LONGHORN ARMY AMMUNITION PLANT

KARNACK, TEXAS

ADMINISTRATIVE RECORD

VOLUME 6 of 13

1994

Bate Stamp Numbers
009003 - 009348

Prepared for:

Department of the Army
Longhorn Army Ammunition Plant
Marshall, Texas 75671-1059

1995

VOLUME 6 of 13

1994

D. Title: Final Workplan - Phase II A-E Chemical Data Acquisition Plan For Remedial Investigation (RI Addendum)
Group(s): 1
Site(s): LHAAP-1 Inert Burning Grounds
LHAAP-11 Suspected TNT Burial Site At Avenues P & Q
LHAAP-27 South Test Area
LHAAP-54 Or LHAAP - XX Ground Signal Test Area
Location: Longhorn Army Ammunition Plant, Marshall, Texas
Company: Sverdrup Environmental, Inc.
Author(s): Sverdrup Environmental, Inc.
Recipient: Longhorn Army Ammunition Plant, Karnack, Texas
Date: August, 1994
Bate Stamp: 009003 - 009250

E. Title: Final Work Plan - Landfill Caps for Remedial Design Investigations
Group(s): Landfill Caps Interim Action
Site(s): LHAAP-12 Active Landfill
LHAAP-16 Old Landfill
Location: Longhorn Army Ammunition Plant, Marshall, Texas
Agency: U.S. Army Corps Of Engineers, Tulsa District
Author(s): U.S. Army Corps Of Engineers, Tulsa District
Recipient: U.S. Army, Longhorn Army Ammunition Plant
Date: August, 1994
Bate Stamp: 009251 - 009302

F. Title: Letter - Subject: Draft RI / FS For Sites No. 13 & 14
Group(s): 3
Site(s): LHAAP-13 Suspected TNT Burial Site Between Active And Old Landfills
LHAAP-14 Area 54 Burial Ground
Location: Longhorn Army Ammunition Plant, Marshall, Texas
Agency: Department Of The Army, Longhorn Army Ammunition Plant
Author(s): Lawrence J. Sowa, Lieutenant Colonel, U.S. Army
Recipient: Ms. Lisa Marie Price, Environmental Protection Agency
Date: August 1, 1994
Bate Stamp: 009303

G. Title: Letter - Subject: Letter Of Intent For Application Of Technical Assistance Grant
Group(s): All
Site(s): General
Location: Longhorn Army Ammunition Plant, Marshall, Texas
Agency: Uncertain Audubon Society

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Author(s): Ruth Culver
Recipient: Ms. Lisa M. Price, Environmental Protection Agency
Date: August 5, 1994
Bate Stamp: 009304 - 009305

H. Title: Letter - Subject: EPA's Comments On Draft Phase II Work Plan For Sumps
Group(s): 4
Site(s): LHAAP-35 Process Wastewater Sumps - Various
LHAAP-36 Explosive Waste Pads
Location: Longhorn Army Ammunition Plant, Marshall, Texas
Agency: Environmental Protection Agency
Author(s): Lisa Marie Price, Environmental Protection Agency
Recipient: David Tolbert, Longhorn Army Ammunition Plant
Date: August 10, 1994
Bate Stamp: 009306 - 009326

I. Title: Letter - Subject: Final Remedial Design Investigations Work Plan For Landfills
Group(s): Interim Remedial Action
Site(s): LHAAP-12 Active Landfill
LHAAP-16 Old Landfill
Location: Longhorn Army Ammunition Plant, Marshall, Texas
Agency: Department Of The Army, Longhorn Army Ammunition Plant
Author(s): Lawrence J. Sowa, Lieutenant Colonel, U.S. Army
Recipient: Lisa Marie Price, Environmental Protection Agency
Date: August 16, 1994
Bate Stamp: 009327

J. Title: Letter - Subject: Final Deadlines For Primary And Secondary Document
Attach(s): Document - Primary and Secondary Document Of The Installation Restoration Program
Group(s): All
Site(s): General
Location: Longhorn Army Ammunition Plant, Marshall, Texas
Agency: Department Of The Army, Longhorn Army Ammunition Plant
Author(s): Lawrence J. Sowa, Lieutenant Colonel, U.S. Army
Recipient: Mr. Michael Moore Texas National Resource Conservation Commission
Ms. Lisa Marie Price, Environmental Protection Agency
Date: August 16, 1994
Bate Stamp: 009328 - 009342

K. Title: Letter - Subject: Draft Proposed Plan For Interim Remedial Action At Burning

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		Ground No. 3 - Comments Offered After Review
	Group(s):	**Early Interim Action At Burning Ground No. 3**
	Site(s):	**LHAAP-18 & LHAAP-24 Burning Ground / Washout Pond & Evaporation Pond**
	Location:	**Longhorn Army Ammunition Plant, Marshall, Texas**
	Agency:	**Texas Natural Resource Conservation Commission (TNRCC)**
	Author(s):	**Michael A. Moore , Texas Water Commission**
	Recipient:	**Mr. Dave Tolbert, U.S. Army, Longhorn Army Ammunition Plant**
	Date:	**August 16, 1994**
	Bate Stamp:	**009343 - 009347**
L.	**Title:**	**Letter - Subject: Final Phase II Workplan For 125 Waste Rack Sumps And 20 Waste Rack Sumps**
	Group(s):	**4**
	Site(s):	**LHAAP-35 Process Wastewater Sumps - Various** **LHAAP-36 Explosive Waste Pads**
	Location:	**Longhorn Army Ammunition Plant, Marshall, Texas**
	Agency:	**Department Of The Army, Longhorn Army Ammunition Plant**
	Author(s):	**Lawrence J. Sowa, Lieutenant Colonel, U.S. Army**
	Recipient:	**Lisa Marie Price, Environmental Protection Agency**
	Date:	**August 26, 1994**
	Bate Stamp:	**009348**

009003

FINAL

CHEMICAL DATA ACQUISITION PLAN ADDENDUM

for the

PHASE II
REMEDIAL INVESTIGATION
SITES 11, 1, XX, 27

at

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Submitted To:

U.S. ARMY CORPS OF ENGINEERS
Tulsa District

AUGUST 1994

Prepared By:

SVERDRUP ENVIRONMENTAL, INC
ST. LOUIS, MISSOURI

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LIST OF ACRONYMS

ASTM	American Society of Testing Materials
CDAP	Chemical Data Acquisition Plan
COC	Chain of Custody Form
COE	Corps of Engineers
DQO	Data Quality Objective
EPA	U. S. Environmental Protection Agency
HTW	Hazardous and Toxic Waste
LHAAP	Longhorn Army Ammunition Plant
MRD Lab	Corps of Engineers Missouri River Division Laboratory
PVC	Polyvinylchloride
QA	Quality Assurance
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RI/FS	Remedial Investigation/Feasibilty Study
RPD	Relative Percent Difference
SSHP	Site Specific Health and Safety Plan
SWD Lab	Corps of Engineers Southwestern Division Laboratory
TAC	Texas Administrative Code
TNT	Trinitrotoluene
USACE	U.S. Army Corps of Engineers

SECTION 1.0

INTRODUCTION

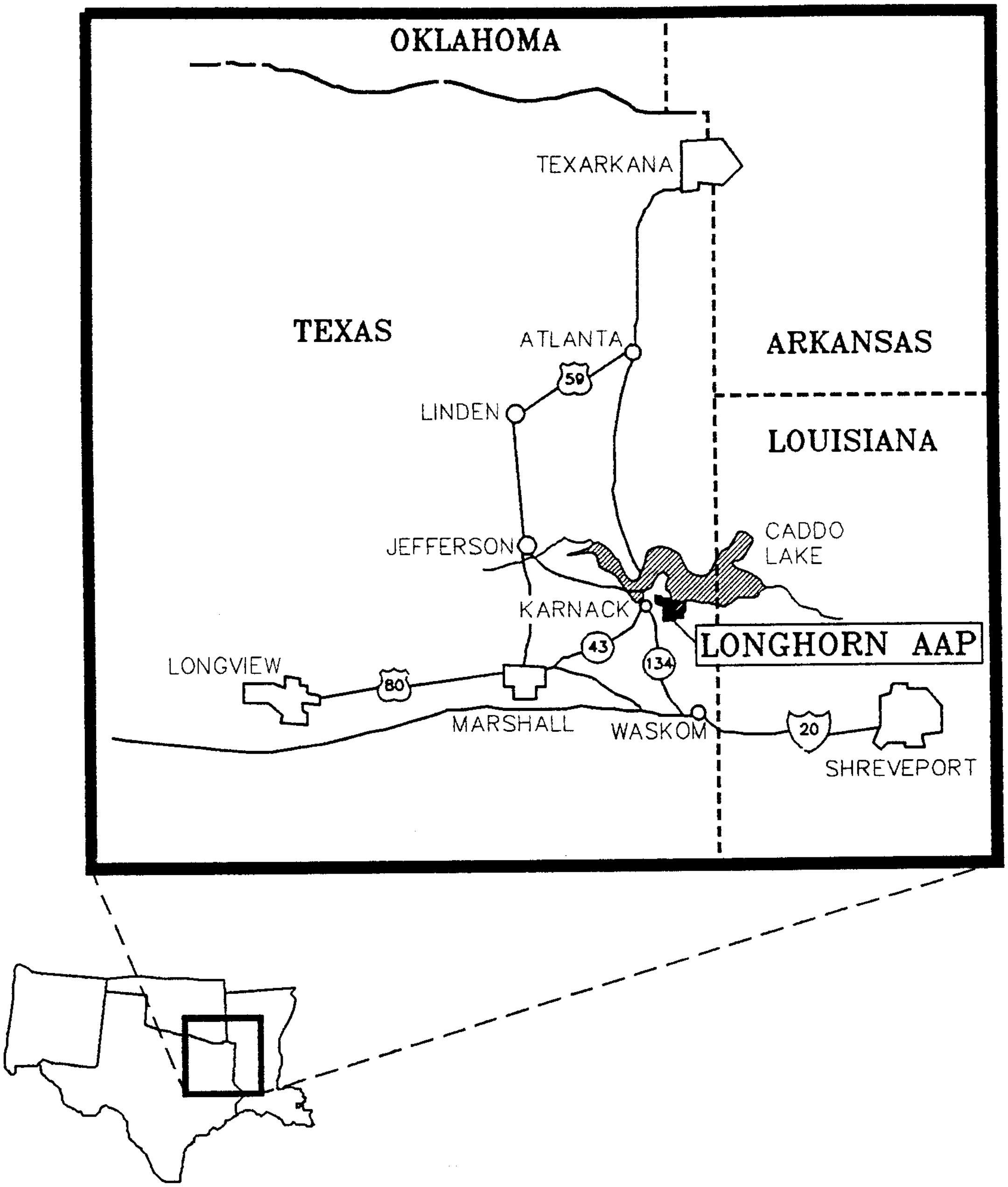
1.1 General. The purpose of this Chemical Data Acquisition Plan Addendum (CDAP) is to document the procedures required to ensure that all data obtained from the investigative activities at Longhorn are of acceptable quality. Quality assurance (QA) is the Government activity required to assure desired and verifiable levels of quality in all aspects of an investigation. Quality control (QC) is the functional mechanism to achieve quality data. The QA program, administered by the Government, will ensure that the QC program will result in high quality data. This document will describe the QA/QC procedures for each aspect of the investigations which will meet the data quality objectives of this project. Procedures in this CDAP came from Chemical Quality Data Management for Hazardous Waste Remedial Activities, ER-1110-1-263 (Ref. 3), a Corps of Engineers regulation, with additional guidance from Development of an RFI Work Plan for RCRA Facility Investigations, SW-87-001 (Ref. 8), and Minimum Chemistry Data Reporting Requirements, (Ref. 2).

This CDAP addendum was prepared using the Corps of Engineers CDAP dated June, 1992. Additions made to the original CDAP are presented in italics. Any deletions appear as strikeouts in this addendum. An effort was made to keep changes to a minimum.

1.2 Site Location and Description.

1.2.1. Site Location. Longhorn AAP occupies 8,493 acres between State Highway 43 at Karnack, Harrison County, Texas, and Caddo Lake, as presented in Figure 1-1. The nearest major cities are Marshall, Texas, approximately 14 miles southwest, and Shreveport, Louisiana, approximately 40 miles east. Longhorn AAP is located in a region of moist, subhumid to humid, mild climate. The average annual rainfall is 46 inches. Average precipitation is fairly evenly distributed throughout the year; however, December through May could be considered the heavier season. Frequently, summer and fall are drought seasons. The facility is included on the National Priorities List (NPL).

1.2.2 Site Description. Longhorn AAP is a government-owned, contractor-operated industrial installation under the jurisdiction of the U. S. Army Armament, Munitions, and Chemical Command. Longhorn AAP was established in October 1942 with the primary mission of production of 2,4,6-trinitrotoluene flake with supporting acid production for munitions production. Flake production was halted in 1945 and the primary mission changed to the load, assembly and pack of pyrotechnic and illuminating/signal munitions and solid propellant rocket motors. Industrial operations at Longhorn resulted in the disposal of various hazardous wastes into ditches, streams, and earthen impoundments where contamination has been identified. The Longhorn Division of Morton-Thiokol Corporation is the current operating contractor.



CORPS OF ENGINEERS, TULSA DISTRICT

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
RI PHASE 2 CDAP

SITE VICINITY MAP

Sverdrup Environmental

FIGURE 1-1

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The four (4) areas addressed in the Phase II field investigation are situated at various locations on the LHAAP installation. The areas are listed below and their locations are presented in Figure 1-2.

LHAAP NO.	*AREA NAME*
11	*Suspected TNT Burial Site at Avenues P and Q*
1	*Inert Burning Grounds*
XX	*Ground Signal Test Area*
27	*South Test Area*

Individual sites are described in detail in the work plan.

1.3 **Organization**. This document discusses the data quality procedures and techniques to be used in the work plan for investigations at Longhorn. The study will be accomplished through the sampling and analysis of soil, sediment, surface water and groundwater. A *soil-gas survey* and the installation of monitoring wells *will take place during the field activities.* Section 2 discusses project organization; Section 3 discusses the quality assurance objectives for this project; Section 4 discusses the procedures to be used in drilling, well installation, and sampling; and Section 5 discusses sample handling and testing. Sections 6 through 9 discuss sample integrity, data reduction and validation, audits, and corrective action.

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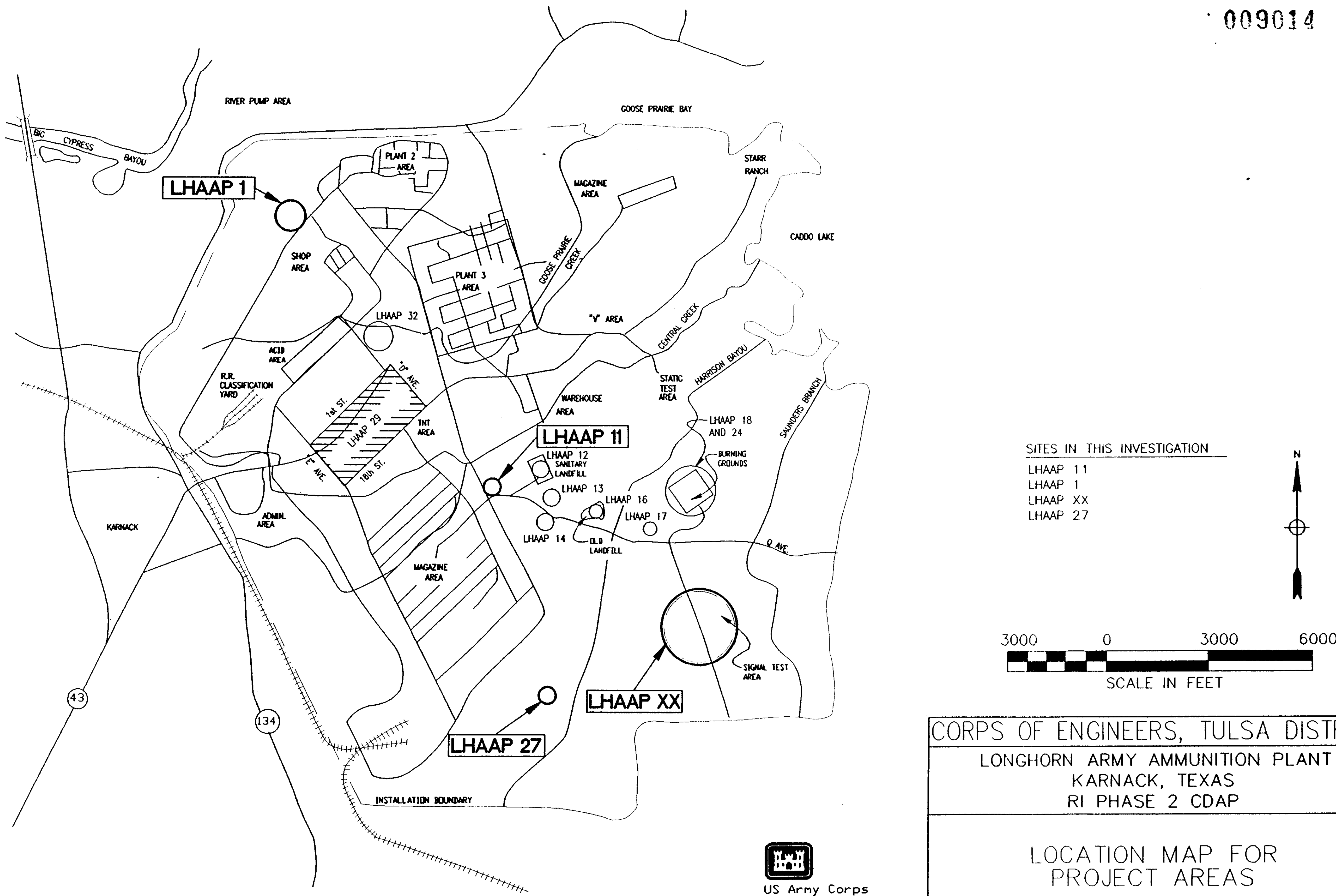

US Army Corps of Engineers Tulsa District

CORPS OF ENGINEERS, TULSA DISTRICT

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
RI PHASE 2 CDAP

LOCATION MAP FOR PROJECT AREAS

Sverdrup Environmental

FIGURE 1-2

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SECTION 2.0

PROJECT ORGANIZATION

The U.S. Army Corps of Engineers (COE) will use a multi-disciplinary project team to oversee all project activities. Project management will be performed by Tulsa District. Project activities will be performed ~~by Roy F. Weston, under contract to Fort Worth District and~~ by *Sverdrup Environmental, Inc.* ~~Ebasco~~ under contract to Tulsa District. This organizational structure is shown in Figure 2-1. ~~Both contractors will submit a CDAP addendum which will address their organizational structure, subcontractors, laboratories, and any proposed deviations from this document.~~

2.1 Field Personnel. Field operations will be conducted by the contractors listed in Section 2.0 or their subcontractors. Later investigative phases will be performed by contractors or the COE.

2.2 Quality Control Personnel. All program personnel are responsible for monitoring and reviewing all procedures used in every stage of the work to ensure that data generated in the course of execution of the work plan is accurate, complete, precise and representative of the site studied. An individual on each field crew will be designated as the Quality Control Officer and will be responsible for the proper execution of field QC, as discussed in Section 4.9.

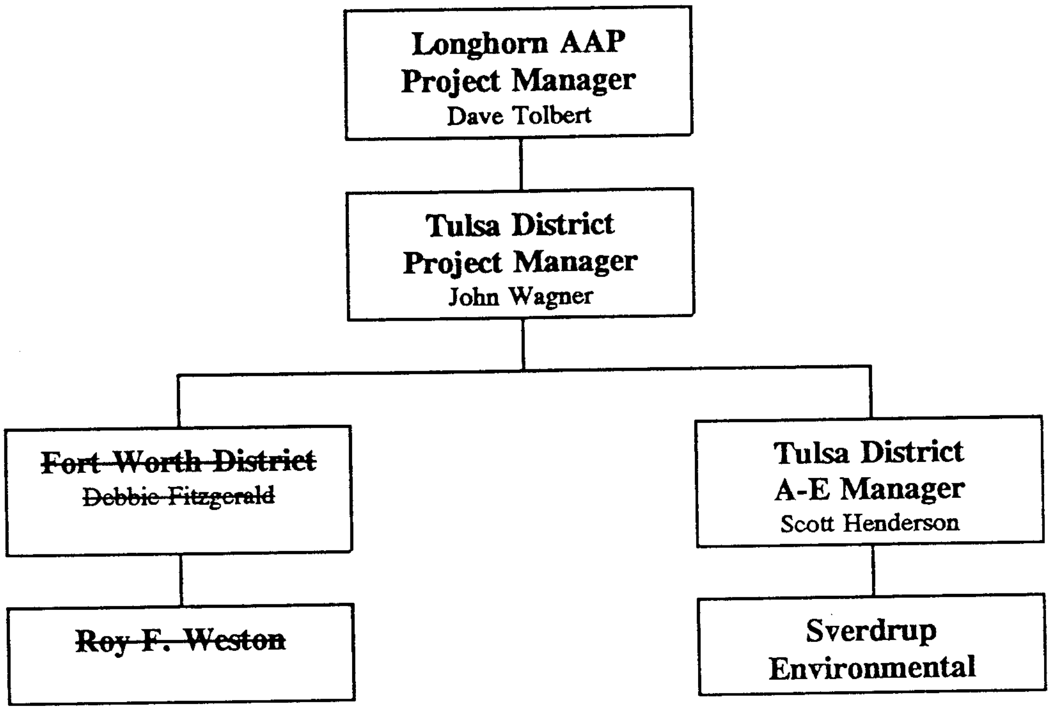

Figure 2-1. Organizational structure of the Longhorn Group No. 1 Phase 2 Remedial Investigation.

2.3 Quality Assurance Personnel. Quality assurance will be performed by the Tulsa District, Geotechnical Branch, Chemistry and Industrial Hygiene Section (Chem and IH). This section reports to the Chief, Geotechnical Branch and will be responsible for performance and system audits of this investigative program, data validation, on-going reviews of QA procedures, and coordination of QA training for project personnel. Data validation reports will be prepared by each contractor. The Tulsa District will add the sections on comparability (based on the QA samples as discussed in section 2.4).

2.4 Laboratory. Analytical testing and quality control testing will be performed by *PDP Analytical Laboratory* ~~laboratories selected by each contractor~~. QA testing will be performed by the Corps of Engineers Southwestern Division Laboratory (SWD Lab). Details on SWD Lab organization, responsibilities and key personnel are contained in their QA/QC Plan, which is on file in the Tulsa District office. Samples taken by the contractors will be sent to their laboratories, with the exception of the QA samples, which will be sent to SWD Lab. If sampling should be performed by COE field crews, SWD Lab will receive shipments of samples from the field, which it will pass on to its contract laboratories. Either SWD Lab or a separate contract lab will analyze the QA samples. ~~These laboratories currently include NDRC Laboratories, Richardson, TX; ARDL, Mount Vernon, IL; and Eureka Lab, Sacramento, CA.~~ All analytical laboratories used for this work will be validated by the Corps of Engineers Missouri River Division ~~Laboratory~~ (MRD ~~Lab~~). The validation process involves review of their laboratory quality management manual, laboratory performance on audit sample analyses, and an on-site inspection. This validation process is discussed in detail in Appendix C of ER-1110-1-263 (Ref. 3).

SECTION 3.0

DATA QUALITY OBJECTIVES

The data quality objectives (DQOs) of this project have been chosen to meet the goals of site characterization, risk assessment, and remedial design. DQOs are qualitative and quantitative statements which specify the quality of data required to support decisions made during remedial response activities. These DQOs will be used to develop a plan to be used throughout the RI/FS process. Data developed during the study will be used to determine the presence and lateral and vertical extent of contamination in the soil, surface water, and groundwater, as well as the rate of migration. The evaluation of this data will be used to screen remedial alternatives and to begin remediation. These goals can be achieved with analytical support between Level III and Level IV, as described in Ref. 7. Level I will be used for field testing. The minimum internal data reporting requirements (from Ref. 2) which will be required of all analytical laboratories includes the following:

- Sample identification numbers cross-referenced with laboratory ID's and QC sample numbers.
- Problems with arriving samples noted on an appropriate form.
- Each analyte reported as an actual value or less than a specified quantitation limit as listed in tables B.4 to B.8.
- Dilution factors, extraction dates, and analysis dates also reported.
- QC samples to be included as laboratory blanks, surrogate spikes, matrix spikes, laboratory duplicates, field duplicates, and field blanks.

The data developed from the investigations described in this work plan will meet the objectives discussed below with respect to precision, representativeness, accuracy, completeness, and comparability. The majority of this data will be developed in the laboratory from the analysis of field samples and the remainder will be measured in the field.

3.1 Accuracy. Accuracy is the degree to which a measurement agrees with the actual value, i.e., the amount of measurement bias. Accuracy is expressed as a percent recovery of a known concentration of reference material. The accuracy of an analytical procedure is determined by the addition of a known amount of material (matrix spike) to a field sample matrix or a standard matrix. A standard matrix is made up of distilled water or sterile, clean soil with approximately the same physical properties (porosity, permeability, plasticity, grain size, etc.) as the field sample. The field sample matrix is described as all components of the sample mixture except the analyte (the compound being analyzed). The lab will be required to perform matrix spiking on 10% of field samples, as well as on 5 to 10% of standard matrix samples. Field sample matrix and standard matrix sample spiking show how the sample matrix-analyte chemical interactions affect the analytical results. The matrix behavior of the spiked field sample will be comparable to that of the matrix of the original sample. After analysis for the spike is completed, the accuracy of the procedure is expressed as a percent recovery as shown by the following equation:

$$\text{PERCENT RECOVERY} = \frac{(C_2 - C_1)}{C_0} \text{ X } 100\%$$

where C_0 = amount of analyte added to the sample matrix,
C_1 = amount of analyte present in the unspiked sample matrix (equal to zero for the standard matrix),

and C_2 = amount of spiked material recovered in the analysis.

Typically, the amount of a reference analyte spiked into a field sample matrix is specified by the laboratory quality control program, or 3 to 5 times the background concentration of the analyte in the sample matrix. Samples cannot be spiked for all organic compounds which could possibly exist in the field sample matrix, however, a set of surrogate compounds, each of whose physical and chemical properties is similar, is used as surrogate matrix spikes, or surrogates. Acceptable recovery ranges for each class of organic compounds are discussed in the analytical methods for each parameter.

3.2 Precision. Precision is a measure of the degree of reproducibility of an analytical value and is used as a check on the quality of the sampling and analytical procedures. Precision is determined by analyzing replicate samples. The significance of a precision measurement depends on whether the sample is a field replicate, lab replicate, or a matrix spike replicate. Field replicates are taken at the rate of 10% or one per batch (each daily shipment of samples from a site), whichever is greater. Precision of the analytical method, at each stage, is determined by calculation of a relative percent difference (RPD) between duplicate analytical recoveries of a sample component, relative to the average of those recoveries:

$$RPD = \frac{|C_2 - C_1|}{(C_2 + C_1)/2} \times 100\%$$

where C_1 = analyte concentration in the sample,
C_2 = analyte concentration in the sample replicate,
and $|\ |$ = an absolute value (It is customary to express RPD as a positive number).

These calculations are usually performed on matrix spikes and matrix spike duplicates.

Precision will be further evaluated by comparing the analytical results of the field sample with its quality control duplicate sample. Multiplicative factors shall be used to determine the significance of differing concentration values. For water samples, should the field sample and its QA/QC duplicate samples differ in value by greater than a factor of 2, a minor disagreement between the values exists. If the values differ by a factor greater than 5, a disagreement between the values exists. For soil/sediment samples, the factors shall be 5 and 10, respectively. The significance, or impact, upon data quality will be discussed in the laboratory Data Validation Report as outlined in Section 7.0.

