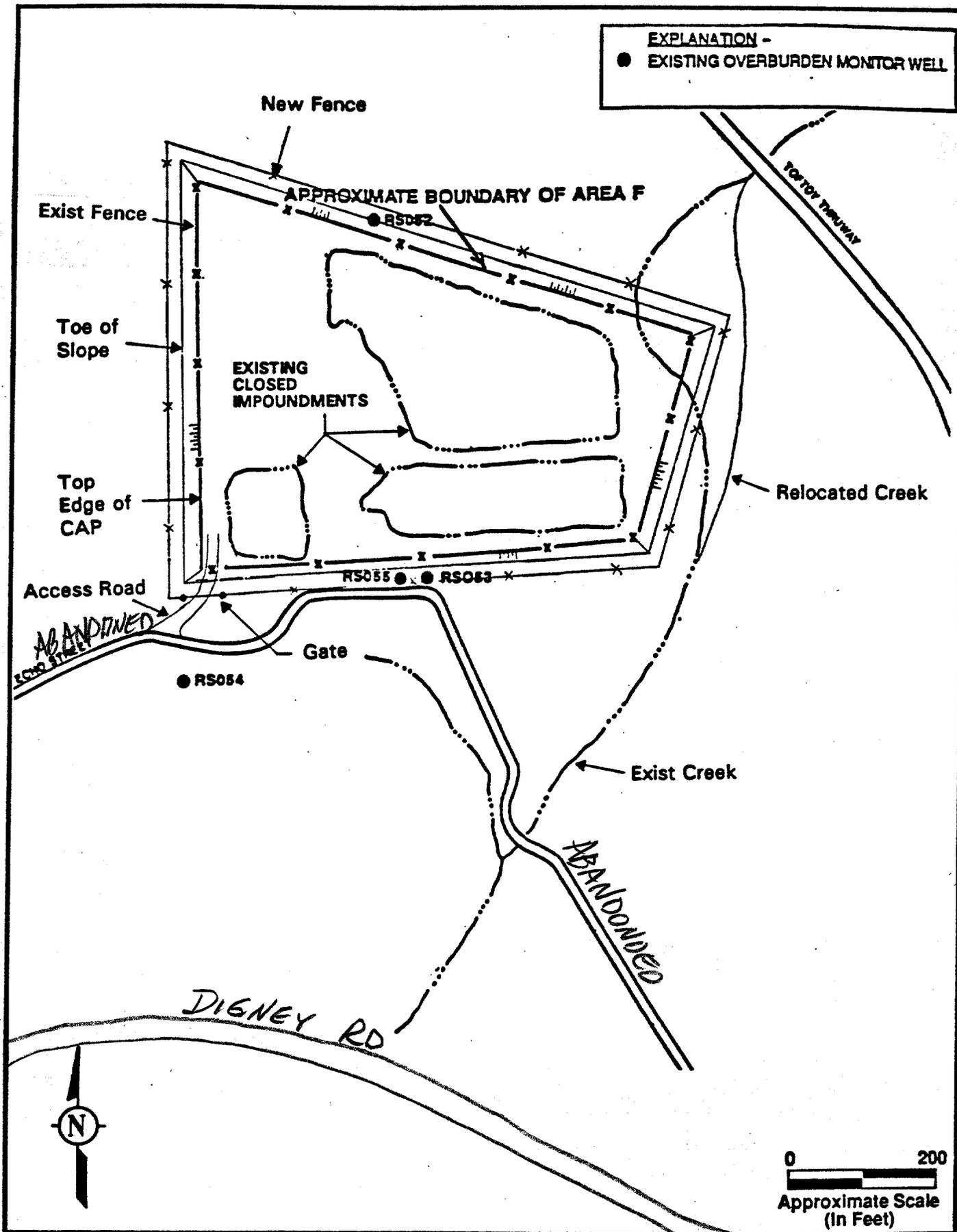
COMMENTS: Revised Drawings

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**FIGURE 1-3 AREA F - ARSENIC IMPOUNDMENT AREA**

Source: P.E. Lamoreaux and Associates, Inc., July 1988



**FIGURE 2-1 AREA F - PROPOSED ARSENIC IMPOUNDMENT CAP CONFIGURATION**

Source: P.E. Lamoreaux and Associates, Inc., July 1988