3.3 Completeness. Field completeness will be assessed by comparing the number of samples collected to the number of samples planned. Analytical completeness will be assessed by comparing the total number of samples with valid analytical results to the number of samples collected. The overall project completeness is, therefore, a comparison between the total number of valid samples to the number of samples planned. The results will be calculated following data validation and reduction. Completeness (C) is determined by:

$$C = \frac{P_1}{P_0} \text{ X } 100\%$$

where P_0 = total number of samples planned,
and P_1 = number of valid data points.

A value of 90% or higher is the goal. For values less than 90%, problems in the sampling or analytical procedures will be examined and possible solutions explored.

3.4 Representativeness. Representativeness expresses the degree to which sample data accurately and precisely represent actual site conditions. The determination of the representativeness of the data will be performed by :

- Comparing actual sampling procedures and chain of custody forms to those described in the work plan,
- Identifying and eliminating nonrepresentative data in site characterization activities,
- Evaluating holding times and condition of samples on arrival at the laboratory,
- Examining blanks for cross contamination.

Representativeness is a qualitative determination. The representativeness objective of this work plan is to eliminate all non-representative data.

3.5 <u>Comparability</u>. Comparability is a qualitative measure of the confidence with which one data set can be compared to another. These data sets include data generated by different laboratories performed under this work plan, data generated by laboratories in previous investigative phases, data generated by the same laboratory over a period of several years, or data obtained using differing sampling techniques or analytical protocols. The comparability objectives of this work plan are (1) to generate consistent data using standard test methods; and (2) to salvage as much previously generated data as possible. Comparability will be evaluated by comparing the QA sample analyzed by an independent laboratory to its field replicate.

3.6 Sensitivity. Sensitivity is a general term which refers to the calibration sensitivity and the analytical sensitivity of a piece of equipment. The calibration sensitivity is the slope of the calibration curve evaluated in the concentration range of interest. The analytical sensitivity is the ratio of the calibration sensitivity to the standard deviation of the analytical signal at a given analyte concentration. The detection limit, which is based on the sensitivity of the analysis, is the smallest reported concentration in a sample within a specified level of confidence. Quantitation limits rep-resent the sum of all of the uncertainties in the analytical procedure plus a safety factor. The detection limit is a part of the quantitation limit. Quantitation limits are given in tables B.4 to B.8.

3.7 Field measurements. Field measurements will be performed to Level I standards. These will include measurements of pH, conductivity, and temperature on groundwater samples. Precision on field measurements will be assessed by four replicate measurements to determine reproducibility. These consecutive readings should be ± 1° for temperature, ± 0.02 units for pH, and ± 10% for conductivity.

SECTION 4.0

FIELD OPERATIONS

This section discusses drilling, well installation, sampling, decontamination, waste disposal, *soil gas surveys*, other field procedures, and field QA/QC.

The basis for selecting the general locations, types of samples to be collected, and the analytical parameters at each of the four LHAAP areas are developed in the USACE RI/FS Work Plan, Volume 1 and the Preliminary Draft Work Plan Addendum for Sites 11, 1, XX and 27, developed by Sverdrup in April, 1994. To accomplish the overall objectives in performing the field investigation for the RI, a field investigation plan has been developed for each LHAAP area and is summarized below.

Table 4-1 presents the chemical sampling plan summary for each LHAAP site. Unless otherwise stated, all groundwater samples from wells, and all soil and sediment samples will be analyzed for the complete list of parameters presented below. Individual compounds to be analyzed in the volatile organics, semivolatile organics, and high explosive categories are listed in Appendix B.

Complete list of Parameters

pH

Specific Conductance

Volatile Organic Compounds (VOCs)

Semivolatile Organic Compounds

High explosives

Nitrates

Chlorides

Sulfates

Metals:

- *Antimony*
- *Arsenic*
- *Barium*
- *Cadmium*
- *Chromium*
- *Lead*
- *Mercury*
- *Nickel*
- *Selenium*
- *Silver*
- *Thallium*

TABLE 4-1
CHEMICAL SAMPLING PLAN SUMMARY
LONGHORN ARMY AMMUNITION PLANT
GROUP NO. 1 SITES
PHASE 2 REMEDIAL INVESTIGATION

SITE	SITE INVESTIGATION				CHEMICAL ANALYSIS														TRAVEL BLANK	EQUIP. BLANK
					GROUNDWATER FROM WELLS			SOIL FROM SOIL BORING(SB) AND WELL BORING (MW)			SEDIMENT			SURFACE SOIL						
					SAMPLE TYPE			SAMPLE TYPE			SAMPLE TYPE			SAMPLE TYPE						
	MW	SB	SEDIMENT	SURFACE SOIL	WATER	QA	QC	SOIL	QA	QC	SOIL	QA	QC	SOIL	QA	QC	TB	EB
LHAAP 11	3	0	0	0	3	1	1	15	1	1	0	0	0	0	0	0	1	2
LHAAP 1/1A	1	0	3	5	1	1	1	0	0	0	3	1	1	5	1	1	1	3
LHAAP XX	**	1	0	0	0	0	0	3	1	1	0	0	0	0	0	0	0	1
LHAAP 27	4	0	0	3	4	1	1	4	1	1	0	0	0	3	1	1	0	3
TOTALS	8	1	3	8	8	3	3	22	3	3	3	1	1	8	2	2	2	9

** If contamination is indicated, one monitoring well will be installed (sample quantities not included in the table).

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TABLE 4-2
PHYSICAL SAMPLING PLAN SUMMARY
LONGHORN ARMY AMMUNITION PLANT
GROUP NO. 1 SITES
PHASE 2 REMEDIAL INVESTIGATION

SITE	SITE INVESTIGATION				PHYSICAL ANALYSIS								
					SOIL FROM SOIL BORING(SB) AND WELL BORING (MW)			SEDIMENT			SURFACE SOIL		
					SAMPLE TYPE			SAMPLE TYPE			SAMPLE TYPE		
	MW	SB	SEDIMENT	SURFACE SOIL	SOIL	QA	QC	SOIL	QA	QC	SOIL	QA	QC
LHAAP 11	3	0	0	0	15	1	1	0	0	0	0	0	0
LHAAP 1/1A	1	0	3	5	5	1	1	0	0	0	0	0	0
LHAAP XX	**	1	0	0	3	1	1	0	0	0	0	0	0
LHAAP 27	4	0	0	3	20	2	2	0	0	0	0	0	0
TOTALS	8	1	3	8	43	5	5	0	0	0	0	0	0

** If contamination is indicated, one monitoring well will be installed and soil samples collected.
Physical analysis includes moisture content, sieve analysis and atterberg limits.

009027

LHAAP 11 - Suspected TNT Burial Site at Avenues P and Q

The field investigation plan developed for LHAAP 11 incorporates the following:

-- installation of three (3) monitoring wells

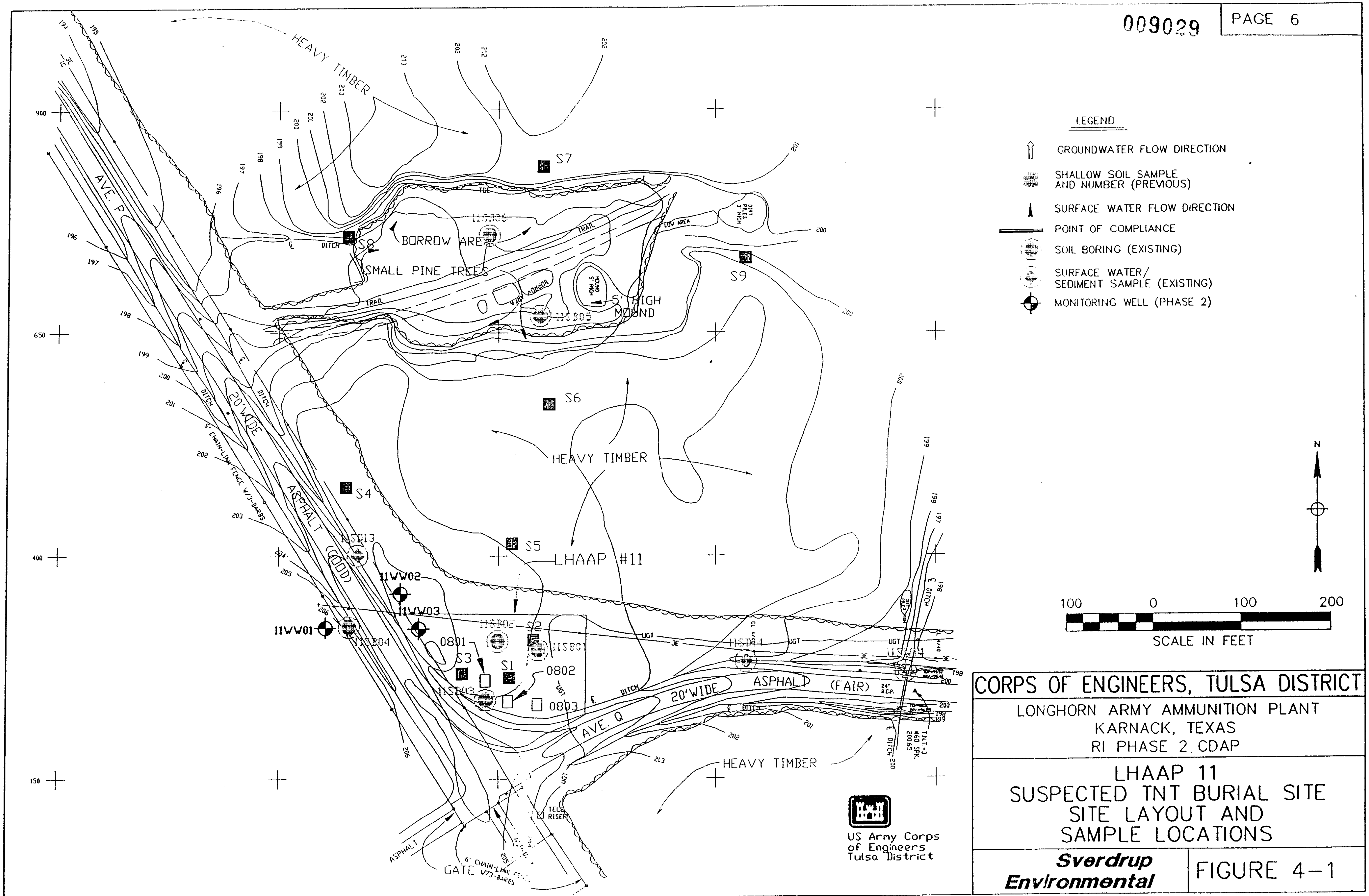
Proposed locations are shown on Figure 4-1. Locations were chosen to investigate potential groundwater contamination in the vicinity of boring 11-SB-04. One well will be installed upgradient and two wells will be installed downgradient of 11-SB-04. Well depths are estimated based on an anticipated average depth to groundwater of 10 feet. Actual depths may vary depending on subsurface conditions encountered during the investigation. Groundwater samples from each well will be collected and analyzed. Slug tests will be performed at each monitoring well. Soil samples will be collected for physical and chemical analysis in accordance with the procedures outlined in Section 4.5.3.

LHAAP 1 - Inert Burning Grounds

The field investigation plan developed for LHAAP 1 incorporates the following:

-- installation of one (1) monitoring well,
-- collection of three (3) sediment samples,
-- collection of five (5) surface (0 to 6 inch depth) soil samples, and

Proposed locations are shown on Figure 4-2. The actual depth of the well will depend on subsurface conditions encountered during the investigation. One groundwater sample will be collected and analyzed and a slug test will be performed on the well. Soil samples collected during installation of the monitoring



CORPS OF ENGINEERS, TULSA DISTRICT

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
RI PHASE 2 CDAP

LHAAP 11
SUSPECTED TNT BURIAL SITE
SITE LAYOUT AND
SAMPLE LOCATIONS

Sverdrup Environmental

FIGURE 4-1

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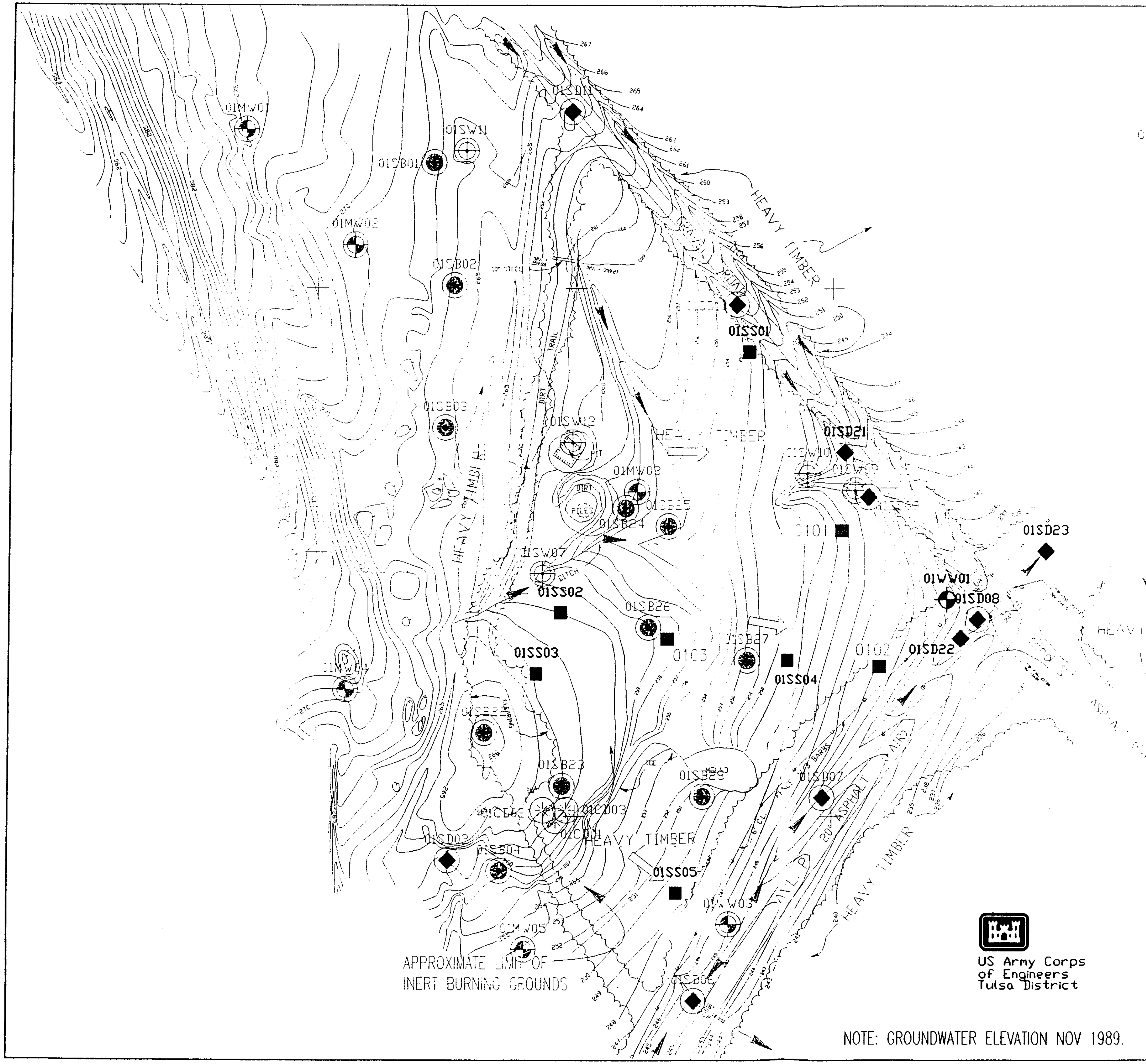

NOTE: GROUNDWATER ELEVATION NOV 1989.

CORPS OF ENGINEERS, TULSA DISTRICT

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
RI PHASE 2 CDAP

LHAAP 1
INERT BURNING GROUND
SITE LAYOUT AND
SAMPLE LOCATIONS

Sverdrup Environmental

FIGURE 4–2

well will be tested for physical parameters only. In addition, existing monitoring well, 01-MW-04, will be sampled and the groundwater will be analyzed for semivolatiles and high explosives.

<u>LHAAP XX - Ground Signal Test Area</u>

The field investigation plan developed for LHAAP XX incorporates the following:

-- *one (1) 6-point active soil gas survey,*

-- one (1) 10-foot soil boring (optional),

-- installation of one (1) 20-foot monitoring well (optional).

Proposed sample locations are shown in Figure 4-3. A six-point active soil gas survey, which may expand to a maximum 26-point survey, if contamination is observed, will be established around soil boring SB-19 as outlined in Section 4.7.2.

If the soil gas survey detects no concentrations of acetone, a 10 ft. soil boring will be drilled near SB-19. Soil samples for chemical and physical analyses will be collected from the soil boring in accordance with the procedures outlined in Section 4.5.3. The chemical analysis shall consist of testing for volatile organics. If either the soil boring or the soil gas survey indicate contamination, one monitoring well will be installed at the point of greatest observed contamination to allow the groundwater to be sampled for volatile organics. Soil samples obtained during installation of the monitoring well will be sampled for

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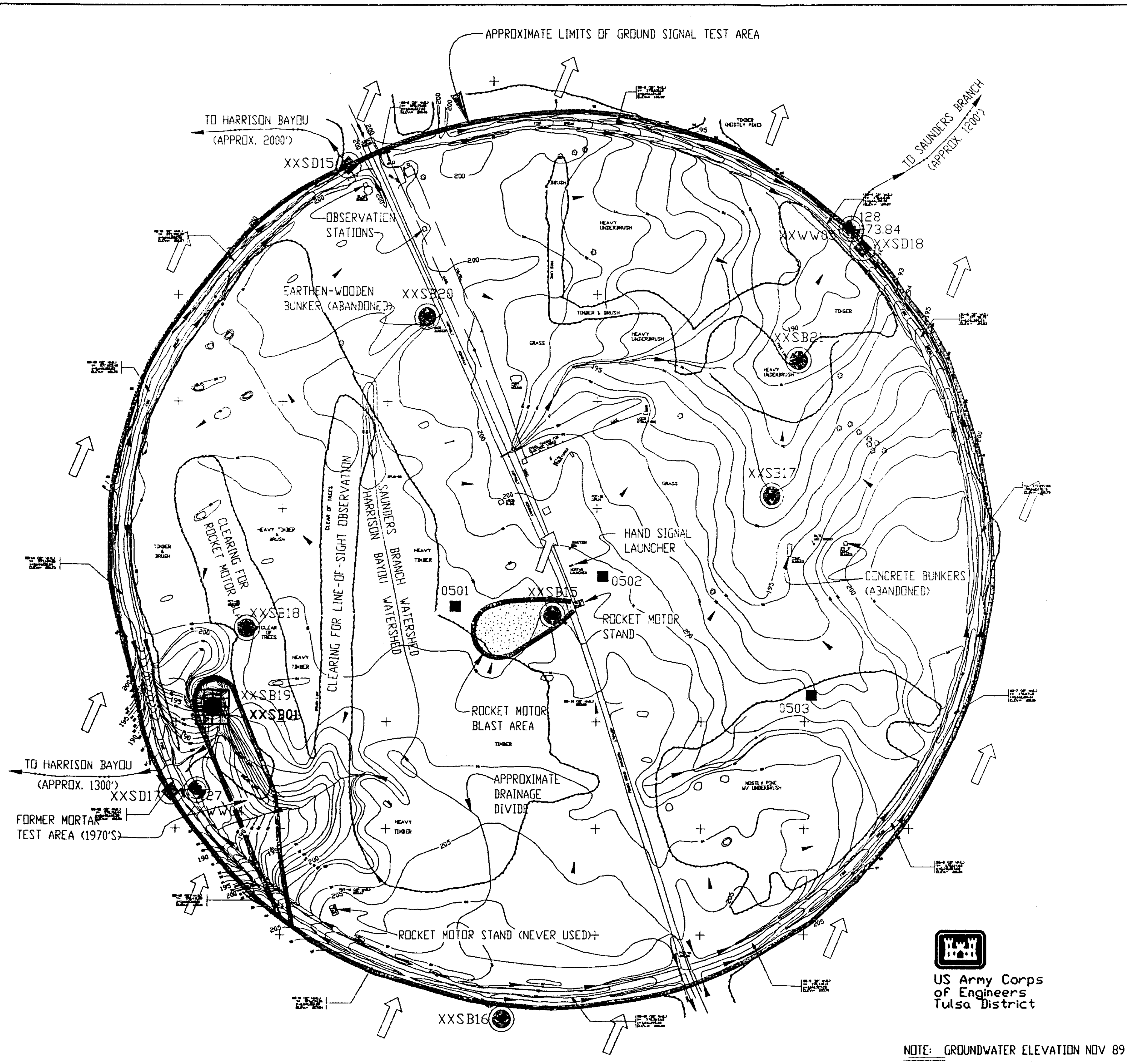

LEGEND

- GROUNDWATER FLOW DIRECTION
- 0501 SHALLOW SOIL SAMPLE AND NUMBER (PREVIOUS)
- SURFACE WATER FLOW DIRECTION
- POINT OF COMPLIANCE
- SOIL BORING (PREVIOUS)
- SURFACE WATER/ SEDIMENT SAMPLE (PREVIOUS)
- MONITORING WELL (EXISTING)
- SOIL BORING (PHASE 2)
- GRID FOR SOIL GAS SURVEY (20' SPACING) (PHASE 2)

N

250 0 250 500

SCALE IN FEET

CORPS OF ENGINEERS, TULSA DISTRICT

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
RI PHASE 2 CDAP

LHAAP XX
GROUND SIGNAL TEST AREA
SITE LAYOUT AND
SAMPLE LOCATIONS

Sverdrup Environmental

FIGURE 4-3

000086-3\CADD\LH3-11

volatile organics also. Depths are estimated based on an anticipated depth to groundwater of 10 feet. Actual depths may vary depending on subsurface conditions encountered during the investigation.

LHAAP 27 - South Test Area

The field investigation plan developed for LHAAP 27 incorporates the following:

-- installation of four (4) monitoring wells,

-- collection of three (3) surface (0 to 6 inch depth) soil samples.

Proposed locations are shown in Figure 4-4. To further evaluate potential groundwater contamination in the vicinity of boring 27-SB-33, one well will be installed within 5-10 ft of the existing boring and two wells will be installed to the east of location 27-SB-33. These locations will form an equilateral triangle with 100-ft side lengths. After these wells are installed, developed, and surveyed, the fourth well will be installed downgradient of the three.

4.1 **Drilling**. An experienced geologist, engineer or technician will serve as an inspector for all drilling activities. The inspector will prepare and describe samples and cuttings, monitor drilling operations, oversee well installation, record groundwater data, and prepare well diagrams and geologic logs. Drilling of most borings will be done by hollow stem auger. This drilling technique utilizes hollow flight augers with a cutting head attached to penetrate the formation. Sampling of these borings will be performed by

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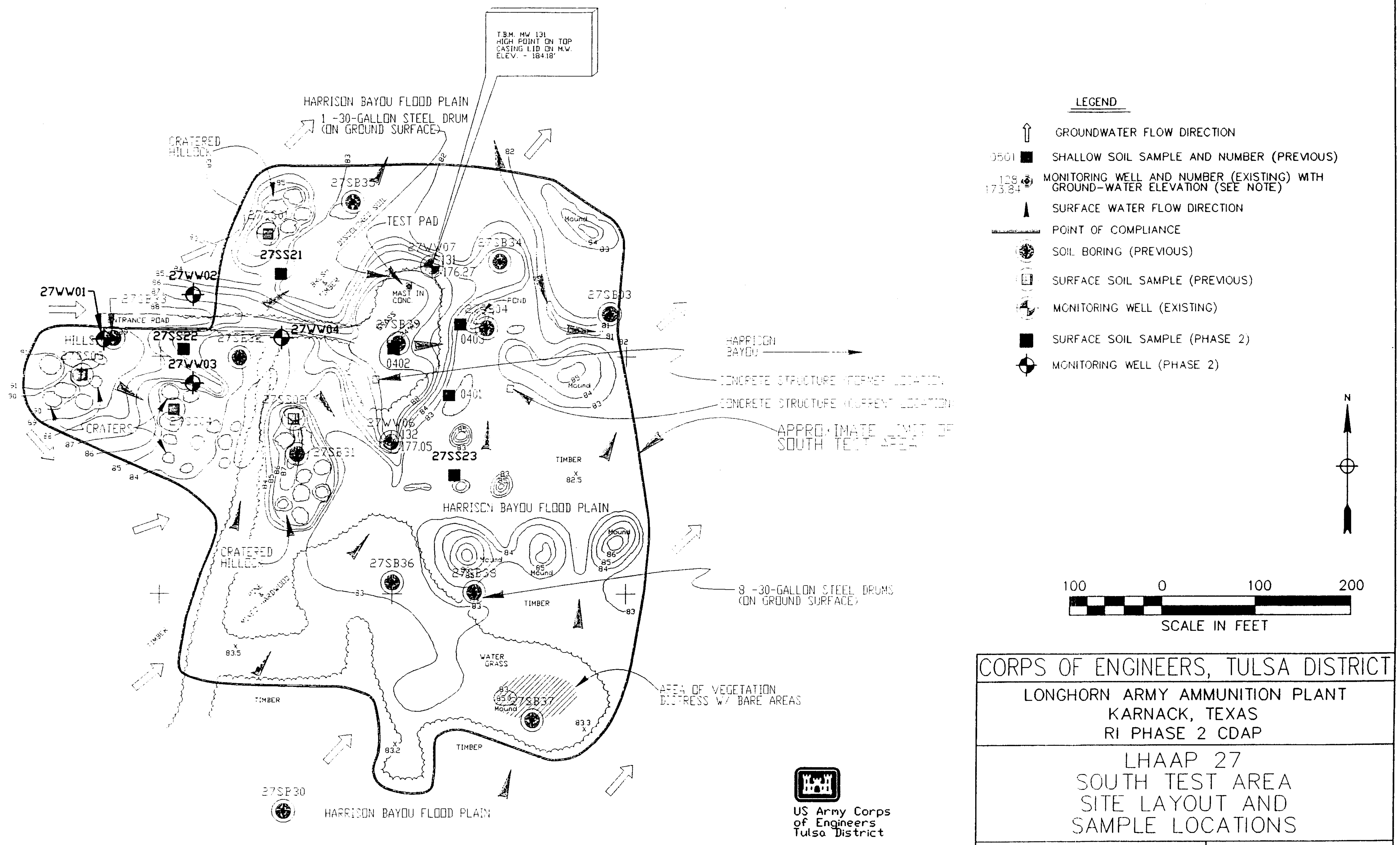

NOTE: GROUNDWATER ELEVATION NOV. 89

CORPS OF ENGINEERS, TULSA DISTRICT

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
RI PHASE 2 CDAP

LHAAP 27
SOUTH TEST AREA
SITE LAYOUT AND
SAMPLE LOCATIONS

Sverdrup Environmental

FIGURE 4-4

split spoon or shelby tube.~~ or from the auger flights.~~ ~~Drilling of 3 deep 150 foot borings for geophysical logging will be performed by rock bit or by hollow stem auger, and will be supplemented with a core barrel or denison barrel as needed to obtain samples~~. Drill pipe, augers, and other equipment used below ground will be steam cleaned as discussed in Section 4.8. It is not anticipated that drilling mud or additives will be needed. Static water levels will be taken from each open borehole after completion of drilling and immediately prior to grouting.

4.1.1 Soil Sampling Equipment. Sampling equipment to be used in conjunction with the drilling techniques discussed above is described in this section. Sampling techniques for sediments are discussed in Section 4.5.2. Samples will be taken at a minimum of one every five feet or every change of lithology, whichever occurs more frequently. Drill action and examination of the materials on the auger flights will be used to determine the location of stratigraphic changes.

4.1.1.1 Split Spoon. A split spoon is a small diameter sampling device which is driven into the soil with a drive hammer. It is frequently used inside hollow stem augers or other types of casing. The sample is representative of the materials encountered, but is not undisturbed. It can be used for samples for chemical tests or physical tests not requiring an undisturbed sample such as Atterberg limits.

4.1.1.2 Shelby Tube. A Shelby tube is a thin-walled sampler which is pushed into the soil. It takes samples primarily in unconsolidated, cohesive materials. A Shelby tube might be useful in sampling near surface materials or overburden sediments. It also does not produce an undisturbed sample.

~~4.1.1.3 **Auger.** Samples for physical or chemical tests can be taken off of the auger flights if it is done carefully. Each run with the auger will be limited to two feet. After the auger is removed completely from the boring, cave in on top of the flights is removed and discarded. The remaining material is examined, and representative samples are taken from the interior of the auger flights, avoiding soil which is in contact with the wall of the boring. This technique works best when the soil is soft and the auger can be "screwed" into the ground rather that drilled into the ground at a high rotation rate. Sampling from an auger will only be performed it a split spoon or shelby tube cannot be used due to soil conditions.~~

4.1.2 **Protection of Lower Aquifers**. If a perched aquifer is encountered that is potentially contaminated, that water-bearing zone will be cased off with the casing thoroughly seated into the lower permeability materials beneath. Drilling will continue through the casing. ~~Continuous flight augers, which act as casing, will reduce the potential for contaminated soil into aquifers beneath a contaminated zone.~~ *Casing will be used in the same manner when drilling through shallow aquifers to reach deeper aquifers.*

4.1.3 **Geological Logs**. The strata encountered during drilling will be described in detail, using the Corps of Engineers geological log form (Eng Form 1836). The log will describe each lithologic unit encountered, groundwater information, sample depths, and drilling methods. The descriptions will include lithology, color, grain size, plasticity, stiffness, cementation, moisture content, sedimentary structures, presence and general orientation of fractures, and other data determined to be pertinent by the geologist. Boring descriptions will be determined from geological logs or from characterization of cuttings and drill action, where samples are not taken. A geologic log form is shown in Appendix A. It will be used for all soil borings, monitoring wells, and shallow soil samples.

4.1.4 <u>Borehole Abandonment</u>. All borings not converted into monitoring wells will be abandoned by filling with a cement grout. The grout will have the composition as described in Section 4.2 and 31 TAC 287. After the grout has dried, the settlement depression will be filled to the surface with additional grout.

4.2 <u>Monitoring Wells</u>.

4.2.1 <u>Drilling and Installation</u>. Monitoring wells for this project will be drilled by an auger as discussed in Section 4.1. Wells can be installed in borings dedicated for that purpose or in borings drilled for environmental samples, geologic, or water information, as long as the minimum diameter is 8 inches. A typical well schematic is shown in Figure 4-5. If more than one water bearing zone is found, then well clusters will be installed to monitor each zone. In such a case, the upper zone will be cased and/or grouted. Large diameter casing will be installed through the upper water bearing zone to an underlying clay bed, and the annulus will be grouted to the surface.

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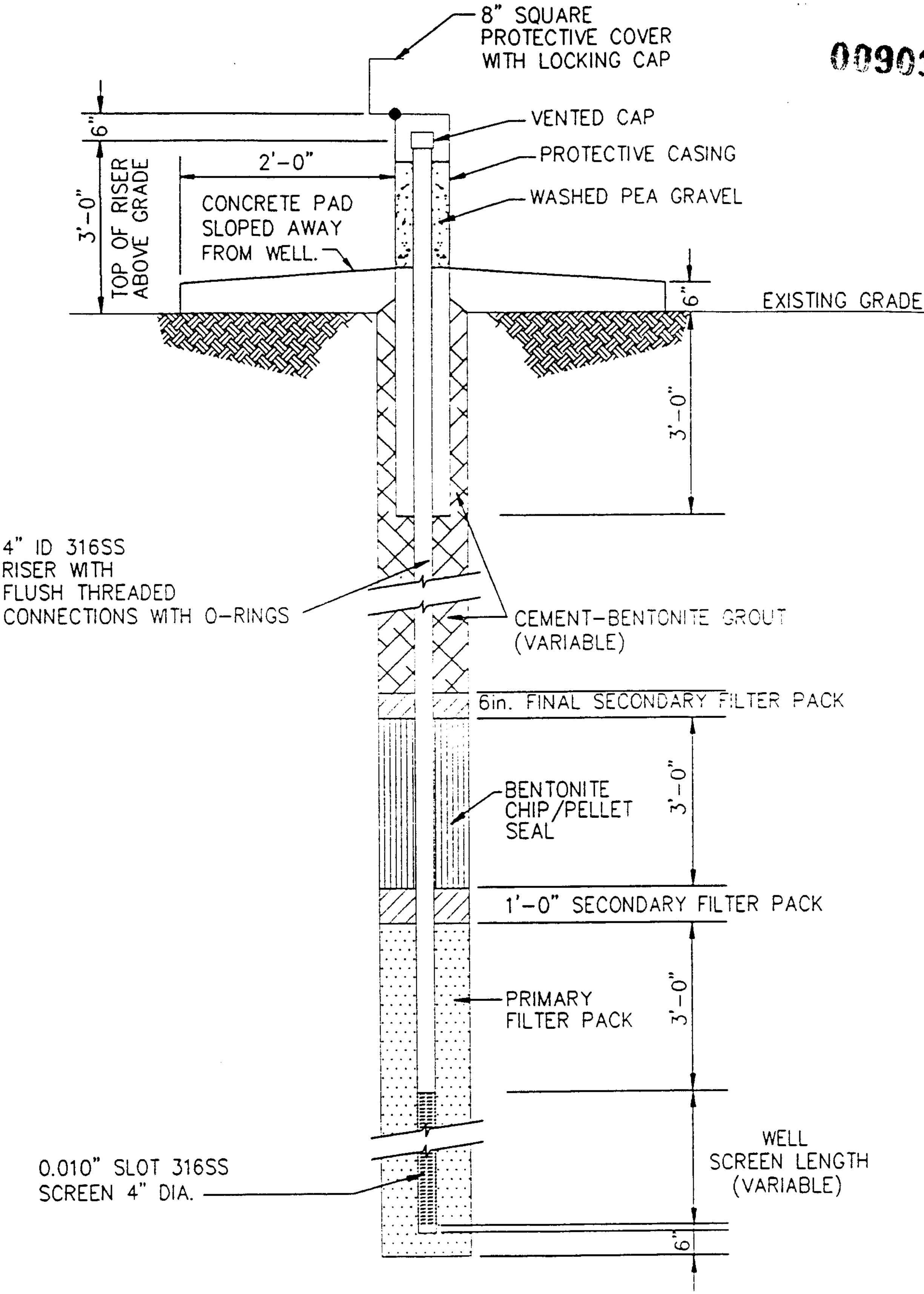

FIGURE 4-5
MONITORING WELL DETAIL
NOT TO SCALE

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4.2.1.1 <u>Well Casing</u>. Four-inch nominal diameter, flush-threaded, *stainless steel 316* ~~schedule 40 PVC~~ casing will be installed from the screen *to an elevation above the potentiometric surface. Schedule 40 PVC casing will then be installed* to approximately three feet above the *ground* surface. Centralizers may be used near the well screen to keep the casing centered in the well bore.

4.2.1.2 <u>Riser and Cap</u>. Surface construction of well pads, covers, etc., will comply with Corps of Engineers requirements as well as requirements of the Technical Enforcement Guidance Document, Ref. 5. Approximately 3 feet of well casing will be left above ground and enclosed in a protective steel casing. The protective casing will extend below the ground surface and will have a locking cover to prevent entry of rainwater and unauthorized personnel. It will also have a drainhole near the base. A four by four-foot concrete pad, four to six inches thick, will be poured around the protective casing at the ground surface, and will be sloped to promote drainage. A cage or metal posts will be placed in the concrete pad to protect the well.

4.2.1.3 <u>Screen</u>. Wells will be screened with 4-inch diameter *stainless steel 316* ~~schedule 40 PVC~~ slot screen. The exact depth of the screen will be determined by the inspector within the guidelines established in the work plan. Screen opening size will be 0.01 inches unless formation grain size indicates this is inappropriate. Screens will be a maximum of 10 feet in length. The entire saturated thickness of the aquifer will be screened to a maximum of 10 feet.

~~4.2.1.4 Sump. A two foot-long, 4-inch diameter schedule 40 PVC sump below the~~

~~screen will be used in all wells to serve as a sediment trap.~~

4.2.1.5 **Filter Pack**. A sand filter will be placed in the annulus between the well screen and the borehole from the bottom of the hole to approximately two feet above the top of the screen ~~with a tremie pipe~~. *The filter sand will be placed with a slow, continuous stream. Continuous depth soundings of the bottom of the hole will be taken to monitor the level of the sand and detect any bridging of sand.* The sand will be either bagged or purchased from a batch plant and will have a *20-40* ~~40-60~~ gradation. ~~The sand will be tested chemically for the same parameters as in the monitoring wells before placement.~~

An approximately 0.5-foot thick secondary filter pack will be installed above the primary filter pack prior to installation of the bentonite seal and above the bentonite seal prior to installation of the grout. Placement of the secondary filter pack above the bentonite seal assists in preventing infiltration of the grout into the bentonite seal. The secondary filter will be installed in the same manner as the primary filter pack. The secondary filter material shall be clean silica sand with 100 percent passing the No. 30 U.S. Standard sieve.

Filter pack thickness may be adjusted in the field based on the borehole stratigraphy.

4.2.1.6 **Bentonite Seal**. An approximately two-foot thick bentonite seal will be placed above the filter sand in the well annulus. This will be accomplished by using pellets *or granules* installed via a tremie pipe or by dropping them directly into the annulus. Bentonite pellets *or granules* will be hydrated with reagent-free water *and allowed to hydrate for approximately 30 minutes before proceeding with the installation.*

4.2.1.7 **Grout**. Grout will be used to fill the annulus between the bentonite seal and the top of the ground, as well as for borehole abandonment. *The grout used in well installation will be a high solids bentonite grout containing no cement. The grout sets up with the consistency of a stiff clay and remains flexible when hydrated. The grout used in borehole abandonment* ~~The grout~~ will consist of a pumpable mixture of water, cement, and approximately 5% bentonite. Grout will be pumped or poured through a tremie or into an open hole or pipe. The quantities of grout used will be recorded. Grouting will be accomplished in an appropriate manner for the specific application.

4.2.2 **Development**. After the monitoring well installation has been completed for at least 24 hours, wells will be developed to remove drill fluid and cuttings as well as any fines from the sand filter which might clog up the well screen. Each well will be surged, bailed and/or pumped until the sediments in the water are reduced substantially. At least 5 well volumes must be removed and temperature, pH, and conductivity must have stabilized over three consecutive readings as discussed in Section 4.5.1.2. Water and cuttings will be disposed of in accordance with Appendix C.

4.2.3 **Well Acceptance**. It is the responsibility of the drilling agency to drill and install a monitoring well which meets the criteria of Section 4.2. If a well is not constructed of the proper materials by the proper methods or if the well does not perform in such a manner to yield water representative of the aquifer which it monitors, then that well shall not be accepted by the Corps.

4.2.4 Well Schematics and Reports. A well diagram will be prepared for each well which will contain all pertinent information concerning the well, such as diameter, casing materials, depth, locations of the bentonite seal, screen length and opening size, filter pack length and gradation, grout, and the riser pipe height. A geologic log will also be prepared for each well. A typical well schematic is shown in Figure 4-5. A Texas Well Driller's Report, also shown in Appendix A, will be prepared for each well.

4.2.5 Well Abandonment. Wells which have been abandoned because of construction problems or because they are no longer needed will be backfilled in the following manner:

- Well construction materials will be removed.
- The hole will be overdrilled.
- The hole will be grouted with a tremie pipe from the bottom of the boring to the top.

4.3 Location Surveys. All borings, monitoring wells, and sampling points will be physically located by survey. The survey contractor will be required to meet or exceed a Third Order Class 1 survey, with an accuracy of 1 in 10,000. This accuracy equates to approximately 0.01 foot horizontally and vertically. The contractor will use bench marks set from approved established control monumentation in the area. Horizontal control will be in accordance with NAD 1983, and vertical control will be referenced to the

NGVD, 1929.

4.4 Water Measurements.

4.4.1 Groundwater.

4.4.1.1 Water Level Measurements. Once the well is completed, both the water level and bottom of well will be measured to the nearest 0.01 foot. Measurements will be made from a notch or mark at the top of the casing and recorded in the field journal and other appropriate forms. An electric probe will be used to establish equilibrium water levels. Depth to bottom of well will also be measured. The probe will be rinsed in Type II reagent grade water immediately before being lowered into the well and immediately after removing it from the well. If the well is heavily contaminated, additional cleaning of the probe may be required as described in Section 4.8.

4.4.1.2 Slug Tests. Slug tests are performed to determine the hydraulic properties of the aquifer. The purpose of this test is to determine the permeability of the water-bearing strata, taking into account bedding planes, fractures, and other discontinuities. Slug tests can give a more reliable indication of permeability than a laboratory test, which is performed on a very small test specimen. A known volume (slug) of water is removed from a well and the rate of recharge is recorded. Also, a mechanical slug could be added to the well, and the rate that the water level drops would be recorded. Groundwater removed from a slug test will be disposed of in accordance with Appendix C.

~~4.4.1.3 **Pump Tests**. A pump test is also used to determine aquifer characteristics. One well is designated as the pump well and additional wells are used for measuring water levels during the test. The test is conducted for a sufficient period of time to establish equilibrium conditions. During the pumping period, water levels are measured in all of the wells with enough frequency to establish a drawdown rate. After pumping has ceased, the wells are again measured to establish a recovery rate. A pump test is more expensive and difficult to administer than slug tests, but yields information pertinent to an area, rather than just a point as is the case with the above. It can also determine a cone of depression and boundary conditions, such as permeability distribution. Groundwater removed from a pump test will be disposed of in accordance with Appendix C.~~

4.4.2 **Pondwater**. Elevations of water samples and sediment samples will be determined by subtracting the depth of the sample from the elevation of the water surface as determined by a survey stake at the water's edge.

4.5 **Sampling**.

4.5.1 **Groundwater Sampling**. Groundwater samples will be collected ~~both~~ from monitoring wells ~~and open bore holes~~.

4.5.1.1 **Sampling from Monitoring Wells**.

4.5.1.1.1 **Open and Dedicated Wells**. Open wells are wells which will not be fitted with dedicated purging and sampling equipment. They will be purged with a portable purging system and sampled with stainless steel bailers. The portable system typically consists of a submersible or purge pump and a discharge pipe. The purge pump will be operated by a portable generator. The generator will not introduce oils into the well during purging operations. After purging is completed, the equipment will be removed from the well and cleaned thoroughly with distilled water and a nylon brush. The bailers will be taken to the field lab and cleaned as described in Section 4.8. If the well shows evidence of heavy contamination, the purging system will cleaned in the same manner as the bailers. Dedicated wells are wells which have permanently installed sampling and/or purging equipment. Several of the existing wells have dedicated bailers. Newly installed wells are not anticipated to have dedicated equipment at Longhorn.

4.5.1.1.2 **Well Evacuation Procedures**. Prior to sampling, the stagnant water within the well (five casing volumes) will be removed so that fresh formation water can enter. If after removing five volumes of water, pH , temperature, and conductivity have not stabilized, then additional volumes will be removed. These parameters will be considered to be stabilized if temperature for three consecutive readings is ± 1°C, pH is ± 0.5 units, and conductivity is ± 10% *of the previous reading*. Handling and disposal of purge water is discussed in Appendix C. The well will be sampled as soon as possible after purging, but not before 85% recovery. For slowly recharging wells, sampling will take place as soon as sufficient recharge has occurred to fill sampling containers. In all cases, sampling will take place within 24 hours of purging. The sampling crew will record the recharge rate, the date, time, and rate of purging, and any unusual conditions noted with this operation. Non-dedicated purging equipment will be thoroughly scrubbed and rinsed with Type II reagent grade water each time it is used. Under heavily contaminated or unknown conditions, additional rinses will be performed, as discussed in Section 4.8.

4.5.1.1.3 Sampling. Wells will be sampled with a stainless steel bailer, which will be slowly lowered into the well. Each sample container will be filled directly from the *bottom of the* bailer. A common container will not be used to fill sample bottles. Sampling equipment and containers will be kept from ground contact, and may be laid on plastic sheets on the ground. Upgradient wells will be sampled before downgradient wells. Samples of groundwater for chemical analysis are taken in the following order:

- Field parameters
- Volatile organics
- Semivolatile organics
- High explosives
- ~~Pesticides and herbicides~~
- Metals
- Anions

Table B.1 lists container, preservation, and handling requirements for each parameter and Table B.2 lists holding times. The sequence of operations for groundwater sampling is as follows:

- Purge slow-recharging wells (if any) at the outset of the sampling day.
- Purge and sample other wells.
- Sample slow rechargers, if possible.
- Preserve the samples.
- Package and ship the samples to the laboratory.

4.5.1.1.4 **Immiscible Layers**. Immiscible liquid layers are not expected to be encountered; however, procedures for dealing with immiscible layers in groundwater are included in this plan and are listed below.

- The level of the immiscible layer surface and water interface will be determined with an electronic probe. The apparent thickness of the immiscible layer is defined as the difference between the liquid level and the interface level.

- A sample will be collected, using a transparent stainless steel bailer. Presence of the immiscible layer will be confirmed visually and noted in the field log..

~~4.5.1.2 Sampling from an Open Bore Hole. All soil borings will be made into the~~

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~~water table and a grab sample of groundwater will be collected prior to plugging the boring. The sample will be collected for the purpose of screening the groundwater to determine the need for groundwater monitoring and to optimize the siting for any required monitoring wells. The groundwater will not be purged prior to sampling and sample collection procedures will be in accordance with the requirements of Section 4.5.1.1.3. The order of sampling shall be as follows:~~

- ~~Field parameters~~
- ~~Total organic halogen~~
- ~~Total organic carbon~~
- ~~High explosives~~
- ~~Phenols~~
- ~~Anions~~

4.5.2 ~~Surface Water and~~ Sediment Sampling. ~~Water samples will be collected directly into the sampling bottle or by such sampling devices as a Kemmerer sampler or a plexiglass Van Dorn sampler and will be taken several feet below the surface of the ponds. Water samples will also be taken from drainage ditches as described in the work plan. If the ditches are dry, then sampling will be done after a rainfall when the ditches are again flowing.~~ Sediment samples will be taken by a push tube or other suitable device composed of stainless steel or other inert material. After extraction from the tube, the upper five inches of sediment will be composited and placed in *two 1/2 L wide-mouth* glass jars with teflon-lined lids for chemical testing. *If sufficient sample volume is present, three sample jars will be* *filled.* Samples for volatiles, however, will be discrete with as little disturbance as possible. Sample locations will be accessed by a small boat or by wading.

4.5.3 <u>Soil Sampling</u>. Samples of soil from drill holes will be taken using a split spoon, shelby tube, or auger flights, as discussed in Section 4.1.1.3. Shallow soil samples will be taken with clean, stainless steel shovel, sample push tube, or drill rig sampling equipment. For each shallow soil sample, a composite of the uppermost foot will be taken *and placed in two (three if sufficient volume is present) 1/2 L glass jars with teflon lined caps.* Samples taken for volatile analysis, however, will not be composites, but discrete samples with as little disturbance as possible. *Soil samples for VOC analysis will be placed in 2 separate 45 ml wide mouth jars with teflon-lined caps.*

4.5.3.1 **<u>Physical Testing</u>**. Soil samples will be described in the field and classified using the Unified Soil Classification System. They will be tested for Atterberg limits, grain size distribution, and moisture content. Samples will be taken every five feet or change of material and shipped to SWD Lab or to a contract laboratory in plastic or glass jars for testing. All samples will be as representative of the strata as possible. Replicates will be taken as needed for QA/QC purposes by splitting a sample into three portions or taking three grabs from the sampler. The two additional samples will consist of a QC sample to be tested by the same lab and a QA sample to be tested by SWD Lab. Methods for physical tests are given in Table B.3.

4.5.3.2 <u>Chemical Testing</u>. Samples will be placed in pre-cleaned glass jars with teflon-lined caps. Each sample shall consists of two *1/2 L and two 45 ml* jars of soil. The samples will be taken at a minimum every five feet at discrete depths from borings and as composites for shallow soil samples. The samples will be packed in ice-filled *coolers* ~~ice chests~~, and shipped to the laboratory by bus or overnight carrier to SWD Lab. QA/QC samples for soil and rock consist of equipment blanks and replicates as discussed in Section 4.8.

4.6 Geophysics.

4.6.1 Electromagnetic Survey. Electromagnetic surveys measure the electrical conductivity of the subsurface soil, rock, and groundwater. Electrical conductivity is a function of the soil type, porosity, permeability, and the type of fluids which fill the pore spaces. This technique can determine subsurface hydrogeologic conditions, map contaminant plumes when the contaminants alter the conductivity of the groundwater, and locate trench boundaries, buried wastes, and drums.

4.6.2 Downhole Geophysics. Geophysical logging will be performed in the deeper borings at LHAAP, as discussed in the Work Plan. Geophysical logs will be used to yield information on lithology and stratigraphy, and to allow correlation of boreholes. Specific types of logs which may be employed during the investigations are discussed below.

4.6.2.1 Spontaneous Potential. This log is applicable in water or mud filled open holes. Natural electrical potential resulting from the interaction of borehole fluids, formation matrix, and formation fluids are measured such that the log records vertical variation of this voltage. Typically this log is used for correlation and to define bed thickness.

4.6.2.2 **Natural Gamma Ray**. This log can be run in dry holes or liquid filled holes, and can be run through PVC or metal casing. A detector in the borehole measures natural radiation in the formations intercepted by the borehole. The natural radiation is a function of the concentration of gamma emitters present (potassium, thorium, uranium). Generally, the concentration of these elements is higher in clays than other lithologies. The log is used for correlation, defining bed thickness, and in lithologic determination.

4.6.2.3 **Resistivity Logs**. This type of log is applicable in fluid-filled open holes. An electrical current is either applied directly to the borehole environment or induced. A variety of this type of electrical source logs are available commercially, e.g. induction logs, multiple point and spacing resistivity logs, laterlogs, microresistivity logs, and micro-laterlogs. Typical uses include thin bed recognition, correlation, and estimation and/or calculation of water saturation.

4.7 Field Screening.

4.7.1 **Headspace Analysis**. A headspace analysis tests the air in a sampling jar for volatile organics. A sample will be placed in a glass jar, which will be covered with foil, and warmed for one to two hours. At the end of the warming period, the vapor space in the jar will be tested with ~~Draeger~~

~~tubes or~~ a photo-ionization detector. This test gives an indication of the presence ~~or absence~~ of volatiles. ~~It will be used, along with visual and olfactory observations, to make a field determination of the depth and relative degree of contamination. Headspace analysis may also be used to make preliminary separations of drilling waste into potentially contaminated and uncontaminated fractions.~~

4.7.2 Soil Gas Surveys. Air-filled voids in the soil may contain compounds which volatilize from the groundwater below. A soil gas survey is a systematic sampling, analysis, and interpretation of the soil gas and what it represents. Sampling devices are placed in the ground on a grid to obtain samples of soil gas, which is analyzed either on site or in the laboratory. Soil gas surveys can detect contaminant plumes, the parent product, and the degree of weathering.

The soil gas survey will be performed using a Geoprobe™ sampling system to hydraulically push a sampling probe into the ground and collect representative soil gas samples at a depth of approximately 5 ft. The system is designed to collect representative samples of soil gas and avoid contamination by surface air. It uses disposable tubing and syringes and expendable probing points, which are discarded after each usage, and the stainless steel probe rod and other supplies are decontaminated before each usage.

Once the stainless steel probe is driven to depth, the point released and the probe rod retracted, polyethylene or teflon tubing is inserted into the probe rod and screwed into the holder. To reduce the possibility of atmospheric contamination of the sample, the tubing is inserted into a barbed stainless steel *screw fitting which is sealed into the expendable point holder with an o-ring. A glass sampling bulb is attached to the upper end of the tube. This bulb has a stopcock at each end, and a centrally located septum port, with a teflon-lined silicone rubber septum. An electric or hand held sampling pump is attached to the end of the sampling bulb, the stopcocks are opened, and 2 to 3 times the volume of the tubing assembly is pulled through the system. A vacuum gauge is inserted in-line and monitored to check that no vacuum is being pulled through the system. In practical terms, this means the vacuum pressure should not exceed 12 inches of mercury.*

When a sufficient volume of soil vapor has been drawn through the system, the stopcocks on either end of the bulb are closed. The sampling bulb is then pressurized to a pressure greater than the outside atmosphere using a disposable syringe. The syringe is inserted into a segment of silicone tubing located between the sampling point and the sampling bulb. Three to five aliquots of vapor are withdrawn from the silicone tube and injected into the sampling bulb. The sample is analyzed on-site by direct injection into a calibrated GC. Samples will be analyzed immediately upon collection. Vapor samples contained in glass sampling bulbs typically have a shelf life of approximately six hours.

4.7.3 **Air Monitoring for Worker Protection**. Air monitoring with a photoionization detector, combustible gas meter, or flame ionization detector, will be used as discussed in the Site Specific Health and Safety Plan (SSHP).

4.8 Decontamination.

The Investigation Derived Waste (IDW) Management Plan was developed by the U. S. Army Corps of Engineers- Tulsa District in June of 1992. No changes have been made to this plan and it is included as Appendix C. Table C-2, located in Appendix C, contains an estimate of the IDW generated by this investigation.

4.8.1 Drilling Equipment. Drilling equipment (augers, bits, split spoons, rods, and tools) will be steam cleaned or hot water pressure cleaned prior to use in each boring. A decontamination station will be established for the washing of drilling and sampling equipment. This station may be located onsite or nearby in order to serve several sites. Waste wash water will be collected and disposed of as discussed in Appendix C. Each member of the drilling crew will don a new pair of gloves before beginning each soil boring. The person taking the samples will wear disposable plastic gloves and will change them between each sampling interval. Used gloves will be bagged and disposed of in a manner which meets RCRA guidelines, as discussed in Appendix C.

4.8.2 Well casing. All casing and screens used in monitoring well construction will remain in the factory-sealed containers until use. These materials will be placed on a clean, dry tarp or on blocks during assembly. If contact with the ground does occur, the affected sections will be cleaned with potable water.

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4.8.3 **Sampling Equipment**. Bailers will be cleaned at the end of the work day. Enough clean bailers will be taken to the field each day so that none needs to be reused in that day's sampling. The sampling equipment will be transported in sealed, clean containers, and care will be taken to avoid contamination. Sampling equipment will be washed with a non-phosphate detergent, tap water, distilled water, and ~~hexane~~ *isopropyl alcohol*, in that order, allowed to air dry, and sealed back into clean containers. A cleaning seal will accompany each bailer with the following information: equipment identification number, date and time cleaned, and signature of the person who cleaned the equipment. The inclusion of the cleaning seal and numbering of the equipment allows for the tracking of any cleaning or cross contamination problems between samples. Each member of the sampling crew will don a new pair of gloves at each sampling location. The person who actually takes the samples will wear disposable plastic gloves and will change them between each sampling interval for each sampling site.

4.9 **Field QA/QC**.

4.9.1 **Chemical Samples**. QA/QC samples for water, sediment, and soil will be used to verify that the sampling and analytical techniques are being performed properly. QC samples are taken in the field and analyzed with the field samples by the same laboratory. QA samples are analyzed by SWD Lab to check the performance of the contract laboratory. QC samples required for soils and water sampling include travel blanks, equipment blanks, and replicates. QA samples also include replicates. QA/QC samples are described below.

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4.9.1.1 **Travel Blanks**. Travel blanks consist of American Society of Testing Materials (ASTM) Type II reagent water sealed into a sample vial in the field laboratory. The blank is not opened again until it is received in the laboratory. One travel blank will be prepared for each shipment of water samples containing volatiles, all of which are shipped in the same ice chest to the lab each day. Travel blanks measure cross contamination during shipment and contamination sources contacted during shipment. They are only analyzed for volatiles.

4.9.1.2 **Equipment Blanks**. Equipment blanks for water or soil samples will consist of ASTM Type II water *used as the final rinse collected after it* ~~which~~ has been poured over or through non-dedicated sampling equipment such as augers, knives, spoons, or bailers. They will be shipped in the ice chest with the associated samples from the site. Equipment blanks will be prepared and preserved in the same manner as a water sample. Equipment blanks measure the effectiveness of equipment decontamination. Equipment blanks are taken at a rate of 1 for every 20, *or fewer,* samples and are analyzed for the same constituents *and/or parameters* as the associated soil or water samples.

4.9.1.3 **Replicate Samples**. *Quality assurance/quality control (QA/QC) samples for water, sediment, and soil will be used to verify that the sampling and analytical techniques are being performed properly. Every tenth, or fewer, field sample is collected with sufficient volume for three portions. One portion is designated as the field sample. One portion is designated as the field sample's quality control duplicate sample (this is a replicate sample). One portion is designated as the field sample's quality assurance duplicate sample (this is a replicate sample). The field sample and QC*

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duplicate sample are both analyzed by the same analytical laboratory. The QA duplicate samples are analyzed by SWD Laboratory to check the performance of the analytical laboratory which performed the analysis on the actual field sample and the QC duplicate sample.

In cases where only sufficient sample material exists for a duplicate sample, every fifth sample will be collected with sufficient volume for two portions. One portion is designated as the field sample. One portion is designated alternately as the QA or QC duplicate sample. The field sample and the QC duplicate sample are both analyzed by the same analytical laboratory. For the sets containing a field sample and QA duplicate sample, the field sample shall be shipped along with other field samples to the analytical laboratory. The QA duplicate sample shall be analyzed by SWD Laboratory to check the performance of the analytical laboratory which performed the analysis on the field sample. ~~Replicate samples or splits are extra samples as identical as possible to the original. They may consist of a composite, or as a series of grab samples from the same source. Every tenth sample is taken in triplicate. One of each set of these replicates will be sent to SWD Lab as an audit sample (QA sample) for the contract laboratory, and the other two samples will be sent to the analytical lab as a field sample and a QC sample, each with a unique sample number. In cases where only sufficient sample exists for a duplicate set, every fifth sample is a duplicate. This duplicate alternates as a QC and QA sample.~~

4.9.2 <u>Samples for Physical Testing</u>. ~~QA/QC on samples for physical testing consists of replicate samples as described in Section 4.9.1.3.~~ *No QA/QC will be required for physical testing.*

SECTION 5.0

SAMPLE HANDLING AND TESTING

5.1 Sample Numbering System. Sample numbers are assigned by the project manager and are unique to each site. Sample numbers identify the site, well or boring, and type of blank or replicate. Sample numbers are assigned as follows:

LHss-xx-yy(zz-zz)-bb

where: LH = Longhorn

ss = Unit Site Number

xx = Sample Type, where:

WW = monitoring well
SD = sediment
SB = soil borehole
SS = shallow soil

yy = Location Number

(zz-zz) = Depth Range, in feet below surface grade

bb = QA/QC Modifier, when needed, where:

QA = QA sample for COE lab
QC = QC field replicate for contract lab
TB = Travel or trip blank
EB = Equipment blank or rinsate

As an example, a QA split from the 5 to 7 foot interval of the first soil boring at Unit XX would be LHXX-SB-01(5-7)-QA. The modifications were made to the COE numbering system so that the "ss-xx-yy" portion *of the number can be used as location numbers for all sampling points in the text and the figures of the RI report. As an example, the third sediment sample location at Unit 1 would be labeled as 1-SD-03. This numbering scheme provides a number that not only gives the unit area and type of sample, but also provides a unique number from all other previous site investigation sample numbers at LHAAP.*

~~LHss-hhhh-xaaa-bb~~

~~LHss refers to the site being investigated at Longhorn,~~
~~hhhh is the well or boring number,~~
~~x describes the sample medium, where~~

~~1 = groundwater~~
~~2 = soil or rock~~
~~3 = sediment~~
~~4 = surface water,~~

~~aaa is the sample number,~~
~~bb is a QA/QC modifier, when needed, where~~

~~QA = a QA sample (split for SWD Lab)~~
~~QC = a QC sample (split for contract lab)~~
~~TB = travel blank~~
~~EB = equipment blank.~~

~~For example, a QA split from the third soil sample of the second boring from site 32 would look like this: LH32-0002-2003-QA.~~

5.2 Preparing Samples. When samples are taken in the field, they are preserved according to Table B.1. They are then placed in the ice chest in styrofoam inserts which have cutouts to accommodate the jars. The ice chest is filled with ice and the chain of custody form and field data form are placed inside in a zip-lock plastic bag placed on top of the ice. The ice chest is wrapped with strapping and a seal is placed on the strapping. The samples are then delivered to the bus station or shipper. Samples *collected for chemical analysis* are shipped on the day they are sampled if possible, *but in no event kept on site longer than 48 hours. If samples are anticipated to arrive at SWD on Friday or the weekend, SWD Laboratory will be contacted prior to shipment to ensure they will have personnel available to recieve the sample shipments. SWD's telephone number is (214) 905-9130. If the SWD lab will not have personnel available, samples will be held until delivery on Tuesday. Samples kept on site will be stored in sealed coolers and will be chilled to 4°C.*

5.3 **Receiving Samples**. After the ice chests are received at the laboratory, the samples are logged in, the COC is signed, and a cooler receipt form is filled out. This form documents the condition of the samples as received. The samples are checked for breakage or leakage and the temperature of the ice bath is checked. If the temperature exceeds 4°C or if any other problems are noted, this information is recorded on the COC and the District office is notified of the problem. Samples are repackaged and shipped to contract laboratories using similar procedures as described in Section 5.2.

5.4 **Laboratory Procedures**. Laboratory analytical procedures come from the following sources: U. S. Environmental Protection Agency (SW 846 and EPA-600, Refs. 6 and 4), and Standard Methods (Ref. 1). Analytical methods from these sources are given in Table B.2. Quantitation limits are given in Tables B.4 through B.8. Quantitation limits, however, are dependent on the concentration of the components in the matrix to be analyzed.

SECTION 6.0

SAMPLE INTEGRITY

The quality of analytical data is suspect if the integrity of the sample cannot be ensured. Integrity includes the procedures and written records which, when taken together, verify that the sample is as represented.

6.1 Security. Security involves procedures which ensure sample integrity. Security is required until final disposal of the sample after laboratory analysis is complete. Aspects of sample security are discussed below.

6.1.1 Security of the Well and Samples in the Field. Each well will have a locking cap and keys will be given out only to those who need them. Samples, once taken, will be in the possession of the sampling crew or locked in the field laboratory. QA and QC samples will be taken, which, when analyzed, will also document the integrity of the sample.

6.1.2 Security of the Sample in the Lab. Samples will be stored in a secure area in the laboratory with limited access to authorized laboratory personnel. Upon receipt of the ice chests, laboratory personnel will check the temperature of the ice bath, the condition of the samples, and the accuracy of the accompanying paperwork.

6.2 **Custody**. Custody consists of formal records which document integrity. These records are described below.

6.2.1 **Chain of Custody Form**. The chain of custody form (COC) is a record which describes the sample, the date and method of sampling, and the analyses, *with method numbers included*, required. *The COC will also have the name and telephone number of the Tulsa District POC, Ms. Yolane Hartsfield, (918) 669-7072.* It has spaces for signatures of those receiving and relinquishing the samples. The form is normally signed by the sampler, the individual preparing the samples for shipment, and the receiving individual at the laboratory. The individual preparing the samples for shipment maintains a copy. The original COC is incorporated into the hard copy laboratory report, where it is placed on file. An example of this form is given in Appendix A.

6.2.2 **Laboratory Traffic Report**. Samples which are sent from SWD Lab to a contract lab are sent with this form. It is a laboratory chain of custody form which gives the sampling date, the analyses to be performed and the date the results are needed. Because various fractions of the sample might be sent to several contract labs, the original COC cannot be used. The traffic reports are incorporated into the hard copy laboratory reports.

6.2.3 **Bill of Lading**. A bill of lading (bus bill or airbill) documents receipt of the samples by the carrier. It is not possible for the carrier's representative to sign the COC since it is sealed in the ice chest. Bills of lading are kept on file in the District Office.

6.2.4 <u>Cooler Receipt Form</u>. The cooler receipt form is completed by the laboratory and documents the condition of the samples as received by the lab. This form is available in the hard copy laboratory report.

6.3 <u>Sample Tracking and Identification</u>. Other than the items listed in 6.2, there is additional documentation which demonstrate sample integrity. These are listed as follows:

6.3.1 <u>Field Log Book</u>. The field log book is a bound record, kept by the water sampling crew, in which water sampling information is recorded. It is taken to the wells to record purging and sampling data, water levels, and other items of interest. It is used in the field lab to record preservation and preparation procedures for shipment. It is also used to record equipment calibration and decontamination of sampling equipment. In case of concurrent operations, sampling information will be transferred to the field log book in the field lab. The information for the COC and field data form comes from the field log book.

6.3.2 <u>Field Data Form</u>. The field data form transmits necessary information about the sample to the lab. Field measurements such as pH, conductivity, and water levels as well as problems with the location or the sample are noted on this form. Field data forms are taken for all sampling events. Examples are shown in Appendix A.

6.3.3 <u>Sample Labels</u>. Labels on each jar contain the well or boring number or surface sample location, the sample number, preservation (if any), the analysis to be performed, and the sampler's initials. Examples are provided in Appendix A.

SECTION 7.0

DATA REDUCTION, VALIDATION, AND REPORTING

7.1 Analytical Data.

7.1.1 **Field Data**. Field data reduction will be performed by the contractor or the COE. Data validation in the field is determined primarily by making several readings (QC checks for reproducibility). Periodic QA oversight is also a part of the validation process. The field data is sent to the lab on the field data form and is returned to the District in the hard copy lab reports.

7.1.2 **Laboratory Data**. Laboratory data are reduced at the contract lab, which generates a laboratory report containing the analytical data and field and lab QC. Tulsa District performs a QA validation and generates a summary report, which is submitted to the project staff. Laboratory deliverables include the following:

- analytical data, results of field and laboratory blanks, matrix spikes, and matrix spike duplicates, surrogate recoveries, field splits, and COC forms;
- *table(s) which cross reference field samples with associated method blanks, matrix spikes and matrix spike duplicate samples;*
- QA validation report;
- ASCII or DBASE format data files, *submitted per the "Guidance for Submittal of Data of Electronic Media for the Tulsa District HTRW Project Database. This document is included with Appendix B.*

Calibration and internal standards information, raw data, and all instrumentation graphs and traces will be available from the laboratory, if needed.

7.2 **Technical Data**. Technical data refers to data of several types, such as groundwater flow calculations, stratigraphic maps generated from geologic and geophysical field data, isopleth profiles of contaminants, and groundwater models. Technical data will be reduced, validated, and reported by the project staff.

7.3 Data Validation Report. Data validation reports shall include an executive summary, an introduction which describes the number of samples tested by medium, QC samples, QA samples, the testing laboratories, and a table arranged by sample batch showing the field and laboratory I.D. numbers and parameters tested, with a code for each laboratory if more than one is used, a detailed discussion by type of compound (i.e. metals, volatiles, explosives), and a conclusion which summarizes problems and corrective action. The detailed discussion shall include the following (discussed in detail in Section 3.0 'Data Quality Objectives'):

1. Accuracy, including matrix spike recoveries, reagent spike recoveries, blank spike recoveries, laboratory control sample spike recoveries, and surrogate recoveries. The discussion will address the number and type of recoveries which were outside quality control limits.

2. Precision, including all spike duplicate recoveries. The discussion will address the number and type of recoveries which were outside quality control limits. The discussion will include

RPDs and the number which were outside quality control limits. The discussion will include a comparison of the field sample(s) and its (their) quality control duplicate sample(s).

3. Representativeness, including field and instrument blanks, holding times, condition of samples upon arrival at laboratory. Discussion will include impact of matrix spike interference(s) if present.

The report shall conclude whether or not the data is suitable for its intended purpose and meets the data quality objectives as specified in this CDAP.

7.4 <u>Corps Data Validation Report</u>. The Corps data validation report, which will address Comparability and contain the comparison of the field sample(s) and its (their) quality assurance duplicate sample(s), will also include a review of the contractor's report and a judgement as to the suitability of the data. This complete report shall constitute acceptance or rejection of the data.

SECTION 8.0

AUDITS

Audits, which are QA procedures designed to meet the data quality objectives discussed in Section 4, are of two basic types as discussed below. Table 8.1 gives the audit elements for the Longhorn investigations.

8.1 Systems Audits. A systems audit is a qualitative evaluation of all components of a project to determine if each component is properly performed. Systems audits are generally performed at the outset of investigations and periodically during the life of a project. Systems audits for office and fieldwork will be performed by the Tulsa District, and system audits for laboratory work will be performed by the MRD Lab. These audits consist primarily of site inspections.

8.2 Performance Audits. Performance audits are quantitative evaluations of the components of a project. These consist of audit samples to be checked by MRD as a part of the laboratory validation process, QA replicates taken as a part of the sampling process and analyzed by SWD Lab, and laboratory QA procedures as specified by the analytical method.

TABLE 8-1 AUDIT ELEMENTS FOR LONGHORN INVESTIGATIONS

Element	By	Frequency
laboratory site inspection	MRD Lab	at laboratory selection and then every 18 months
field inspections	COE	at least monthly at first less frequently thereafter
technical data inspections	COE	as needed
laboratory check samples	MRD Lab	at laboratory selection and then every 18 months
analysis of field replicates	SWD Lab	every 10 samples
lab QA summary report	SWD Lab	one for each lab report

SECTION 9.0

CORRECTIVE ACTION

9.1 **Field Activities**. Field activities which are improper will be corrected as quickly as possible. The inspector or crew chief will be responsible to see that corrective action is initiated and documented whenever the error has the potential to compromise the quality of the data being generated or when-ever there is a possibility that the error might be repeated.

9.2 **Field Data**. Corrective action for poor field data quality (as determined by replicate measurements or prior expectation) consists of remeasurement until successive readings agree within reasonable limits. Examples of frequently made measurements and limits to which they should agree include:

- pH - Measurements should agree within 0.02 pH unit.
- *Temperature - Measurements should agree to $\pm$ 0.5° C.*
- Conductivity - Measurements should agree within two numbers of the last significant digit.
- Depth and water level measurements - Readings should agree within 0.01 foot.

If remeasurement is not successful, then instrument calibration and operation and the user's technique will be evaluated.

9.3 **Laboratory**. Laboratory corrective action is described in the analytical method for that analysis.

9.4 **Implementing and Reporting**. Corrective action should be initiated at the lowest level possible. Corrective action which involves correcting a mistake for little potential of repetition need not be reported as long as the error was not reported. For example, an erroneous water level measurement, such as 40 feet in a 30 foot well, would be corrected by making several additional readings which agreed with each other and looked reasonable. It would not be necessary to report this error. Corrective action involving a potentially repetitive error or one which had been reported should be documented in writing. For example, an erroneous water level measurement due to a low battery in the water level indicator, should be documented because previous suspect water levels may need to be flagged and/or checked. The corrective action report would state the nature of the problem and the potential ramifications as well as what actions have been taken. In this case, it would be to replace the battery and check the last several days of readings of the indicator. This report will be sent to the project manager.

SECTION 10

REFERENCES

1. American Public Health Association, 1989, "Standard Methods for the Examination of Water and Wastewater", 17th Ed., APHA, Washington, DC.

2. U. S. Army Corps of Engineers, August, 1989, "Minimum Chemistry Data Reporting Requirements for DERP and Superfund HTW Projects", CEMRD-ED-GC Memorandum.

3. U. S. Army Corps of Engineers, January, 1990, "Chemical Data Quality Management for Hazardous Waste Remedial Activities", ER-1110-1-263.

4. U. S. Environmental Protection Agency, March, 1983, "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020.

5. U. S. Environmental Protection Agency, September, 1986, "RCRA Ground Water Monitoring Technical Enforcement Guidance Document.

6. U. S. Environmental Protection Agency, November, 1986, "Test Methods for Evaluating Solid Waste", SW 846, 3rd Ed.

7. U. S. Environmental Protection Agency, May, 1987, "Data Quality Objectives for Remedial Response Activities: Development Process", EPA 540/G-87/003.

8. U. S. Environmental Protection Agency, 1987, "Development of an RFI Work Plan and General Considerations for RCRA Facility Investigations", SW-87-001.

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APPENDIX A

FORMS USED IN FIELD SAMPLING ACTIVITIES

Chain of Custody Record

PROJECT

SITE

COLLECTOR

SAMPLE I.D.	TYPE	DATE/TIME	Analyses											REMARKS

RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	RELINQUISHED BY:	DATE	TIME	RECEIVED BY:
RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	RELINQUISHED BY:	DATE	TIME	RECEIVED BY:

RECEIVED FOR LABORATORY BY:	DATE	TIME	REMARKS

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Sverdrup 009075

GROUNDWATER SAMPLING
FIELD DATA FORM

PROJECT NAME: DATE:

SAMPLING POINT: TIME:

SAMPLED BY: WEATHER:

TOP OF CASING ELEVATION: ______ FEET

DEPTH TO STATIC WATER LEVEL: ______ FEET

DEPTH TO WELL BOTTOM: ______ FEET

HEIGHT OF WATER COLUMN, H = ______ FEET

DIAMETER OF WELL CASING, D = ______ FEET

VOLUME OF WATER COLUMN, $\pi \times H \times \frac{D^2}{4} \times 7.48 =$ ______ GALLONS

VOLUME OF WATER EVACUATED: ______ GALLONS

DID WELL READILY RECOVER? ______ YES ______ NO

METHOD OF EVACUATION: ______

METHOD OF SAMPLING: ______

SAMPLE TEMPERATURE: ______ °C ______ °F

SAMPLE pH: ______

SAMPLE SPECIFIC CONDUCTANCE: ______ µmhos/cm

SAMPLE COLOR: ______

SAMPLE TURBIDITY: ______ HIGH

______ MODERATE

______ LOW

SAMPLE ODOR: ______

OTHER OBSERVATIONS: ______

ADDITIONAL COMMENTS ON METHODOLOGY, ETC.:

LONGHORN AAP
RINSATE WATER SAMPLES
PARAMETER SHEET
FY - 92

CONTAINERS		PARAMETERS	EPA METHOD	PRESERVATIVES
NO.	SIZE		NO./SHIP	
GLASS			(7)	
1	w/m jar	pH, Conductivity, & Temp. (4 sets)	*****	dispose
2	1 liter	Semi-Volatiles	8270	Brim full & 4°C
2	1 liter	Explosives	8330	Brim full & 4°C
2	1 liter	Herbicides, Pesticides & PCB's (2,4-D & 2,4,5-TP)	8150/8080	4°C
1	1 liter	Nitrate	353.1	4°C
PLASTIC			[1]	
1	1 liter	Total Metals (Ag. As. Ba. Cd. Cr, Hg. Ni, Pb, Sb, Se & Tl)	6010/7041/7060 7470/7740/7841	pH<2 w/HNO_3
VIALS			{3}	
3	40 ml vials	Volatile Organics	8240	4 drops HCl, n/a, n/b & 4°C

LH/RB/PAR/27JAN92

One rinsate sample should be taken for every (20) soil samples. The rinsate must be taken on the actual piece of equipment used to obtain the soil sample, (split spoon, auger, knife, etc.) and should have the same I.D. as the corresponding boring/depth number taken with that equipment.

Hole No.

009077

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
2. LOCATION (Coordinates or Station)	12. MANUFACTURER'S DESIGNATION OF DRILL
3. DRILLING AGENCY	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
4. HOLE NO. (As shown on drawing title and file number)	14. TOTAL NUMBER CORE BOXES
5. NAME OF DRILLER	15. ELEVATION GROUND WATER
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ______ DEG. FROM VERT.	16. DATE HOLE — STARTED — COMPLETED
	17. ELEVATION TOP OF HOLE
7. THICKNESS OF OVERBURDEN	18. TOTAL CORE RECOVERY FOR BORING %
8. DEPTH DRILLED INTO ROCK	19. SIGNATURE OF INSPECTOR
9. TOTAL DEPTH OF HOLE	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. | PROJECT | HOLE NO.

009078

Send original copy by certified mail to: Texas Water Commission, P.O. Box 13087, Austin, Texas 78711

Please use black ink.

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

State of Texas
WELL REPORT

Texas Water Well Drillers Board
P.O. Box 13087
Austin, Texas 78711

1) OWNER ____________ (Name) ADDRESS ____________ (Street or RFD) (City) (State) (Zip)

2) LOCATION OF WELL:
County ____________ . ____________ miles in ____________ (NE, SW, etc.) direction from ____________ (Town)

Driller must complete the legal description below with distance and direction from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter- or Half-Scale Texas County General Highway Map and attach the map to this form.

☐ LEGAL DESCRIPTION:
Section No. ______ Block No. ______ Township ______ Abstract No. ______ Survey Name ______
Distance and direction from two intersecting section or survey lines ____________

☐ SEE ATTACHED MAP

3) TYPE OF WORK (Check):
☐ New Well ☐ Deepening
☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check):
☐ Domestic ☐ Industrial ☐ Monitor ☐ Public Supply
☐ Irrigation ☐ Test Well ☐ Injection ☐ De-Watering

5) DRILLING METHOD (Check):
☐ Driven
☐ Mud Rotary ☐ Air Hammer ☐ Jetted ☐ Bored
☐ Air Rotary ☐ Cable Tool ☐ Other ______

6) WELL LOG:
Date Drilling:
Started ______ 19 ___
Completed ______ 19 ___

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
	Surface	

7) BOREHOLE COMPLETION:
☐ Open Hole ☐ Straight Wall ☐ Underreamed
☐ Gravel Packed ☐ Other ______
If Gravel Packed give interval . . . from ______ ft. to ______ ft.

From (ft.)	To (ft.)	Description and color of formation material

(Use reverse side if necessary)

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setting (ft.) From	Setting (ft.) To	Gage Casting Screen

9) CEMENTING DATA [Rule 287.44(1)]
Cemented from ______ ft. to ______ ft. No. of Sacks Used ______
______ ft. to ______ ft. No. of Sacks Used ______
Method used ______
Cemented by ______

10) SURFACE COMPLETION
☐ Specified Surface Slab Installed [Rule 287.44(2)(A)]
☐ Specified Steel Sleeve Installed [Rule 287.44(3)(A)]
☐ Pitless Adapter Used [Rule 287.44(3)(B)]
☐ Approved Alternative Procedure Used [Rule 287.71]

11) WATER LEVEL:
Static level ______ ft. below land surface Date ______
Artesian flow ______ gpm. Date ______

12) PACKERS: Type Depth

13) TYPE PUMP:
☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder
☐ Other ______
Depth to pump bowls, cylinder, jet, etc., ______ ft.

14) WELL TESTS:
Type Test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated
Yield: ______ gpm with ______ ft. drawdown after ______ hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
☐ Yes ☐ No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? ______ Depth of strata ______
Was a chemical analysis made? ☐ Yes ☐ No

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME ______ (Type or print) WELL DRILLER'S LICENSE NO. ______

ADDRESS ______ (Street or RFD) (City) (State) (Zip)

(Signed) ______ (Licensed Well Driller) (Signed) ______ (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

For TWC use only: Well No. ______ Located on map ______

WWD-012 (Rev. 05-18-90)

TEXAS WATER COMMISSION COPY

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Please use black ink. File WHITE COPY with: Texas Water Commission P.O. Box 13087 Austin, Texas 78711 Phone (512) 371-6299	State of Texas **PLUGGING REPORT** (This form must be completed and filed with the TWC within 30 days following the date the well is plugged as required by current statutory law.)	Texas Water Well Drillers Board P.O. Box 13087 Austin, Texas 78711 Phone (512) 371-6299

A. Well Identification and Location Data

1) Owner ______________ (Name) Address ______________ (Street or RFD) (City) (State) (Zip)

2) Owner's Well Number ______________

3) Location of Well: County ______________ ______ miles in ______ (N.E., S.W., etc.) direction from ______________ (Town)

Driller or other person performing the plugging operations must complete the legal description to the right with distance and direction from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter- or Half-Scale Texas County General Highway Map and attach the map to this form.

☐ Legal description:

Section No. ________ Block No. ________ Township ______________

Abstract No. ________ Survey Name ______________

Distance and direction from two intersecting section lines or survey lines: ______________

☐ See Attached map.

B. Historical Data on Well To Be Plugged (if available)

4) Driller ______________ License Number ______________ City ______________

5) Drilled ______________ 19____; 6) Diameter of hole ________ inches; 7) Total depth of well ______________ feet.

C. Current Plugging Data

8) Date well plugged ______________, 19______.

9) Sketch of well: Using space at right, show method of plugging the well including all casing and cemented intervals.

10) Name of Driller or other person actually performing the plugging operations ______________

______________;

if a water well driller plugged the well, give the driller's license no. ______________.

11) Casing and cementing data relative to the plugging operations:

Diameter (inches)	Casing Left in Well From (feet)	Casing Left in Well To (feet)

Cement Plug(s) Placed in Well From (feet)	Cement Plug(s) Placed in Well To (feet)	Sack(s) of cement used

D. Validation of Information Included in Form

I hereby certify that this well was plugged by me (or under my supervision) and that all of the statements herein are true and accurate to the best of my knowledge and belief.

Company or Individual's Name ______________ (Type or Print)

Address ______________ (Street or RFD) (City) (State) (Zip)

(Signed) ______________ (Person performing plugging operations) (Signed) ______________ (Owner of Well)

For TWC use only
Well No. ______________
Location on map ______________

WWD-009 (Rev. 07/27/88)

TEXAS WATER COMMISSION'S COPY

EAGLE PICHER
ENVIRONMENTAL SERVICES
36 B J TUNNELL BLVD - MIAMI, OK 74354
1-800-331-7425

Specially Cleaned Sample Container

LOT #:

DATE:	TIME:	COLLECTED BY:

SAMPLING SITE:

SAMPLE TYPE:
☐ Grab ☐ Composite ☐ Other ____________

TESTS REQUIRED:	PRESERVATIVE

CUSTODY SEAL

Person Collecting Sample ______________________ (signature) Sample No. ____________

Date Collected ______________________ Time Collected ____________

CUSTODY SEALS

APPENDIX B

TABLES

TABLE B.1 SAMPLE CONTAINERS, PRESERVATION, AND PREPARATION FOR WATER SAMPLES

PARAMETER	SIZE AND TYPE OF CONTAINER	# OF CONTAINERS	ICE	METHOD OF PRESERVATION
pH	½ L, glass	4*	N	field test
conductivity	½ L, glass	4*	N	field test
temperature	½ L, glass	4*	N	field test
metals	1 liter, plastic	1	Y	nitric acid to pH <2
volatiles	40 ml, VOA vial	3	Y	HCl to pH <2, no head space or air bubbles
semivolatiles	1 liter, amber glass	2**	Y	none
explosives	1 liter, amber glass	2**	Y	none
anions	1 liter, glass	2**	Y	none
pesticides/PCBs	1 liter, amber glass	2**	Y	none
herbicides	1 liter, amber glass	2**	Y	none
total organic carbon	1 liter, amber glass	1	Y	sulfuric acid to pH <2
total organic halides	1 liter, amber glass	1	Y	sulfuric acid to pH <2
phenols	1 liter, amber glass	1**	Y	sulfuric acid to pH <2
TCLP (See note 1) volatiles semivolatiles pesticides herbicides metals				

Note 1. Sample containers for aqueous samples to be analyzed for TCLP are identical to the sample containers for the corresponding total analysis.

* May see pH sample aliquot for this sample

** Where sufficient sample volume exists, add one additional container for this parameter.

*** Preservation dependent upon anions specified for analysis. Refer to method for preservation requirements.

TABLE B.2 MAXIMUM HOLDING TIMES AND ANALYTICAL METHODS IN SOIL AND WATER

ANALYTICAL METHOD PARAMETER	EXTRACTION	ANALYSIS	REFERENCE	METHOD #
Field tests				
pH	-	immediate		
conductivity	-	immediate		
temperature	-	immediate		
Metals				
antimony	-	6 months	SW-846(1)	7041
arsenic	-	6 months	SW-846	7060
selenium	-	6 months	SW-846	7740
lead	-	6 months	SW-846	7421
mercury in water	-	28 days	SW-846	7470
mercury in soil	-	28 days	SW-846	7471
thallium	-	6 months	SW-846	7841
others	-	6 months	SW-846	6010
Volatiles	-	14 days	SW-846	8240
Semivolatiles			SW-846	8270
in water	7 days	40 days		
in soil	14 days	40 days		
Explosives				
in water	7 days	40 days	SW-846	8330
in soil	14 days	40 days	SW-846	8330
Anions			EPA-600(2)	300.0
nitrate	-	14 days		
chloride	-	28 days		
sulfate	-	28 days		
Pesticides/PCBs				
in water	7 days	40 days	SW-846	8080
in soil	14 days	40 days	SW-846	8080
Herbicides				
in water	7 days	40 days	SW-846	8150
in soil	14 days	40 days	SW-846	8150
Total Organic Carbon		28 days	SW-846	9060
Total Organic Halogen		14 days	SW-846	9020
Phenols		28 days	SW-846	9066

TCLP				
volatiles		14 days	SW-846	1311/8240
semivolatiles	7 days(3)	40 days	SW-846	1311/8270
pesticides	7 days(3)	40 days	SW-846	1311/8080
herbicides	7 days(3)	40 days	SW-846	1311/8150
metals (except mercury)		6 months	SW-846	1311/various
(mercury)		28 days	SW-846	1311/7470

(1) SW-846 reference 6;
(2) EPA-600 reference 4
(3) There is a holding time of 7 days from field collection to TCLP extraction, 7 days from TCLP extraction to preparative extraction and 40 days from preparative extraction to determinative analysis for a total elapsed time of 54 days.

TABLE B.3	METHODS FOR PHYSICAL TESTS
TEST	METHOD SOURCE
grain size	ASTM D421, D422, D1140
atterberg limits	ASTM D4318
moisture content	ASTM D2216

ASTM American Society of Testing and Materials.

TABLE B.4 QUANTITATION LIMITS FOR VOLATILE ANALYSES IN SOIL AND WATER BY METHOD 8240

PARAMETER	WATER (ug/l)	LOW LEVEL SOIL/SEDIMENT (ug/kg)
chloromethane	10	10
bromomethane	10	10
vinyl chloride	10	10
chloroethane	10	10
methylene chloride	5	5
acetone	10	10
carbon disulfide	5	5
1,1-dichloroethane	5	5
1,1-dichloroethene	5	5
cis-1,2-dichloroethene	5	5
trans-1,2-dichloroethene	5	5
chloroform	5	5
1,2-dichloroethane	5	5
2-butanone (MEK)	10	10
1,1,1-trichloroethane	5	5
carbon tetrachloride	5	5
vinyl acetate	10	5
bromodichloromethane	5	5
1,2-dichloropropane	5	5
trichloroethene	5	5
dibromochloromethane	5	5
1,1,2-trichloroethane	5	5
benzene	5	5
trans-1,3-dichloropropene	5	5
4-methyl-2-pentanone	10	10
2-hexanone	10	10
tetrachloroethene	5	5
toluene	5	5
1,1,2,2-tetrachloroethane	5	5
chlorobenzene	5	5
ethylbenzene	5	5
styrene	5	5
xylenes (total)	5	5
acrolein	5	5
acrylonitrile	10	10
dibromomethane	5	5
dichlorodifluoromethane	5	5
1,4-dichloro-2-butene	10	10
ethyl methacrylate	5	5
1,2,3-trichloropropane	5	5
dichloromethane	5	5
iodomethane	10	10
trichlorofluoromethane	5	5

TABLE B.5 QUANTITATION LIMITS FOR SEMIVOLATILE ANALYSIS IN SOIL AND WATER BY METHOD 8270

PARAMETER	WATER (ug/l)	LOW-LEVEL SOIL/SEDIMENT (ug/kg)
phenol	10	330
bis(2-chloroethyl) ether	10	330
2-chlorophenol	10	330
1,3-dichlorobenzene	10	330
1,4-dichlorobenzene	10	330
benzyl alcohol	10	330
1,2-dichlorobenzene	10	330
2-methylphenol	10	330
bis(2-chloroisopropyl) ether	10	330
4-methylphenol	10	330
n-nitrosodi-n-propylamine	50	1600
hexachloroethane	10	330
nitrobenzene	10	330
isophorone	10	330
2-nitrophenol	10	330
2,4-dimethylphenol	10	330
benzoic acid	50	1600
bis(2-chloroethoxy) methane	10	330
2,4-dichlorophenol	10	330
1,2,4-trichlorobenzene	10	330
naphthalene	10	330
4-chloroaniline	10	330
hexachloro-1,3-butadiene	10	330
4-chloro-3-methylphenol	10	330
2-methylnaphthalene	10	330
hexachlorocyclopentadiene	10	330
2,4,6-trichlorophenol	10	330
2,4,5-trichlorophenol	50	1600
2-chloronaphthalene	10	330
2-nitroaniline	50	1600
dimethyl phthalate	10	330
acenaphthylene	10	330
2,6-dinitrotoluene	10	330
3-nitroaniline	50	1600
acenaphthene	10	330
2,4-dinitrophenol	50	1600
4-nitrophenol	50	1600
dibenzofuran	10	330
2,4-dinitrotoluene	10	330
diethyl phthalate	10	330

4-chlorophenyl phenyl ether	10	330
fluorene	10	330
4-nitroaniline	50	1600
4,6-dinitro-2-methylphenol	50	1600
N-nitrosodiphenylamine	10	330
4-bromophenyl phenyl ether	10	330
hexachlorobenzene	10	330
pentachlorophenol	50	1600
phenanthrene	10	330
anthracene	10	330
di-n-butyl phthalate	10	330
fluoranthene	10	330
pyrene	10	330
butyl benzyl phthalate	10	330
3,3'-dichlorobenzidine	20	660
benzo(a)anthracene	10	330
chrysene	10	330
bis(2-ethylhexyl)phthalate	10	330
di-n-octyl phthalate	10	330
benzo(b)fluoranthene	10	330
benzo(k)fluoranthene	10	330
benzo(a)pyrene	10	330
indeno(1,2,3-cd)pyrene	10	330
dibenz(a,h)anthracene	10	330
benzo(g,h,i)perylene	10	330
1-chloroanaphthalene	10	660
3-methylphenol	10	330
diphenylamine	20	1000
1,2-diphenylhydrazine	50	1600

Medium soil/sediment quantitation limits are 60 times the low soil/sediment quantitation limits.

TABLE B.6 QUANTITATION LIMITS FOR PESTICIDE ANALYSES IN SOIL AND WATER BY METHOD 8080

PARAMETER	WATER (ug/l)	LOW-LEVEL SOIL/SEDIMENT (ug/kg)
aldrin	0.4	63.2
alpha-BHC	0.3	47.4
beta-BHC	0.6	94.8
delta-BHC	0.9	142.2
gamma-BHC	0.4	63.2
chlordane	1.4	221.2
4,4'-DDD	1.1	173.8
4,4'-DDE	0.4	63.2
4,4'-DDT	1.2	189.6
dieldrin	0.2	31.6
endosulfan I	1.4	221.2
endosulfan II	0.4	63.2
endosulfan sulfate	6.6	1042.8
endrin	0.6	94.8
endrin aldehyde	2.3	363.4
heptachlor	0.3	47.4
heptachlor epoxide	8.3	1311.4
methoxychlor	18	2844
toxaphene	24	3792
arochlor-1018	1	158
arochlor-1221	1	158
arochlor-1232	1	158
arochlor-1242	1	158
arochlor-1248	1	158
arochlor-1254	1	158
arochlor-1260	1	158

TABLE B.7 REQUIRED QUANTITATION LIMITS FOR EXPLOSIVES IN SOIL AND WATER BY METHOD 8330*

PARAMETER	WATER (ug/l)	LOW-LEVEL SOIL/SEDIMENT (ug/g)
EXPLOSIVES		
HMX	0.50	2.2
RDX	0.85	1.0
1,3,5-TNB	0.55	0.25
1,3-DNB	0.25	0.25
Tetryl	0.70	0.65
NB	0.80	0.26
2,4,6-TNT	0.55	0.25
4-Am-DNT	–	–
2-Am-DNT	–	–
2,6-DNT	0.45	0.26
2,4-DNT	0.55	0.25
2-NT	0.70	0.25
4-NT	0.50	0.25
3-NT	0.50	0.25

* Quantitation limits revised from those shown in Method 8330.

TABLE B.8 QUANTITATION LIMITS FOR OTHER ANALYSES IN SOIL AND WATER

PARAMETER	WATER (mg/l)	LOW-LEVEL SOIL/SEDIMENT (mg/kg)
	METALS	
antimony	0.03	1.0
arsenic	0.01	1.0
barium	0.02	10.0
cadmium	0.005	1.0
chromium	0.01	1.0
lead	0.002	1.0
mercury	0.002	0.1
nickel	0.05	1.0
selenium	0.01	1.0
silver	0.07	1.0
thallium	0.01	1.0
	COMMON ANIONS	
nitrate	0.1	0.1
chloride	2.0	-
sulfate	2.0	-
	HERBICIDES	
2,4-D	0.01	1.0
2,4,5-TP	0.002	0.2
	MISCELLANEOUS	
total organic carbon	1.0	
total organic halogen	0.005	
phenols	0.002	

GUIDANCE FOR SUBMITTAL OF DATA ON ELECTRONIC MEDIA FOR THE TULSA DISTRICT HTRW PROJECT DATABASE

1. Required files, file formats, and data element descriptions are attached.

2. ASCII data may be submitted on 3.5" dos formatted diskettes or on 8mm tape using the UNIX TAR or CPIO utilities. Tape labels should include blocking factors and the UNIX command used to create the tape. If a compression utility is used, an executable of the utility should be provided.

2. All dates should be in the format YYMMDD. (920623 rather than 06/23/92).

3. The sample numbering system detailed in the work plan should be followed. As a minimum, all samples id's should contain at least three four character strings, with an additional two characters for qa and qc samples.

4. Data elements in each record may be separated by a ¦ or other special character. Padding data fields with blanks is neither required nor desired. Optionally, data may be submitted positionally. Positional data files must be acommpanied by a key indicating the beginning column for each data element.

6. All depth measurements should be expressed as positive numbers.

7. A diskette containing the following information is enclosed.

TULSADB.FIL	This document in WordPerfect 5.1 format
VALIDS.LST	A WP51 file containing a listing of the values contained in the List_Domain table of the Oracle database. The numbers in the left column equate to the numbers in the DOMAIN column of the wordperfect tables in this document.
ANALYTES	A WP51 file containing the CAS number and other accepted abbreviations. This is the information contained in the ANALYTE table of the Oracle database.

8. Point of Contact for electronic data submissions is Karla Fleming (918)-669-7157.

TABLE/COLUMN NAME	DESCRIPTION	DATA TYPE	DOMAIN
RESULTS TABLE	Analytical results for one or more analytes obtained from a single extraction and testing event. Each record provides the analytical results for a single analyte.		
analysis_method	Code identifying the analysis method used. This code, along with the lab_sample_id and run_number will link back to the appropriate test table record.	char 10	121200
result_flag	A coded value qualifying the analytical results field. Indicates whether the result was undetected, detected above or below the detection limit.	char 5	121700
detection_limit	Minimum detectable quantity of a parameter based on laboratory conditions, analytical method, or field conditions. This should account for any dilutions done on sample other than the normal dilutions called for in the analytical method.	numeric	
lab_sample_id	The sample id assigned by the performing laboratory, used with analysis method to link to cl_sample_id in the tests table.	char 20	
measured_value	Value for a given parameter (analytical result) reported in units consistent with the units of measurement code.	numeric	
review_qualifier	Coded values that are assigned during chemistry data validation (for example EPA qualifiers).	char 5	

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value_cas	The Chemical Abstract Services identifier for the analyte being reported. A code from the Analyte Domain Table is used for physical properties and compounds that do not have assigned CAS numbers.	char 12	
value_uom	Units of measure used to report the measured_value.	char 10	121600
qc_expected_result	The target value for a QC sample. Typically equal to the amount of standard spiked into the sample.	numeric	
run_number	Run number of the analysis if more than one run was made.	integer	
value_confidence	Confidence value associated with the reported measured value (eg: measured value plus or minus confidence interval).	integer	

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TABLE/COLUMN NAME	DESCRIPTION	DATA TYPE	DOMAIN
SAMPLE TABLE	Information regarding a water, soil or environmental sampling event. Each record provides data about the sampling of one environmental medium at one sampling location.		
sample_id	PTXss-hhhh-xaaa-bb The sample numbering system detailed in the work plan should be followed. As a minimum, all samples id's should contain at least three four character strings, with an additional two characters for qa and qc samples.	char 20	
loc_code	Unique identification assigned to each sampling location. Usually this is the same as the hhhh portion of the sample id. Links the sample table to the Location table.	char 10	
sample_date	Date that a sample was collected, field test performed, or a quality control sample created. Format is YYMMDD.	YYMMDD	
top-depth	Distance in feet from the surface elevation to the top of the sample.	numeric	
bottom_depth	Lower depth in feet at which a soil sample is collected for analysis, relative to ground surface.	numeric	
field_lot_number	The lot number is used to group together all field samples associated with or judged against a particular set of QC samples. This field is combined with the sample date for lot correlation.	char 19	
matrix	A code indicating the media sampled.	char 3	120900

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method	A code identifying the method used to collect a sample.	char 4	120800
qc_code	Identifies a QC sample type.	char 8	121000
sample_time	Time of day that a sample is collected, a field measurement is made or a quality control sample is created. Use 24 hour clock. Format is HHMMSS. Option field during testing of GIS. Will be a required field on future investigations.	HHMMSS	
collector	Name of the person who obtained the sample or created the quality control sample. Optional	char 24	
witness	Name of the person who witnessed the sampling or creation of the control sample. Optional.	char 24	
contractor	Identifier of the contractor performing the sampling event.	char 5	
remarks	Any remarks about the sample. Optional field	char 40	

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TABLE/COLUMN NAME	DESCRIPTION	DATA TYPE	DOMAIN
TESTS TABLE	Information relating a single sampling event to one or more sample extraction and analysis events. Each record describes a single extraction and analysis event for one environmental sample at one location.		
analysis_date	Date than analysis was performed. Format is YYMMDD.	YYMMDD	
analysis_time	Time that analysis was performed. Use a 24 hour clock, no colons. HHMMSS . For initial submissions this field is not being required, however we expect to make it mandatory in the future.	HHMMSS	
analysis_method	A code representing the method used to analyze for a given analyte.	char 6	121200
basis	A code indicating whether test results are reported on a wet or dry basis.	char 1	121400
cl_sample_id	The sample id assigned by the laboratory performing the test. This field links to the lab_sample_id in the results table.	char 20	
dilution_factor	A number representing the adjustment of the sample concentration. A dilution factor of 1 indicates no adjustment.	numeric	
extract_date	Date extraction was performed. Format is YYMMDD.	YYMMDD	
extract_method	A code representing the method used to extract or prepare a sample for a particular analysis.	char 6	121300
extract_time	Time extraction was performed expressed as HHMMSS using a 24 hour clock.	HHMMSS	

lot_control	The batch designator of an autonomous group of environmental samples and associated quality control samples analyzed by a test. This is equivalent to the EPA SW-846 concept of "analytical batch".	char 10	
pl_sample_id	This field will be the same as the sample_id in the sample table if the laboratory received the sample from the field. If the sample was received from another laboratory, this field will contain the sample identification assigned by the sending laboratory. This field links the test table to the sample table.	char 20	
lab_code	A code identifying the analytical laboratory performing the analysis of a sample.	char 4	
run_number	Run number of the analysis. Not required if only one run is reported.	integer	

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TULSA DISTRICT DATA DICTIONARY
ERMA DATABASE

TABLE/COLUMN NAME	DESCRIPTION	DATA TYPE	DOMAIN
LOG_RUN	General information about a logging run which is a collection of data by a logging tool.		
inspector	Name of the inspector on the job.	char 5	
loc_code	The location code identifying the well	char 10	Location Table
log_equip	A code indicating the type of log.	char 7	122300
lrsequency	Number of the logging run in the sequence of runs.	integer	
reference	Name of the place where the geophysical log is stored.	char 24	
remarks	Any remarks regarding the logging run.	char 240	
run_date	Date on which the logging run was performed.	integer	YYMMDD
svc_company	Code for the company performing the logging operation.	char 5	Contractor Table
tool_type	The type of geophysical tool used.	char 7	122400
witness	Name of witness to the logging run.	char 24	

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TULSA DISTRICT DATA DICTIONARY
ERMA DATABASE

TABLE/COLUMN NAME	DESCRIPTION	DATA TYPE	DOMAIN
BOREHOLE	Information about a borehole. The borehole table acts as an adjunct to the location table and a prerequisite to any well information tables.		
const_method	A code identifying the method used to construct the borehole.	char 2	121800
depth	Total depth of the borehole.	numeric	
deviation_code	A code identifying the direction of the deviation.	char 4	123500
diameter	Diameter of the borehole expressed in inches.	numeric	
drill_company	A code identifying the contractor drilling the borehole.	char 5	Contractor Table
start_date	Drilling start date	YYMMDD	
end_date	Date drilling was completed.	YYMMDD	
Loc_code	A code identifying the surveyed location at which the borehole was drilled.	char 10	Location Table

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TULSA DISTRICT DATA DICTIONARY
ERMA DATABASE

TABLE/COLUMN NAME	DESCRIPTION	DATA TYPE	DOMAIN
LOCATION	Information defining the general area where samples are to be taken.		
class	A code describing the location such as CH for channel, SW for surface water, WL for well, BH for borehole etc.	char 2	123200
loc_code	The unique identifier assigned to a location where samples are taken.	char 10	Location Table
coord_uncertainty	Resolution of the coordinate	char 1	123400
descript	Any additional information to describe a sampling or measuring location in text format. Example: "Monitoring well 10 feet NE of building 624.	char 240	
establish_company	Code for the organization which establishes a sampling or measuring location. Typically the primary contractor.	char 5	Contractor Table
establish_date	The date construction of a sampling or measuring location was completed.	YYMMDD	
latitude	Latitude coordinate. Optional	numeric	
longitude	Longitude coordinate. Optional	numeric	
easting	Easting coordinate. SPCS 1983 Texas Central	numeric	
northing	Northing coordinate. SPCS 1983 Texas Central	numeric	
proximity	A code indicating whether the sampling location is on or off a military base. Not required for Pantex.	char 1	123300
scode	SWMU code associated with this location.	char 12	SWMU Table

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surface_elevation	Elevation of ground surface for groundwater, soil or sediment sampling. Elevation of water surface for water sampling. Report in mean feet above sea level.	numeric	
survey_id	Survey license number.	Char 12	
survey method	A code indicating the method of survey used. Examples : survey, GPS, digitized, grid estimate.	char 4	124900

TULSA DISTRICT DATA DICTIONARY
ERMA DATABASE

TABLE/COLUMN NAME	DESCRIPTION	DATA TYPE	DOMAIN
WELL_ANNULUS			
descript	Any comments or a description of the annulus interval.	char 10	
diameter	The diameter of the annulus expressed in inches.	numeric	
fill_volume	The volume of material used to fill the annulus interval expressed in cubic inches.	numeric	
loc_code	The code used to identify the location of the annulus interval. This code also serves as a key to the well_construction table.	char 10	Location Table
material	A code identifying the material used as fill in the annulus interval.	char 3	122000
top_depth	The depth in feet from the surface elevation.	numeric	

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TABLE/COLUMN NAME	DESCRIPTION	DATA TYPE	DOMAIN
WELL_CASING	Information about the casing.		
inner_diameter	Inside diameter of the casing in inches.	numeric	
loc_code	The location identifier of the well being described. This value serves as a key to both the location and well_construction tables.	char 10	Location Table
material	A code indicating the type of casing material used.	char 15	123600
outer_diameter	Outside diameter of the casing in inches.	numeric	
segment_count	Number of casing segments. All segments must be of equal length.	integer	
segment_len	The length of the segments in feet.	numeric	
top_depth	The depth in feet from the surface elevation to the top of the casing.	numeric	

TABLE/COLUMN NAME	DESCRIPTION	DATA TYPE	DOMAIN
WELL_CENTRALIZERS			
depth	Depth in feet from the surface elevation to the well centralizers.	numeric	
loc_code	A code identifying the well location. Links this table to the Location table and the well construction table.	char 10	Location Table

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TULSA DISTRICT DATA DICTIONARY
ERMA DATABASE

TABLE/COLUMN NAME	DESCRIPTION	DATA TYPE	DOMAIN
TEST_PIT	Information about a test pit.		
loc_code	Identifies a surveyed location which can be associated to the test pit.	char 10	Location Table
tarea	Total calculated area of this test pit.	numeric	
tvol	Total estimated volume of test pit expressed in cubic yards.	integer	

TABLE/COLUMN NAME	DESCRIPTION	DATA TYPE	DOMAIN
WELL_CONSTRUCTION	General information about the construction of a well.		
completion_method	A code describing the method used to complete the well or the nature of the openings that allow water to enter the well.	char 2	120300
cover_type	A code for the type of cover placed on top of the well.	char 1	125500
geo_complete_zone	A code for the general hydrologic description of the well completion zone.	char 2	120400
loc_code	A code identifying the surveyed location of this well.	char 10	Location Table
number_posts	The number of protective posts placed on the pad at the top of the well.	integer	
pad_size	A description (eg. 5 X 4 feet) of the pad placed at the top of the well.	char 10	
pump_equip	A code identifying the type of pump used.	char 3	125600
remarks	Comments on the purpose of the well, construction of the well, or information identifying the geologic formation of the completion.	char 240	
riser_height	The height of the riser in feet above the top of the well.	numeric	
ss_aquifer	A code identifying the sole source aquifer in which the well was completed.	char 4	120500
sump_length	Length of the sump in feet.	numeric	
sump_material	A code for the sump material.	char 3	122200
well_type	A code describing the type of well (water supply, monitoring, etc.)	char 3	120200

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TULSA DISTRICT DATA DICTIONARY
ERMA DATABASE

TABLE/COLUMN NAME	DESCRIPTION	DATA TYPE	DOMAIN
WELL_SCREEN	Information about the well screen.		
diameter	Diameter of the screen in inches.	numeric	
loc_code	A code identifying the location of the well in which the screen is placed. This key serves as a key to the well_construction table.	char 10	Location Table
material	A code for the material used to make the screen.	char 6	121500
percent_open_area	Percent of screen that is open for flow.	numeric	
slot_size	Vertical size of the screen slot opening in inches	numeric	
stype	A code identifying the type of screen being used.	char 3	121900
top_depth	Depth in feet from the ground surface to the top of the screened interval.	numeric	
wslength	Length in feet of the screened interval.	numeric	

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TABLE/COLUMN NAME	DESCRIPTION	DATA TYPE	DOMAIN
WELL_STATUS	This table is used to track the changes in the status of the well. Each record represents a change in the status of a well. The end date of a status is assumed to be the same as the start date of the subsequent status.		
comments	Historical information relating to the well changes.	char 240	
loc_code	The unique code assigned to identify the well.	char 10	Location Table
start_date	Date on which the specific changes to the well began.	YYMMDD	
wsstatus	Well status code	char 4	120200

TULSA DISTRICT DATA DICTIONARY
ERMA DATABASE

TABLE/COLUMN NAME	DESCRIPTION	DATA TYPE	DOMAIN
CORE	Field and/or laboratory information associated with a core or sidewall sample.		
bottom_depth	The depth in feet from the location surface elevation to the bottom of the core.	numeric	
ctype	A code describing the type of core retried based on the standard core barrel sizes.	char 2	125200
diameter	Core diameter in units of inches.	numeric	
loc_code	The location code of the well.	char 10	Location Table
percent_recovered	Total length of core recovered in a core run divided by the total distance of the core run.	numeric	
rock_quality	The rock quality designation is obtained by counting the total number of core pieces greater than 4 inches in length divided by the total length of the core, in NX and larger sized cores.	numeric	
run_number	The number for the core run from which the sample was taken.	integer	
top_depth	The depth in feet from the location surface elevation to the top of the core.	numeric	

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APPENDIX C

INVESTIGATION DERIVED WASTE MANAGEMENT PLAN

009112

LONGHORN ARMY AMMUNITION PLANT

RI/FS WORKPLAN

INVESTIGATION-DERIVED WASTE

MANAGEMENT PLAN

PREPARED BY:

U.S. ARMY CORPS OF ENGINEERS
Tulsa District

JUNE 1992

PREPARED FOR:

Longhorn Army Ammunition Plant
Karnack, Texas

TABLE OF CONTENTS

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FIGURES

TABLES

1. __Introduction.__ Longhorn Army Ammunitions Plant (LHAAP) was placed on the National Priority List (NPL) in August 1990. This document will serve as an Investigations-Derived Waste (IDW) management plan for the investigations to be performed per the Remedial Investigations/Feasibility Study (RI/FS) Workplan under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Twelve locations have been identified as having 13 sites within the installation.

1.1. __Purpose of Management Plan__. The purpose of this plan is to describe the anticipated approach and procedures for IDW management. During the investigations,waste will be generated that may contain hazardous substances as defined by CERCLA, be characteristically hazardous under the Resource Conservation and Recovery Act (RCRA), listed hazardous waste under RCRA, or industrial solid waste. The intent of the IDW management is to leave the site in no worse condition after the investigation than existed prior to the investigation and to comply with ARARS to the extent practicable. In accordance with the guidance this document will be written as a stand-alone plan but will only provide the briefest details other than those specific to waste management. Detailed information about facility, the sites, and the investigations is provided in the Volume 1 of the RI/FS Workplan.

1.2. __IDW Management Approach__. The approach will be to utilize the Area of Contamination (AOC) unit concept as outlined in the EPA guidance document, __Superfund Management of Investigation-Derived Wastes During Site Inspections__, May 1991, (Appendix C-1). The most important elements of the IDW management approach as listed in the above referenced guidance are as follows:"

- Leaving a site in no worse condition than existed prior to the investigations.
- Removing those waste that pose an immediate threat to human health or the environment.

- Leaving on-site wastes that do not require off-site disposal or extended above-ground containerization.
- Storing on site waste that is contaminated but is not hazardous for treatment during the remedial action.
- Complying with federal ARARs, to the extent practicable.
- Complying with state ARARs, to the extent practicable.
- Careful planning and coordination for IDW management.
- Minimizing the quantity of generated wastes."

1.3. __Facility Description Summary__. LHAAP is a US Army facility with restricted access. It is located in the northeast corner of Harrison County of east Texas. The facility consists of 8,493 acres located between State Highway and the western shore of Caddo Lake. It's primary mission is to load, assemble, and packout pyrotechnic and illuminating/signal ammunition and solid propellant rocket motors. The facility was established in 1942 and has a long history of producing high explosives (HE), pyrotechnic and illuminating ammunition by various contractors.

1.3.1. __Climate.__ LHAAP is located in a moist, humid, mild climate and receives an average rainfall of 46 inches.

1.3.2. __Terrain__. It is situated on gently rolling land with an average slope of 3 percent. All surface water drains into Caddo Lake via four drainage systems across the facility.

1.3.3. __Regional Groundwater__. Groundwater is generally unconfined, it can vary in depth beneath land surface (BLS) from 1 to 20 feet and is approximately 120 to 130 feet thick.

1.4. Current Sites To Be Investigated. There are thirteen separate operable units located at twelve sites included in this investigation. The locations of the project sites are provided as Figure C-1. The LHAAP designation numbers and names of the thirteen sites are:

LHAAP 11 - Suspected TNT Burial Site at Avenues P & Q

LHAAP 13 - Suspected TNT Burial Site between the Old and Active Landfills/Acid Dump

LHAAP 14 - Area 54 Burial Ground

LHAAP 16 - Old Landfill

LHAAP 17 - Burning Ground No.2/Flashing Area

LHAAP 18 - Burning Ground No. 3 and Unlined Evaporation

LHAAP 24 - Pond/Rocket Motor Washout Lagoon (same site as LHAAP 18)

LHAAP 29 - Former TNT Production Area

LHAAP 12 - Active Landfill

LHAAP 32 - Former TNT Disposal Plant

LHAAP 01 - Inert Burning Grounds

LHAAP XX - Ground Signal Test Area

LHAAP 27 - South Test Area

1.5. Past investigations. The facility has been shown by past investigations to contain contaminated surface soils, sediment, vadose zone soils, groundwater, and surface water to varying degrees at the different sites as described in Volume 1. Table C-1 provides a brief summary of the highest concentrations of contaminants at the individual sites from past investigations.

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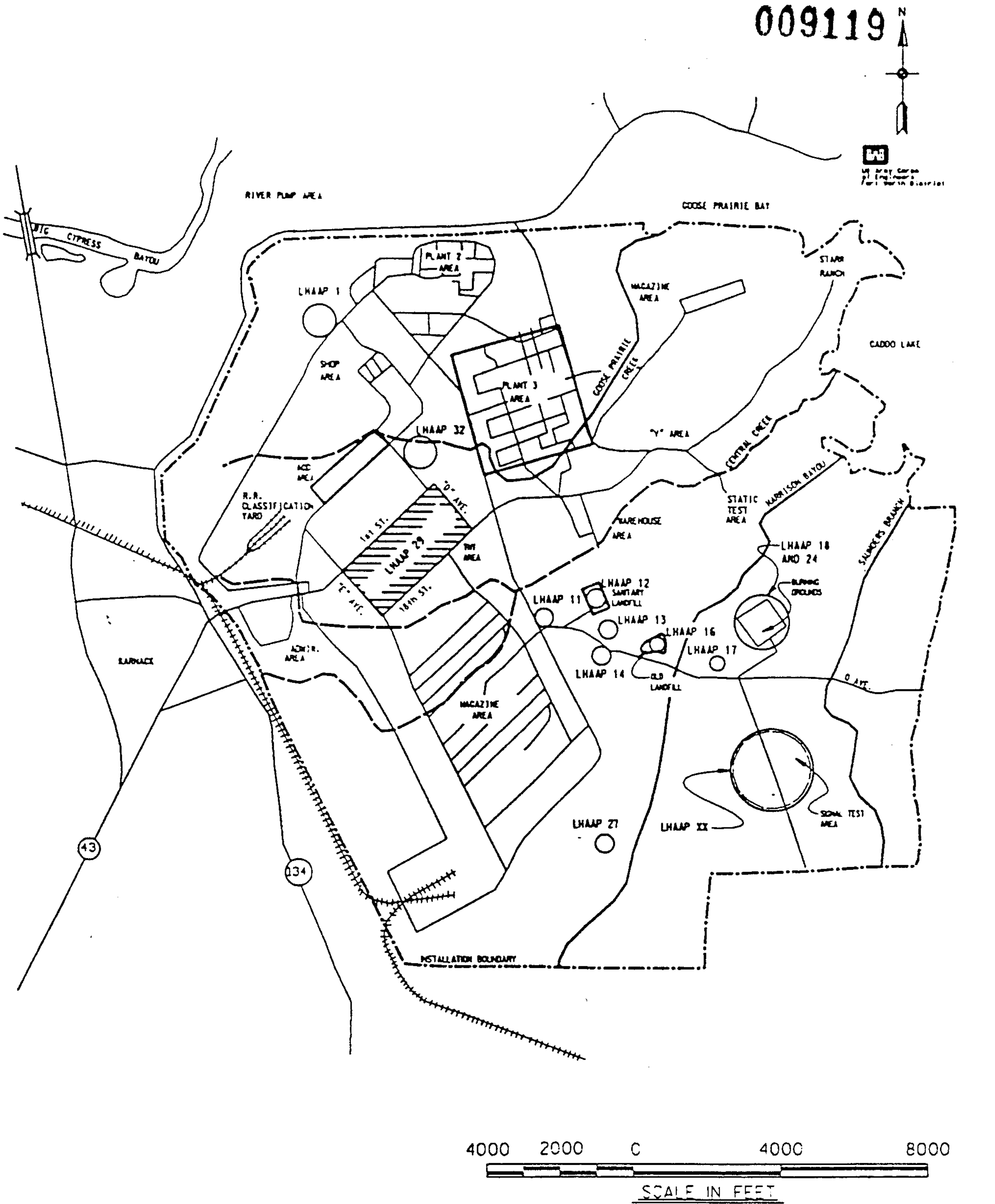

CORPS OF ENGINEERS
FORT WORTH DISTRICT
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
RI/FS WORK PLAN

LOCATION MAP FOR PROJECT AREAS

DATE: JUNE 1992	FIGURE C-1

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Table C-1
SITE PAST CONTAMINATION SUMMARY
LONGHORN RI IDW MANAGEMENT INFORMATION

LHAAP UNIT NO.	SITE NAME	SOIL CONTAMINATION TYPE (depth)	SOIL MAXIMUM CONC. (mg/Kg)	DEPTH TO GROUND WATER	GROUND WATER CONTAMINATION TYPE	GROUND WATER MAXIMU M CONC. (ug/l)
11	Suspected TNT Burial Site at Ave.'s P & Q	2,4,6,-TNT (2.5') 1,3,5-TNB (1.5')	1.86 117.0	3.0'	NO INFORMATION (NI)	NI
13	Suspected TNT Burial Site Between Old & Active Landfills/Acid Dump	(Suspected) 2,4,6,-TNT Acidic waste	NI	25.0'	NI	NI
14	Area 54 Burial Ground	Suspected Demolition Debris Explosives/Acidic waste	NI	24.0'	1,3,5-TNB (BH-12)	6.1
16	Old Landfill	1,3-DNB (sed./017) 2,6-DNT (sed./017) 2,4,6-TNT(sed./017) 1,3,5-TNB(SS/Q-II) 2,4,6-TNT(SS/704T) 2,4-DNT (15'/Q-IV) 2,6-DNT (10'/Q-IV) TCE (15'/Q-I) DCE (10'/Q-I) VCl (10'/Q-I) 1,1-DCA (15'/Q-IV)	12.2 15.0 3.9 0.153 13.6 73.0* 173.0 1.0 1.9 2.1 2.6	8.5'	Strontium (SW-017) Sulphate (SW-017) 2,6-DNT (MW-122) VCl (MW-122) Cadmium (MW-122) Chromium(MW-122) Barium (MW-122) Nitrate (BH-12) Phosphates (BH-13) Sulphate (BH-13) Stronium (BH-16)	80.0 8,170.0 8.6 10.5 6.84 55.8 217.0 1213.0 3930.0 122,000.0 1,790.0
17	Burning Ground No. 2 /Flashing Area	1,3,5-TNB /SS 2,4,6-TNT /SS 1,3-DNB /SS MEC /SS TCE /SS 1,4-DCB /SS 1,3-DNB (5') 2,4,6-TNT (5') 1,3,5-TNB (5') 2,4-DNT (5') 2,6-DNT (5') MEC (5') TCE (5') 1,4-DCB (5')	.127 .153 .180 .26 .53* .21 .470 .040 .060 .14* .053 .13 .56* .86	5.0'	Phenol (sw-016) Chromium (sw-016) Nitrate (sw-016) Sulphate (sw-016) Chloride (sw-016) MEC (mw130) Tetrahydrofuran (mw130) Chloride (BG-2) Strontium (BG-2) Chloroform (mw130)	14.0 34.5 940.0 10,500.0 4,000.0 153.0 46.0 2,348,000.0 1,116.0 16.0

Table C-1
SITE PAST CONTAMINATION SUMMARY
LONGHORN RI IDW MANAGEMENT INFORMATION

LHAAP UNIT NO.	SITE NAME	SOIL CONTAMINATION TYPE (depth)	SOIL MAXIMUM CONC. (mg/Kg)	DEPTH TO GROUND WATER	GROUND WATER CONTAMINATION TYPE	GROUND WATER MAXIMUM CONC. (ug/l)
18 & 24	Burning Ground No. 3 & Unlined Evaporations Pond/ Rocket Motor Washout Lagoon	Tetryl (8A-902, 14') TNT (8A-905, 8') MEC (8A-940, 10') TCE (8A-940, 4') 1,2-DCE (8A-902, 14') Toluene (8A-940, 4')	26.6 9.5 420.0 430.0* 153.3 34.0	22'	MEC (120) Acetone 1,2-DCE 1,2-DCA TCE (120) PCA Barium (MW-2) Chloride (MW-2) TOX (MW-2) Nitrates (123)	17,000,000.0 810.0 120.0 52.0 1,400,000.* 17,000.0 3,600.0 880,000.0 3,644,000.0 6,300.0
29	Former TNT Production Area	2,4,6-TNT (sediment) 1,3-DNB (SS) 2,4,6-TNT (SS) 1,3,5-TNB (SS) 2,4-DNT (SS) 2,6-DNT (SS) 1,3-DNB (1'-3.5') 2,4,6-TNT (2.5') 1,3,5-TNB (3.5') 2,4-DNT (1.5') 2,6-DNT (1-3.5')	0.78 0.52 7645.68 64.65 16.8* <0.61 <.01 .73 0.63 0.093 <.01	20'	2,4,6-TNT (SW) 2,4-DNT (SW) 2,6-DNT (SW) 1,3,5-TNB (MW-114 & 118) (All other groundwater samples below detection limit.)	206.9 23.4 13.6 1.4
12	Active Landfill	Sediment samples taken in 1991 investigations - no results over detection limits for explosives, VOC, and SVO.		12'-19'	1,3-DNB (BH-18) Aluminum (MW-103) Manganese (BH-17) Strontium BH-19) Chloride (BH-19) Sulphate (BH-18) Nitrate (BH-17) MEC (BH-17)	2.25 361.0 1,990.0 1,160.0 2,725,000.0 235,000.0 1,120.0 48.0
32	Former TNT Disposal Plant	Soil samples taken indicate no results over detection limits for explosives.		10'	2,4,6-TNT (SW)	7.6

Table C-1
SITE PAST CONTAMINATION SUMMARY
LONGHORN RI IDW MANAGEMENT INFORMATION

LHAAP UNIT NO.	SITE NAME	SOIL CONTAMINATION TYPE (depth)	SOIL MAXIMUM CONC. (mg/Kg)	DEPTH TO GROUND WATER	GROUND WATER CONTAMINATION TYPE	GROUND WATER MAXIMUM CONC. (ug/l)
1	Inert Burning Grounds	Soil samples taken indicate no results over detection limits for explosives and anions. No high samples were reported for metals. Nitrate (103) Sulphate (103)	 8.33 40.48	5'	1,3,5-TNB (104) Nitrobenzene (104) Strontium (104) Chloride (104) Nitrate (104) Sulphate (104) No VOC's or SVO detected.	9.74 1.82 96.0 8,000.0 3,500.0 5,710.0
xx	Ground Signal Test Area	Soil samples taken indicate no results over detection limits for explosives and anions.No high results were reported for metals. Aluminum (0102)	 1,435.0	10'-15'	Manganese (127) Strontium (104) Chloride (104) Sulphate (104) No Explosives, VOC's or SVO detected.	1,860.0 4,120.0 1,000,000.0 1,622,000.0
27	South Test Area	2,4,6-TNT (0401)	10.15	4'	Aluminum (MW-132) Manganese (MW-132) Strontium (MW-127) Chloride (MW-131) Sulphate (MW-132)	232.0 1,448.0 2,640.0 1,850,000.0 337,000.0

DCA = dichloroethane
DCB = dichlorobenzene
DCE = dichloroethene
DNB = dinitrobenzene
DNT = dinitrotoluene
MEC = methylene chloride
PCA = tetrachlorethane
TCE = trichloroethylene
TNB = trinitrobenzene
TNT = trinitrotoluene

VCl = vinyl chloride
VOC = volatile organic carbons
SVO = semivolatile organic carbon
TOX = total organic halides
MW = monitoring well
SB = soil boring
NI = no information available
* = concentration greater then the TCLP regulatory limits

1.6. Site Descriptions.

1.6.1. (11) Suspected TNT Burial Site at Ave.'s P & Q. This site consists of a cleared, grassy area at the intersection of two roads. The site was reported by USATHAMA as a possible burial site used to dispose of TNT in the 1940's. A borrow pit was later created in the central part to the wooded area north of the site, leaving a depression approximately 5 feet deep. This depression is apparent in aerial photographs taken in 1963, is inactive at present, and is not a candidate for the investigation. There is no operational activity presently scheduled at the suspected burial site.

The explosive compounds 2,4,6-TNT and 1,3,5-TNB have been found in soils at this site down to at least 5-foot depths, the maximum depth sampled. Maximum concentrations were 1.86 ug/g of TNT and 117 ug/kg of TNB.

1.6.2. (13) Suspected TNT Burial Site Between Old & Active Landfills/Acid Dump. This site is located in a clearing in a heavily wooded area immediately south of a power line easement. Based on conversations with employees at LHAAP, there was a suspected one-time disposal of TNT and/or acid at this site. No other known or suspected disposals have occurred.

The site contains a number of bare patches that support little of no vegetation. The patches vary in size from 1 to 10 feet in diameter. The three larger bare patches stand out very well in the surrounding grass which is 1 to 2 feet tall. Based on the presence of the bare patches it appears reasonable to suspect something may have been disposed of at these locations which is preventing the native grasses from re-establishing themselves.

The site has not been previously investigated. Based on the statements of plant employees and the continued presence of bare spots at the site, it is reasonable to investigate the site for possible soil and groundwater contamination due to the suspected burial of explosives and associated wastes, or the possible dumping of pesticides, herbicides, or acids.

1.6.3. (14) Area 54 Burial Ground. This site is approximately 150 feet in size and contains a small 25 by 30 foot asphalt parking lot. It was reportedly used during the 1940's and early 1950's for the disposal of demolition debris, explosives, and acids. The parking lot may cap the burial pit.

The site has not been previously investigated. Based on the statements of plant employees and the presence of contaminants which have been found near the site, possible soil and groundwater contamination will be investigated for explosives, demolition debris, and acids.

1.6.4. (16) Old Landfill. This site is defined as an open area bounded along the western and northern edges by a gravel road and along the eastern and southern edges by a wooded area. A large rectangular paved area that is designated as the Retail Sales Area for LHAAP is located on the western edge of the site. In the past, equipment auctions were held at this location. A tributary of Harrison Bayou runs closely along the eastern edge of the site.

The Old Landfill area was used for the disposal of inert materials and mission related hazardous wastes. The area was used to dispose of TNT redwater ash material from 1942 to 1944. In the mid to late 1950's, three rocket motor casings were burned and possibly buried on the eastern side of this landfill. A large bermed depression, once located near the center of the Old Landfill, served as an all-purpose junkyard for the disposal of such materials as substandard TNT, barrels of chemicals, oil, paint, scrap iron and wood. This area was filled in and the pond no longer exists. The landfill operation started at original ground level at the north-south mid-line of the site and ended 15 feet above original grade at the eastern edge of the site. Currently, all inert solid wastes are disposed of in the Active Landfill located elsewhere on the installation. The Old Landfill site is now used for the deposition of inert rubble only.

Soil contamination due to explosives has been verified at the site to depths of at least 15 feet. Sediments in the adjacent tributary to Harrison

Bayou also are contaminated with explosive compounds. No explosives have been detected in groundwater downgradient of the site, and none have been found in surface waters. The only contaminant exceeding TDH drinking water standards identified in the groundwater downgradient of the landfill is cadmium. Major contaminants and their maximum concentrations are presented in Table C-1. Reference: Longhorn Army Ammunition Plant RI/FS Workplan, Volume 1, February 1992.

1.6.5. (17) Burning Ground No. 2 /Flashing Area. This site is situated within a heavily wooded section of LHAAP. It consists of two 185 by 305 foot cleared areas separated by a gravel entrance road. The east area of the entrance road was once fenced, and the area west of the road is open. Harrison Bayou flows approximately 1200 feet northwest of the site.

Burning Ground No. 2 was used for burning bulk TNT, photo flash powder, and reject material when LHAAP was operated by Universal Match Corporation. Although it has been reported that bulk TNT was uncovered at the site in 1954, there is no documentation to support bulk TNT burial at the site. In 1959, all of the materials removed from the TNT Production Area (LHAAP 29) during razing were burned or flashed at this site. A 1958 aerial photograph shows a possible man-made pond on the western side of the road entering the site. This depression does not appear in 1954 or 1963 photos. There are no records of the pond's existence or the nature of its use over this 9 year period other than the 1958 photo. It is suspected that this was a burn pit or trenching operation. The site was used until 1980 as a flashing area to decontaminate recoverable metal by products. Burning trenches were located around the inside perimeter of the fenced area. As each trench filled with ash, the trench was covered and a new trench was dug. The waste residues were reportedly removed in 1984 and the site was allowed to revegetate. The site is presently inactive.

Soils at the location of the suspected pond have been identified as being contaminated with explosives, metals, and trace amounts of volatile organic compounds to a depth of at least 5 feet, the maximum sampling depth. Although a monitoring well exists downgradient of the previously fenced flashing area, it is inconclusive whether groundwater has been impacted. It is possible that explosive residues and other contaminants may be present in the surface soils of old burn trenches that have not been investigated. Some of the significant contaminant maximum concentrations found at the site are presented in Table C-1. Reference: Longhorn Army Ammunition Plant RI/FS Workplan, Volume 1, February 1992

1.6.6. (18 & 24) Burning Ground No. 3 & Unlined Evaporations Pond/Rocket Motor Washout Lagoon. Burning Ground No. 3 is a fenced 34.5 acre secured area currently used for the disposal of explosives and explosive-contaminated wastes through open burning. It is a cleared area within a heavily wooded section of LHAAP. The UEP, now closed and capped, is located in the northern corner of Burning Ground No. 3. Harrison Bayou flows within 1,000 feet of the western edge and within 500 feet of the northern edge of the burning grounds site.

Burning Ground No. 3 has been in operation since 1955. The area has been used for the treatment, storage, and disposal of solid and liquid explosive, pyrotechnic, and combustible solvent wastes by open burning, incineration, evaporation, and burial. Historical waste management units include open burning pits, an unlined evaporation pond (UEP), stockpiles of solvent soaked sawdust, and suspected waste burial pits. The UEP was constructed at the burning grounds in 1963 as a holding pond to store explosive wastes resulting from the washout of rocket motor casings, which was performed at the northern corner of the pond. In 1973, the pond also began receiving wash water containing solvent residues and solids collected from LHAAP operations involving pyrotechnic material preparation and mixing. Sawdust soaked with methylene chloride and other solvents that were used to clean and scour mixers used for mixing illuminants were stockpiled along the southern berm of the pond as well as burned in trenches in the western portion of the burning ground. An air curtain destructor (ACD) was built in 1979 in the western corner of the burning grounds for the purpose of disposing of explosive and explosive-contaminated wastes by burning. Use of burn pits and trenches was reportedly discontinued in 1984. Use of the UEP was discontinued in 1984 when it was discovered that the pond was contaminating groundwater beneath the site. The UEP was closed as a RCRA interim status surface impoundment in 1986 by removing all waste and capping the impoundment. As part of the INF Treaty activities being conducted at LHAAP, a burn cage was added in 1989 for the open burning of Pershing II missile motors. Current operations include disposal of explosive and explosive-contaminated wastes by burning in the ACD, three open burning cages, and two open burning pans, as well as a burn cage for Pershing II motor elimination.

A summary of the major contaminants detected in groundwater and their maximum concentrations is provided in Table C-1. Contaminants found in shallow soils include tetryl (26.6 ug/g), TNT (5.7 ug/g), and reportedly high concentrations of unspecified volatile compounds.
Reference: Longhorn Army Ammunition Plant RI/FS Workplan, Volume 1, February 1992.

1.6.7. <u>(29) Former TNT Production Area</u>. The Former TNT Production Area is an 85-acre site located in the west central portion of LHAAP. With the exception of the former Bulk Toluene Storage Area, the site is bounded by Avenue E on the southwest, 1st Street on the northwest, 18th Street on the southeast and Avenue D on the northeast. The Former Bulk Toluene Storage Area, once a part of the TNT production area, is a 500 by 500 foot area located across Avenue D from the production area. It is a wooded area bounded by 33rd Street on the north and Avenue D on the west.

The Former TNT Production Area operated from April 1943 until August 1945 as a six line plant with a supporting acid plant which produced over 180 million kg of TNT. All six production lines, lines A through F, operated throughout this period with line F used as a reserve line for production when other lines were inactive. Redwater from the wash houses associated with each of these lines flowed via underground wood stave pipelines to a pumphouse located on the northern end of the site adjacent to 16th Street, and then on to the TNT Waste Disposal Plant. Cooling water (blue water) drain lines from the former production lines flow to the northeast and empty into an open ditch alongside 16th Street approximately 550 feet from Avenue D. A toluene bulk storage facility, servicing the TNT production operation, was located across Avenue D from the production area. The TNT production plant was not operated after World War II and was razed, except for foundations, in 1959. There are presently no industrial activities conducted in these two areas.

The site contains high levels of TNT in the surface soil. Explosives were also found in sediments and surface water drainage from the production area site. The abandoned Bulk Toluene Storage Area has not been investigated. Explosives have been identified in soils down to at least 42 inches at random locations across the production area site. Pieces of crystallized DNT have been found in the abandoned cooling water drain line and where the line discharges into an open ditch. Two locations have been identified where sediments are contaminated with 2,4,6-TNT. One of these locations also had surface water contaminated with low levels of various explosive compounds. Groundwater has apparently not been impacted by soil contamination at the production area site. It is not known if contamination from the bulk storage of toluene at the storage area exists. Major contaminants and their maximum concentrations are provided in Table C-1.

Reference: Longhorn Army Ammunition Plant RI/FS Workplan, Volume 1, February, 1992.

1.6.8. <u>(12) Active Landfill</u>. The Active Landfill is located in the central portion of LHAAP. The center of the site is about 1,700 feet east-northeast of the intersection of Avenue P and Avenue Q. The entrance to the site's graveled access road is on Avenue Q about 0.2 mile east of Avenue P.

Aerial photography taken in 1954 reveals the construction of a diversion ditch between Central Creek and one of its principal tributaries which collects surface runoff from the southern part of the Magazine Area. The apparent purpose of the ditch was to divert flow in the area where a railroad crossed the tributary system, eliminating the need for a bridge. The diversion ditch remained functional until 1963 when aerial photography shows waste material disposed in the ditch system. 1970 photographs show that enough waste material had been disposed to block the flow of the system, but the site appeared to be inactive. Sometime between 1970 and 1978, the site was reactivated for waste disposal. By 1978 the entire ditch system had been filled with waste material and an adjacent undisturbed hillside had also been used for disposal. Since 1978, the site has been in continuous use for disposal of industrial solid wastes generated at LHAAP. An area southeast of the original ditch system has been cleared and is now used for the disposal of non-hazardous combustible and non-combustible wastes. The types of waste disposed of at this site since 1963 are largely unknown. It is possible that the Active Landfill site has been used for the disposal of similar wastes which were disposed of at the Old Landfill which include substandard TNT, barrels of chemicals, oils, paints, scrap iron, and wood.

The site contains elevated concentrations of metals in the soil and groundwater along with trace amounts of 1,3-DNB at one monitoring well location and volatile organics at three locations. Major contaminants and their maximum
Reference: LHAAP RI/FS Workplan, Volume 1, February 1992.

1.6.9. <u>(32) Former TNT Disposal Plant</u>. The site is situated in the west central portion of LHAAP and is located approximately 400 feet northwest of Avenue C and 600 feet southeast of 6th Street.

The Former TNT Waste Disposal Plant was constructed in 1942 to treat and dispose of wastewaters generated at the nearby Former TNT Production Area (LHAAP 29). The disposal plant was operated by Monsanto Chemical Co. from April 1943 until August 1945 and disposed of wastewaters resulting from the production of over 397 million pounds of 2,4,6-TNT. The plant was not operated after August 1945. In 1959, most of the buildings and tanks used in the disposal process were removed, leaving only the concrete foundations, access roads, underground utilities, and constructed surface water drainage. The disposal process involved neutralization and storage of the waste until it could be burned by incineration.

Explosive compounds were not detected at the site with the exception of 7.6 ug/l of 2,4,6-TNT found in surface water adjacent to the former Neutralized Wastes Storage Tank. Concentrations of aluminum, chromium, lead, manganese, and nickel are also present in surface water above local background levels. Major contaminants and their maximum concentrations are provided in Table C-1. Reference: Longhorn Army Ammunition Plant RI/FS Workplan, Volume 1, February 1992.

1.6.10. (1) Inert Burning Grounds. This site is situated in the extreme northwestern portion of LHAAP. The center of the site is at least 2,000 feet from the LHAAP boundary and approximately 400 feet west of the intersection of Avenue P and 32nd Street.

The Inert Burning Grounds was originally used during World War II by Monsanto Chemical Company for burning trash, ashes, scrap lumber, and waste from burned 2,4,6-TNT. Bulk 2,4,6-TNT may also have been burned at the site. The site was not used between August 1945 and February 1952 when LHAAP was is a standby status. Universal Match Corporation later used the site to burn wastes, including photo flash powder, for a few years during the 1950's until most burning operations were transferred to the Burning Ground No. 2/Flash Area (LHAAP 17). Intermittent, small-scale burning may have continued into the early 1960s. Burn residues were most likely not removed. It is also suspected that some wastes may have been dumped without burning and were subsequently covered by or mixed with fill material.

Previous investigations indicate elevated levels of metals in the soil and groundwater. Explosives nitrobenzene and 1,3,5-TNB exceed background levels in the groundwater at concentrations of 1.82 and 9.74 ug/l respectively. Major contaminants and their maximum concentrations are provided in Table C-1. Reference: Longhorn Army Ammunition Plant RI/FS Workplan, Volume 1, February 1992.

1.6.11. (xx) Ground Signal Test Area. This site is located in the southeastern portion of LHAAP. Access to the site is provided by an asphalt gravel road that intersects Long Point Road just east of its intersection with Avenue Q.

The Ground Signal Test Area is currently used for aerial and on-ground testing of various pyrotechnic, illuminant, and signal devices manufactured at LHAAP. Since late in 1988, the site has also been used for the burn-out of Pershing missile rocket motors destroyed in accordance with the INF Treaty.

The site has been used intermittently since April 1963 for aerial and on-ground testing and destruction of a variety of devices, including red phosphorus smoke wedges, infrared flares, illuminating 60 and 81 mm mortar shells, illuminating 40 to 155 mm cartridges, button bombs, and various types of explosive simulators. Prior to 1963 the site was used intermittently for testing and burn-out of rocket motors from Nike-Hercules, Pershing, and Sargent missiles. In 1970 a rocket motor was inadvertently destroyed when it exploded in the center of the site. Debris from the explosion was placed in the crater and backfilled.

Previous investigations indicate elevated levels of metals in the soil and groundwater. No detectable levels of explosives or organics where found at the site. Major contaminants and their maximum concentrations are provided in Table C-1.

Reference: Longhorn Army Ammunition Plant RI/FS Workplan, Volume 1, February 1992.

1.6.12. (27) South Test Area. This site is located in the south central portion of LHAAP. The earthen test pad is approximately 2,000 feet southeast of Avenue P and the Magazine Area. A deteriorated asphalt and gravel road runs from the entrance to the Test Pad. The concrete bunkers and Observation Building are situated alongside the road about halfway between the entrance and the Test Pad. A circular, 50 foot wide fire lane with a 2,000 foot diameter is centered at the Test Pad. The fire lane is now overgrown with brush and small trees.

The South Test Area was constructed in 1954 and was used by Universal Match Corporation for testing photo flash bombs that they produced at LHAAP until about 1956. The bombs were tested by exploding them in the air over an elevated, semi-elliptical earthen Test Pad with the floodplain of Harrison Bayou. During the late 1950s, illuminating devices were demilitarized within pits excavated in the vicinity of the Test Pad. During the early 1960s, leaking 3 to 4 pound canisters of white phosphorus were possibly demilitarized in the vicinity of the Test Pad. In the early 1980s photo flash cartridges were demilitarized in an area just east of the Observation Building.

Aerial photographs taken in 1954 when the area was under construction indicate an area of apparent vegetation distress. This area may have been used for toxic waste disposal during early stages in construction. The vegetation distress has persisted for over 37 years.

Previous investigations indicate elevated levels of metals in the soil along with low levels of 2,4,6-TNT. Elevated levels of metals are also present in the groundwater along with trace amounts of semivolatile organic compounds. Major contaminants and their maximum concentrations are provided in Table C-1. Reference: Longhorn Army Ammunition Plant RI/FS Workplan, Volume 1, February 1992.

1.7. Investigation Summary. This IDW Management Plan pertains to the following investigations:

- Soil sampling from bore holes at 76 locations
- Soil sampling from monitoring well bore holes at 21 locations
- Groundwater sampling from the 68 soil borings
- Groundwater sampling from the 21 new wells and the 56 existing monitoring wells for a total of 77 samples
- Surface water sampling from 63 locations

TABLE C-2
LONGHORN ARMY AMMUNITION PLANT
GROUP NO. 1 SITES
PHASE 2 REMEDIAL INVESTIGATION
INVESTIGATION DERIVED WASTE SUMMARY

LHAAP Unit No.	Site Name	Investigations						Estimated Waste Quantities (Drums)			
				Samples							
		Monitoring Wells (depth)	Borings (depth)	Sediment	Soil	Groundwater	Surface Water	Soil Cuttings	Purge Water	Decon Water	PPE & Disp. Equipment
11	Suspected TNT Burial Site	3 (20')	0	0	0	3 (MW)	0	6	12	3	1
1/1A	Inert Burning Grounds	1 (10')	0	3	6 (0-6")	1 (MW)	0	1	4	2	1
XX	Ground Signal Test Area	1 (20') (optional)	1 (10')	0	0	1 (MW) (optional)	0	1 (SB) 2 (optional)	4 (optional)	2	1
27	South Test Area	4 (20')	0	0	3 (0-6")	4 (MW)	0	8	16	5	1
TOTALS		9	1	3	9	9	0	18	36	12	4

009133

2. Waste Description.

2.1. Types and Estimated Quantities of IDW. Table C-2 provides a listing of the estimated waste quantities for each site and the sections below provide a description and total amount for each type.

2.1.1. Drill Cuttings. The drill cutting will consists of soil removed from borings and monitoring well installations. All of the bore holes will be drilled at least 2 feet into the saturated groundwater zone. To prevent spread of contamination the bore holes will be grouted after soil and bore hole water sampling. All borings and monitoring wells will be drilled in the AOC's with the exception of the background investigations that by nature is not expected to be contaminated. No borings or monitoring wells are planned for outside the facility. A total of 30.44 cubic yards of drill cuttings are expected to be generated.

2.1.2. Purge and Development Water. The new monitoring wells will be purged of at least 5 volumes of water during development and an additional five volumes of water prior to sampling new and existing monitoring wells as described in the CDAP, section 4.5. The soil borings will not be purged for water sampling. This water will be taken directly from the saturated groundwater zone. A total of 40,120 gallons of purge and development water is expected to be generated.

2.1.3. Decontamination Fluids. The drilling equipment will be decontaminated between each hole as described on page 23 of the CDAP.

Purging equipment will be scrubbed and rinsed with Type II reagent grade water each it is used.

Sampling equipment will be washed with a non-phosphate detergent, tap water, distilled water, and hexane, in that order, allowed to air dry, and sealed back in clean containers prior to use.

Personnel decontamination will be minimal with the use of disposable suits, gloves, and boot covers. A boot wash will be utilized, if chemically resistent boots (rather than covers) are used. If PPE Level C or higher is implemented additional decontamination washes will be utilized.

A total of 6,493 gallons of purge and development water is expected to be generated.

2.1.4. Personnel Protective Equipment (PPE). A modified Level D PPE will initially apply for all intrusive investigations. This is described in detail in the Site Safety and Health Plan in Volume III of this workplan. Disposable items will include the following items:

- Tyvek full body coveralls
- Chemically resistant surgical type gloves (inner)
- Cotton work gloves (outer)
- Chemical resistent boot covers
- Respiratory dual cartridge filters for air purifying and a combination organic vapor/HEPA filter (respirators will be added if needed based upon the air monitoring action levels)

A total of 446 20 gallon plastic bags are expected to be generated.

2.2. IDW Applicable of Relevant and Appropriate Requirements (ARARs). A comprehensive list of ARARs is presented in Section 7 of the Workplan.

2.3. Methods for Characterizing RCRA Hazardous/Non-hazardous IDW. The primary method for characterizing the IDW has been review of historical use of the sites and past investigation results. For LHAAP 13 that has no past investigation the assumption was made that the waste would be similar to LHAAP 11 and 14. Past experience and professional judgement was also utilized. All liquid waste will be tested for TCLP parameters to determine if it is characteristically hazardous.

3. <u>Area of Contamination Description</u>. The Area of Contamination (AOC) Unit is a boundary to the waste unit and the surrounding contamination present in the soil, groundwater, sediment, and surface water. This provides a conceptual area in which investigations activities, storage and storage of IDW will not degrade the site so as to increase the hazard to human health and the environment. This provides a mechanism for practical and efficient investigation without negative impact to the environment. Figure C-2 shows the entire facility with the site locations and the seven AOC's.

3.1. <u>AOC-A</u>. Figure C-3 shows the AOC-A with the LHAAP 1 investigations.

3.2. <u>AOC-B</u>. Figure C-4 shows the AOC-B with the LHAAP 32 investigations.

3.3. <u>AOC-C</u>. Figure C-5 shows the AOC-C with the LHAAP 29 investigations.

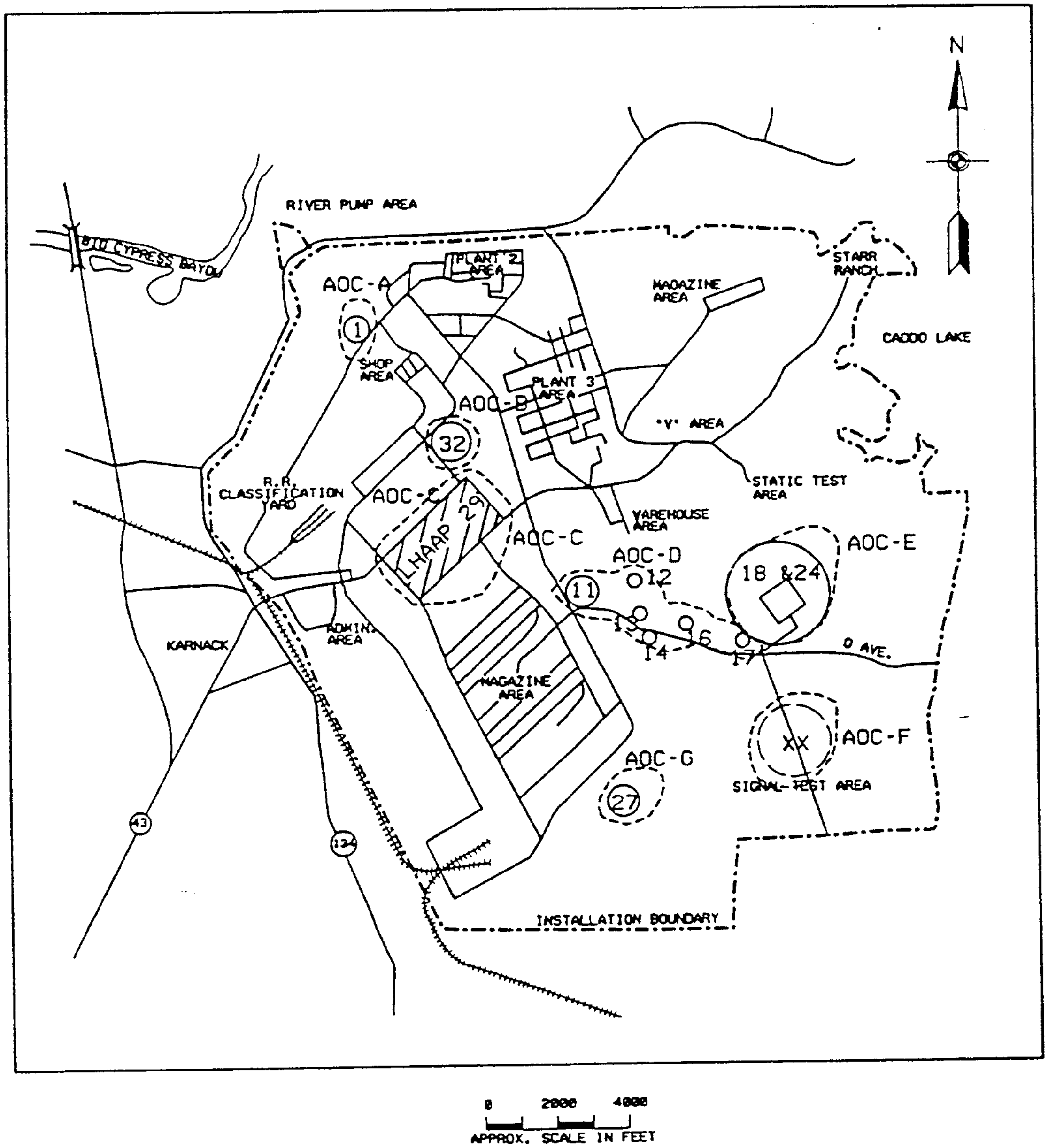
3.4. <u>AOC-D</u>. Because LHAAP 11, 12, 13, 14, 16, and 17 are so physically close together and extent of spread of contamination is unknown, these 6 sites were included in one AOC unit. Figure C-6 shows the AOC-D with the LHAAP 11 investigations. Figure C-7 shows the AOC-D with the LHAAP 12 investigations. Figure C-8 shows the AOC-D with the LHAAP 13 investigations. Figure C-9 shows the AOC-D with the LHAAP 14 investigations. Figure C-10 shows the AOC-D with the LHAAP 16 investigations. Figure C-11 shows the AOC-D with the LHAAP 17 investigations.

3.5. <u>AOC-E</u>. Figure C-12 shows the AOC-E with the LHAAP 18 & 24 investigations.

3.6. <u>AOC-F</u>. Figure C-13 shows the AOC-F with the LHAAP XX investigations.

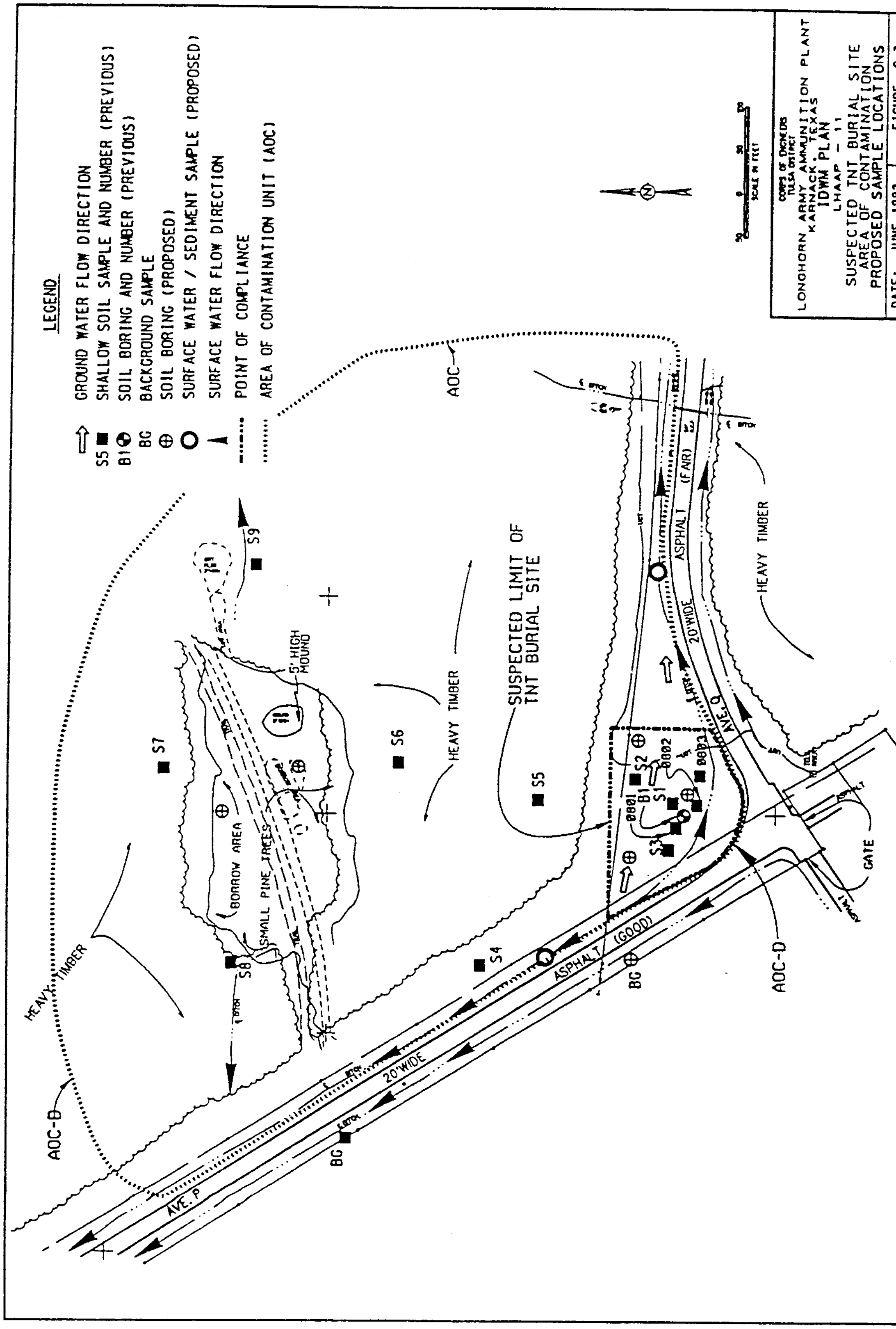
3.7. <u>AOC-G</u>. Figure C-14 shows the AOC-G with the LHAAP 27 investigations.

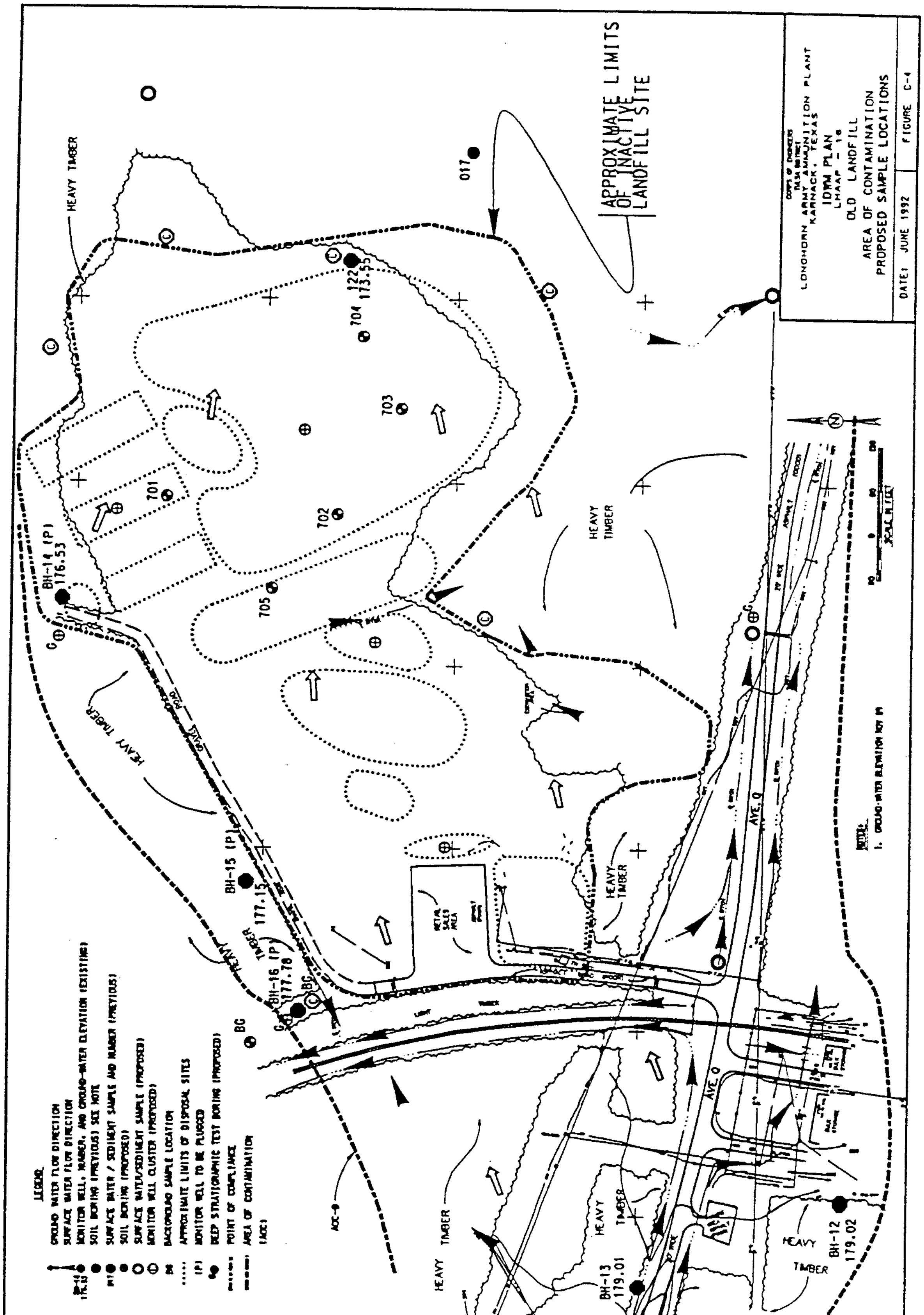
009137

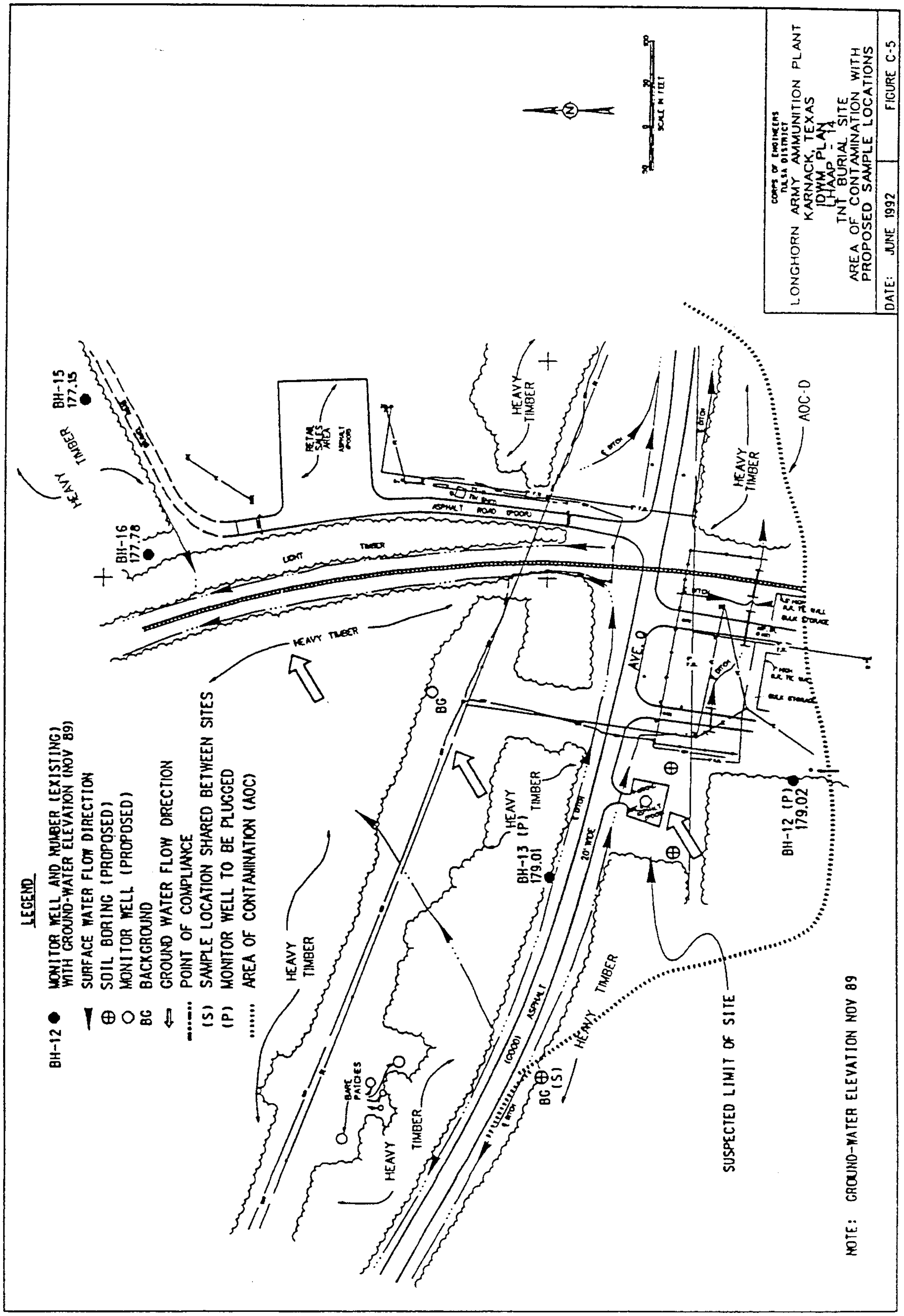


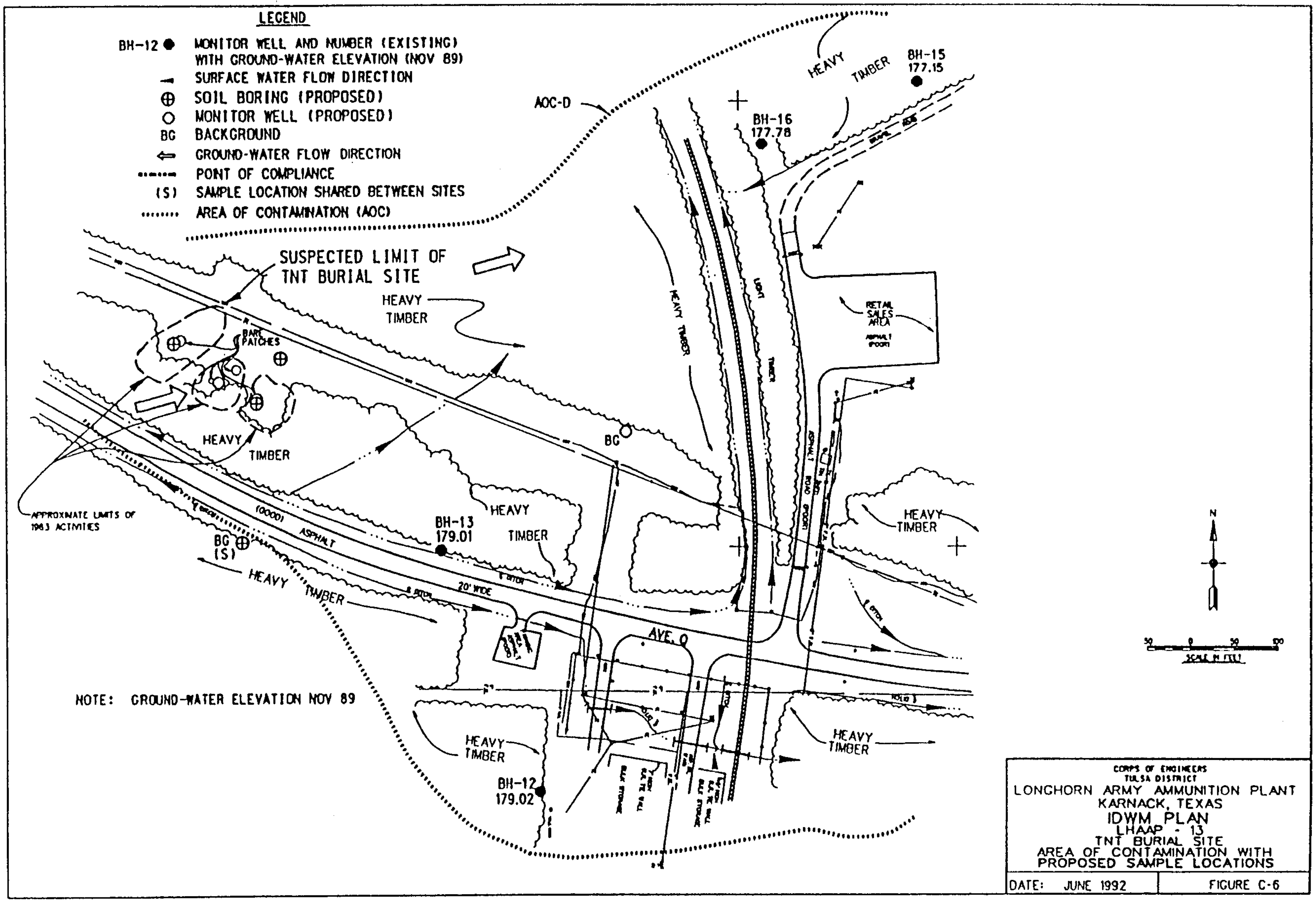
LONGHORN ARMY AMMUNITION PLANT
RI/FS WORK PLAN
LOCATION MAP FOR AREA OF CONTAMINATION UNITS
WITH LHAAP CERCLA SITES
IDW MANAGEMENT PLAN

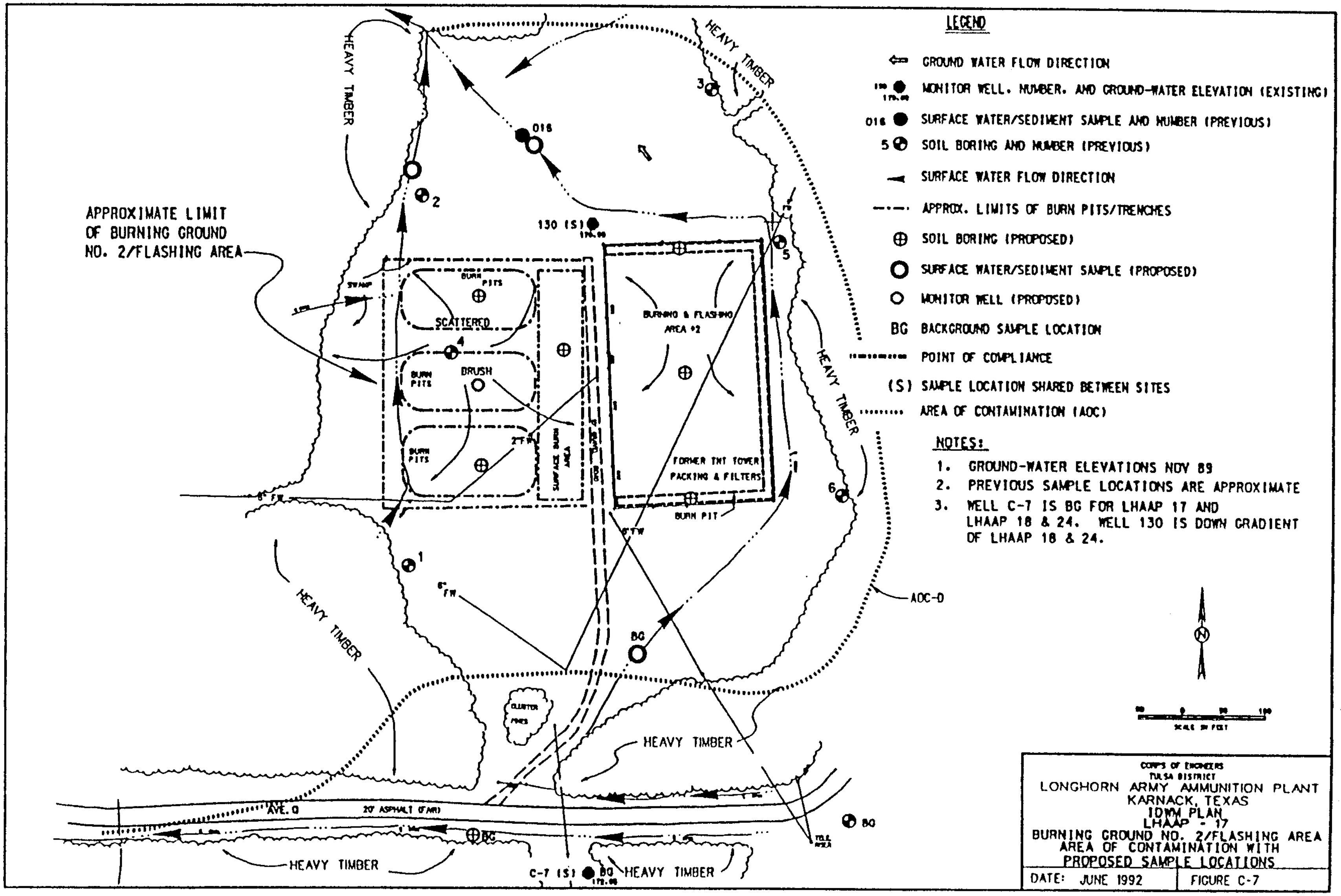
FIGURE C-2


LEGEND
GROUND WATER FLOW DIRECTION
S5 ■ SHALLOW SOIL SAMPLE AND NUMBER (PREVIOUS)
B1 SOIL BORING AND NUMBER (PREVIOUS)
BG BACKGROUND SAMPLE
SOIL BORING (PROPOSED)
SURFACE WATER / SEDIMENT SAMPLE (PROPOSED)
SURFACE WATER FLOW DIRECTION
POINT OF COMPLIANCE
AREA OF CONTAMINATION UNIT (AOC)
SUSPECTED LIMIT OF TNT BURIAL SITE
HEAVY TIMBER
BORROW AREA
SMALL PINE TREES
5' HIGH MOUND
AOC
AOC-D
ASPHALT (GOOD)
ASPHALT (FAIR)
20'WIDE
AVE. P
AVE. Q
GATE
S1
S2
S3
S4
S5
S6
S7
S8
S9
B1
BG
0001
0002
0003
SCALE IN FEET
CORPS OF ENGINEERS
TULSA DISTRICT
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
IDWM PLAN
LHAAP - 11
SUSPECTED TNT BURIAL SITE
AREA OF CONTAMINATION
PROPOSED SAMPLE LOCATIONS
DATE: JUNE 1992
FIGURE C-3


APPROXIMATE LIMITS OF INACTIVE LANDFILL SITE
CORPS OF ENGINEERS TULSA DISTRICT
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
IDWM PLAN
LHAAP - 16
OLD LANDFILL
AREA OF CONTAMINATION
PROPOSED SAMPLE LOCATIONS
DATE: JUNE 1992
FIGURE C-4
HEAVY TIMBER
BH-14 (P) 176.53
BH-15 (P) 177.15
BH-16 (P) 177.78
BH-12 179.02
BH-13 179.01
122 173.55
017
701
702
703
704
705
AVE. Q
AOC-8
LEGEND

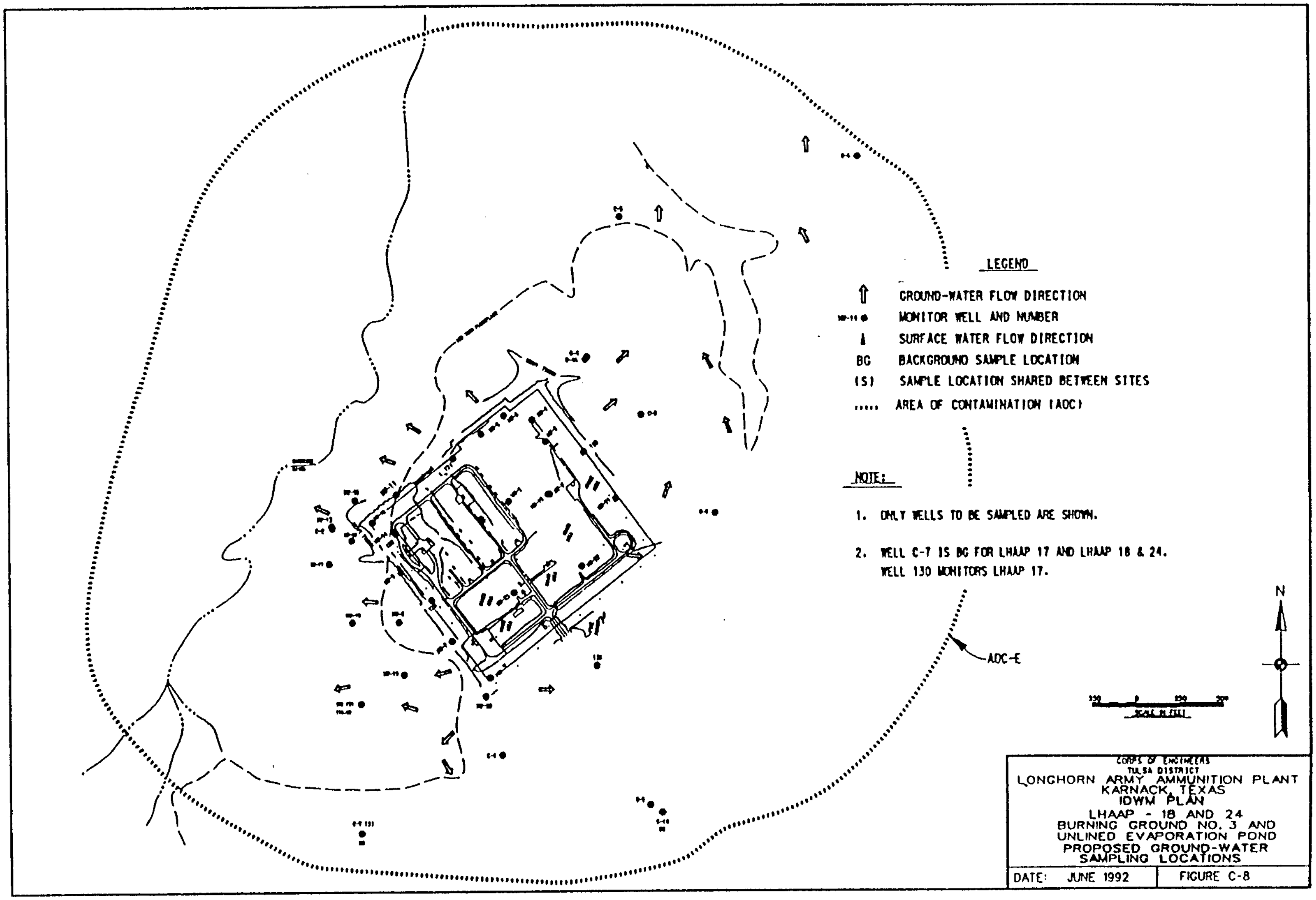

CORPS OF ENGINEERS
TULSA DISTRICT
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
IDWM PLAN
LHAAP - 14
TNT BURIAL SITE
AREA OF CONTAMINATION WITH
PROPOSED SAMPLE LOCATIONS
DATE: JUNE 1992
FIGURE C-5
SCALE IN FEET
LEGEND
BH-12 ● MONITOR WELL AND NUMBER (EXISTING) WITH GROUND-WATER ELEVATION (NOV 89)
SURFACE WATER FLOW DIRECTION
⊕ SOIL BORING (PROPOSED)
○ MONITOR WELL (PROPOSED)
BG BACKGROUND
GROUND WATER FLOW DIRECTION
POINT OF COMPLIANCE
(S) SAMPLE LOCATION SHARED BETWEEN SITES
(P) MONITOR WELL TO BE PLUGGED
AREA OF CONTAMINATION (AOC)
BH-15
177.15
BH-16
177.78
BH-13 (P)
179.01
BH-12 (P)
179.02
HEAVY TIMBER
LIGHT TIMBER
RETAIL SALES AREA
ASPHALT ROAD (POOR)
AVE. Q
AOC-D
BG
BG (S)
20' WIDE
BARE PATCHES
SUSPECTED LIMIT OF SITE
NOTE: GROUND-WATER ELEVATION NOV 89

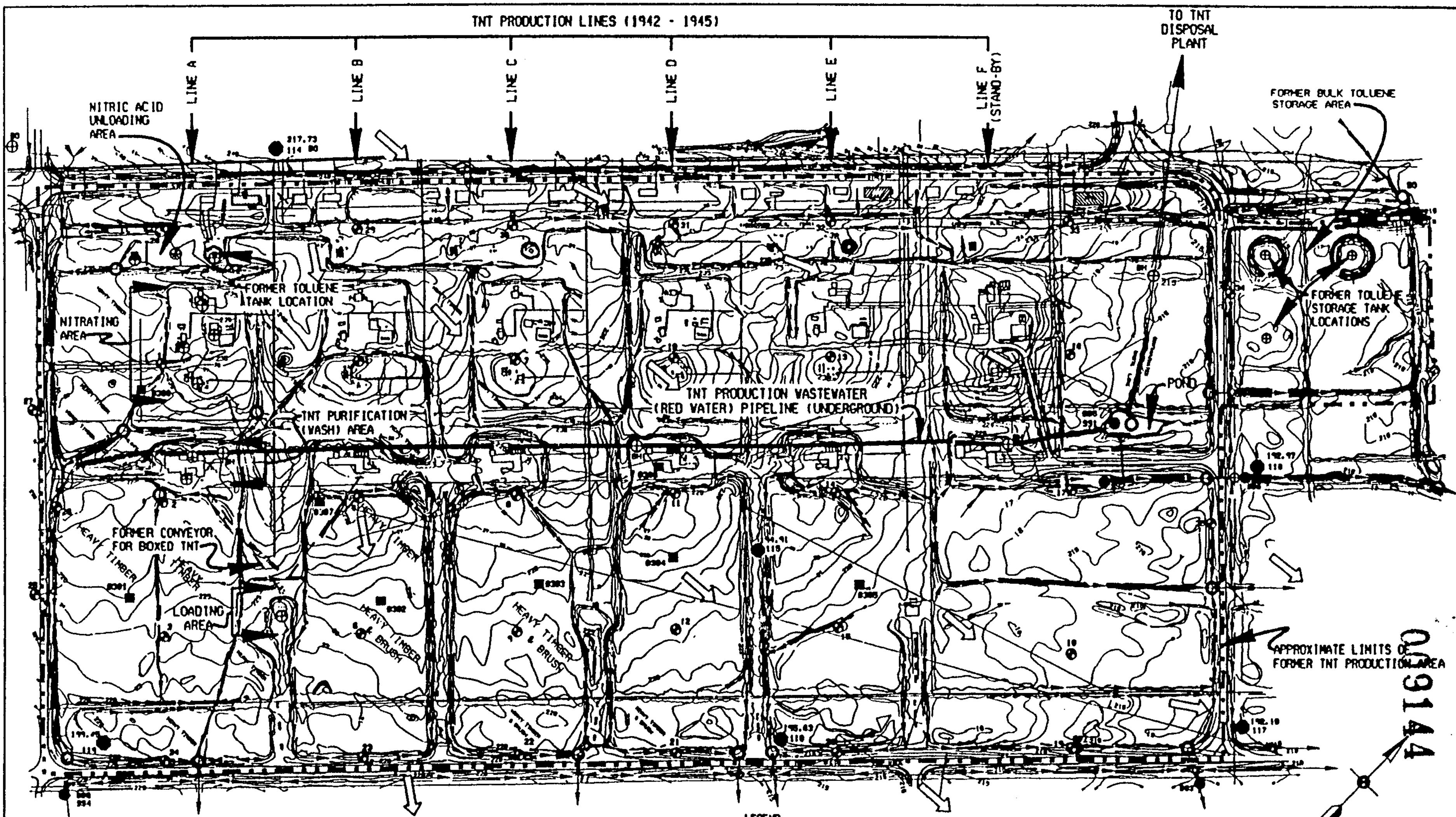

LEGEND
BH-12 MONITOR WELL AND NUMBER (EXISTING) WITH GROUND-WATER ELEVATION (NOV 89)
SURFACE WATER FLOW DIRECTION
SOIL BORING (PROPOSED)
MONITOR WELL (PROPOSED)
BG BACKGROUND
GROUND-WATER FLOW DIRECTION
POINT OF COMPLIANCE
(S) SAMPLE LOCATION SHARED BETWEEN SITES
AREA OF CONTAMINATION (AOC)
AOC-D
SUSPECTED LIMIT OF TNT BURIAL SITE
HEAVY TIMBER
BARE PATCHES
BG
BH-15
177.15
BH-16
177.78
BH-13
179.01
BH-12
179.02
BG (S)
LIGHT TIMBER
RETAIL SALES AREA
ASPHALT ROAD (POOR)
(GOOD) ASPHALT
20' WIDE
AVE. Q
BULK STORAGE
APPROXIMATE LIMITS OF 1983 ACTIVITIES
NOTE: GROUND-WATER ELEVATION NOV 89
N
SCALE IN FEET
CORPS OF ENGINEERS
TULSA DISTRICT
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
IDWM PLAN
LHAAP - 13
TNT BURIAL SITE
AREA OF CONTAMINATION WITH PROPOSED SAMPLE LOCATIONS
DATE: JUNE 1992
FIGURE C-6



LEGEND
GROUND WATER FLOW DIRECTION
MONITOR WELL, NUMBER, AND GROUND-WATER ELEVATION (EXISTING)
016 SURFACE WATER/SEDIMENT SAMPLE AND NUMBER (PREVIOUS)
5 SOIL BORING AND NUMBER (PREVIOUS)
SURFACE WATER FLOW DIRECTION
APPROX. LIMITS OF BURN PITS/TRENCHES
SOIL BORING (PROPOSED)
SURFACE WATER/SEDIMENT SAMPLE (PROPOSED)
MONITOR WELL (PROPOSED)
BG BACKGROUND SAMPLE LOCATION
POINT OF COMPLIANCE
(S) SAMPLE LOCATION SHARED BETWEEN SITES
AREA OF CONTAMINATION (AOC)
NOTES:
1. GROUND-WATER ELEVATIONS NOV 89
2. PREVIOUS SAMPLE LOCATIONS ARE APPROXIMATE
3. WELL C-7 IS BG FOR LHAAP 17 AND LHAAP 18 & 24. WELL 130 IS DOWN GRADIENT OF LHAAP 18 & 24.
APPROXIMATE LIMIT OF BURNING GROUND NO. 2/FLASHING AREA
HEAVY TIMBER
BURNING & FLASHING AREA #2
FORMER TNT TOWER PACKING & FILTERS
BURN PIT
BURN PITS
SCATTERED
BRUSH
SWAMP
130 (S)
016
AOC-D
BG
C-7 (S)
AVE. Q
20' ASPHALT (FAIR)
CORPS OF ENGINEERS
TULSA DISTRICT
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
IDWM PLAN
LHAAP - 17
BURNING GROUND NO. 2/FLASHING AREA
AREA OF CONTAMINATION WITH
PROPOSED SAMPLE LOCATIONS
DATE: JUNE 1992
FIGURE C-7

009143


LEGEND
GROUND-WATER FLOW DIRECTION
MONITOR WELL AND NUMBER
SURFACE WATER FLOW DIRECTION
BG BACKGROUND SAMPLE LOCATION
(S) SAMPLE LOCATION SHARED BETWEEN SITES
AREA OF CONTAMINATION (AOC)
NOTE:
1. ONLY WELLS TO BE SAMPLED ARE SHOWN.
2. WELL C-7 IS BG FOR LHAAP 17 AND LHAAP 18 & 24.
WELL 130 MONITORS LHAAP 17.
AOC-E
N
CORPS OF ENGINEERS
TULSA DISTRICT
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
IDWM PLAN
LHAAP - 18 AND 24
BURNING GROUND NO. 3 AND
UNLINED EVAPORATION POND
PROPOSED GROUND-WATER
SAMPLING LOCATIONS
DATE: JUNE 1992
FIGURE C-8



009144

NOTE:

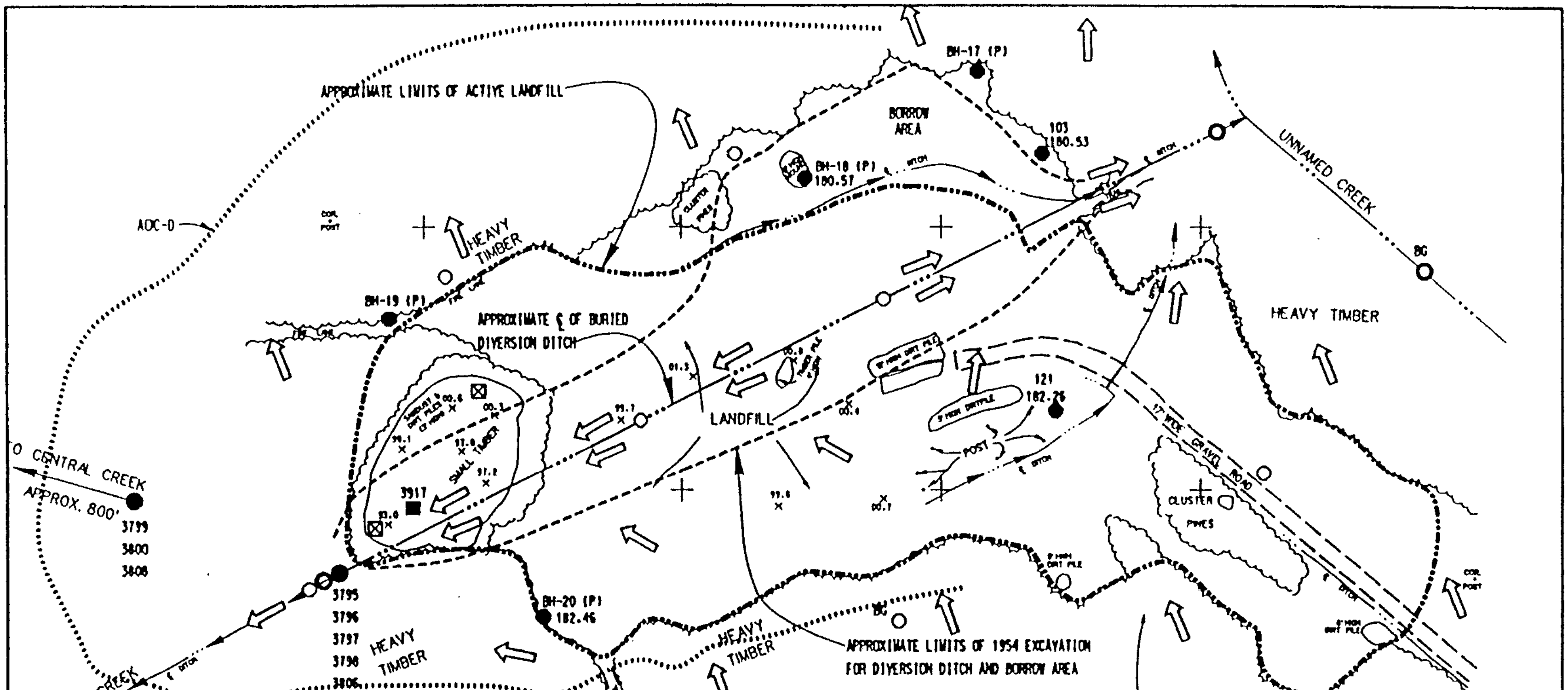
1. GROUND-WATER ELEVATION NOV 89
2. PREVIOUS SAMPLING LOCATIONS ARE APPROXIMATE
3. SEE FIGURE 6-7-2 FOR ADDITIONAL SAMPLE LOCATIONS
4. PRODUCTION LINE A CONSTRUCTED FIRST AND OPERATED FROM OCTOBER 1942 TO AUGUST 1945

LEGEND

- MONITOR WELL AND NUMBER(EXISTING) WITH GROUND-WATER ELEVATION (SEE NOTE)
- SHALLOW SOIL SAMPLE AND NUMBER (PREVIOUS)
- SOIL BORING AND NUMBER (PREVIOUS)
- SURFACE WATER/SEDIMENT SAMPLE AND NUMBER (PREVIOUS)
- GROUND-WATER FLOW DIRECTION
- SURFACE WATER FLOW DIRECTION
- SURFACE WATER/SEDIMENT SAMPLE (PROPOSED)
- SOIL BORING (PROPOSED)
- BACKGROUND SAMPLE
- BACKHOE SAMPLE (PROPOSED)
- POINT OF COMPLIANCE

CORPS OF ENGINEERS
FORT WORTH DISTRICT
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
RI/FS WORK PLAN
LHAAP-29
FORMER TNT PRODUCTION AREA
PROPOSED SAMPLE LOCATIONS

DATE: JUNE 1992	FIGURE C-9



LEGEND

- GROUND-WATER FLOW DIRECTION DURING WET PERIODS
- SURFACE WATER FLOW DIRECTION
- 121 182.26 ● MONITOR WELL AND NUMBER (EXISTING) WITH GROUND-WATER ELEVATION (SEE NOTE)
- 3917 ■ SHALLOW SOIL SAMPLE AND NUMBER (PREVIOUS)
- 3799 ● SURFACE WATER / SEDIMENT SAMPLE AND NUMBER (PREVIOUS)
- ○ SURFACE WATER / SEDIMENT SAMPLE (PROPOSED)
- ○ MONITOR WELL (PROPOSED)
- ⊠ SHALLOW SOIL SAMPLE (PROPOSED)
- BG BACKGROUND SAMPLING LOCATION
- (P) MONITOR WELL TO BE CLOSED BY PLUGGING
- POINT OF COMPLIANCE
- AREA OF CONTAMINATION (AOC)

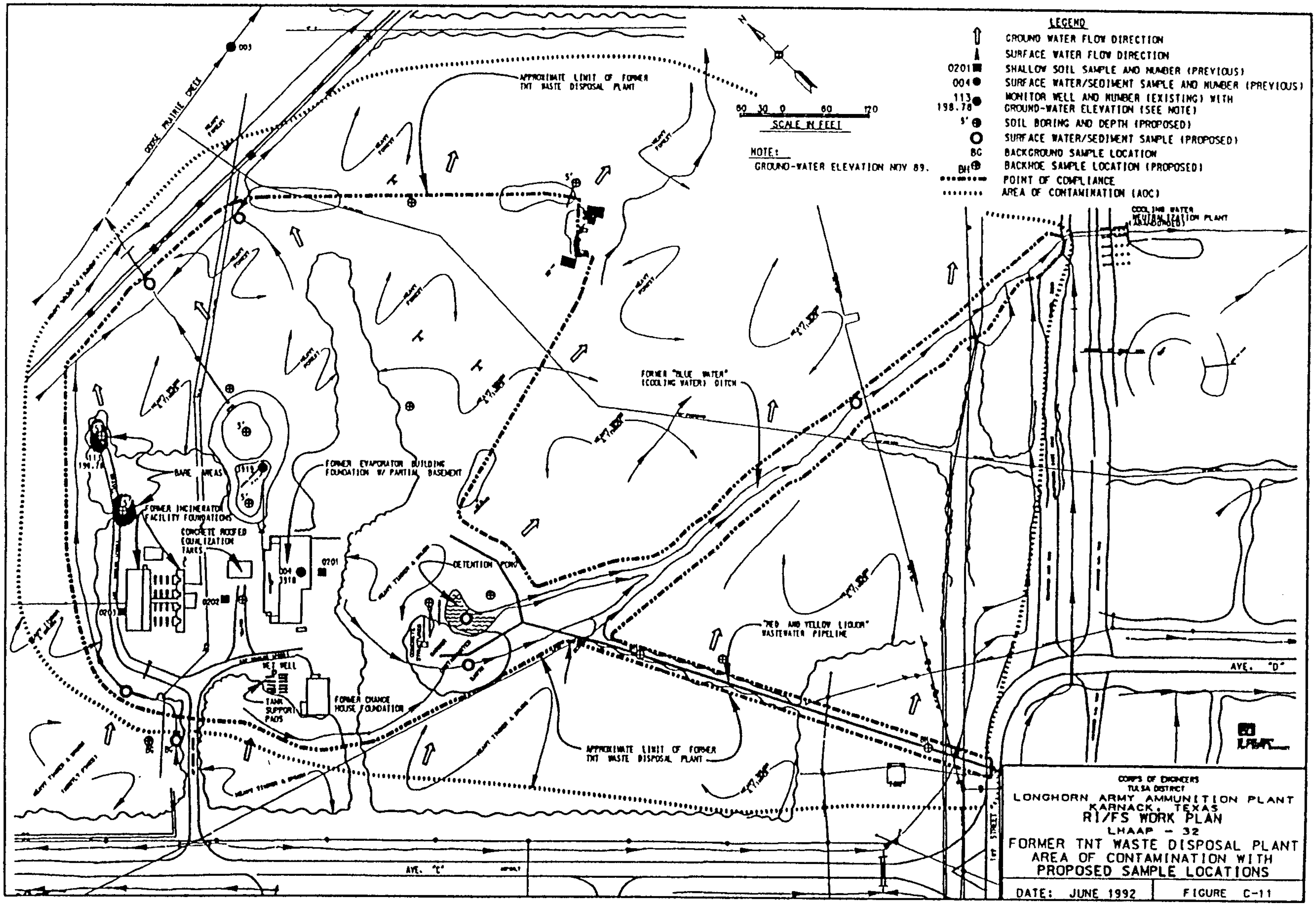
NOTE:
GROUND-WATER ELEVATION NOV 89.

CORPS OF ENGINEERS
TULSA DISTRICT
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
IDWM PLAN
LHAAP - 12
ACTIVE LANDFILL
AREA OF CONTAMINATION WITH
PROPOSED SAMPLE LOCATIONS

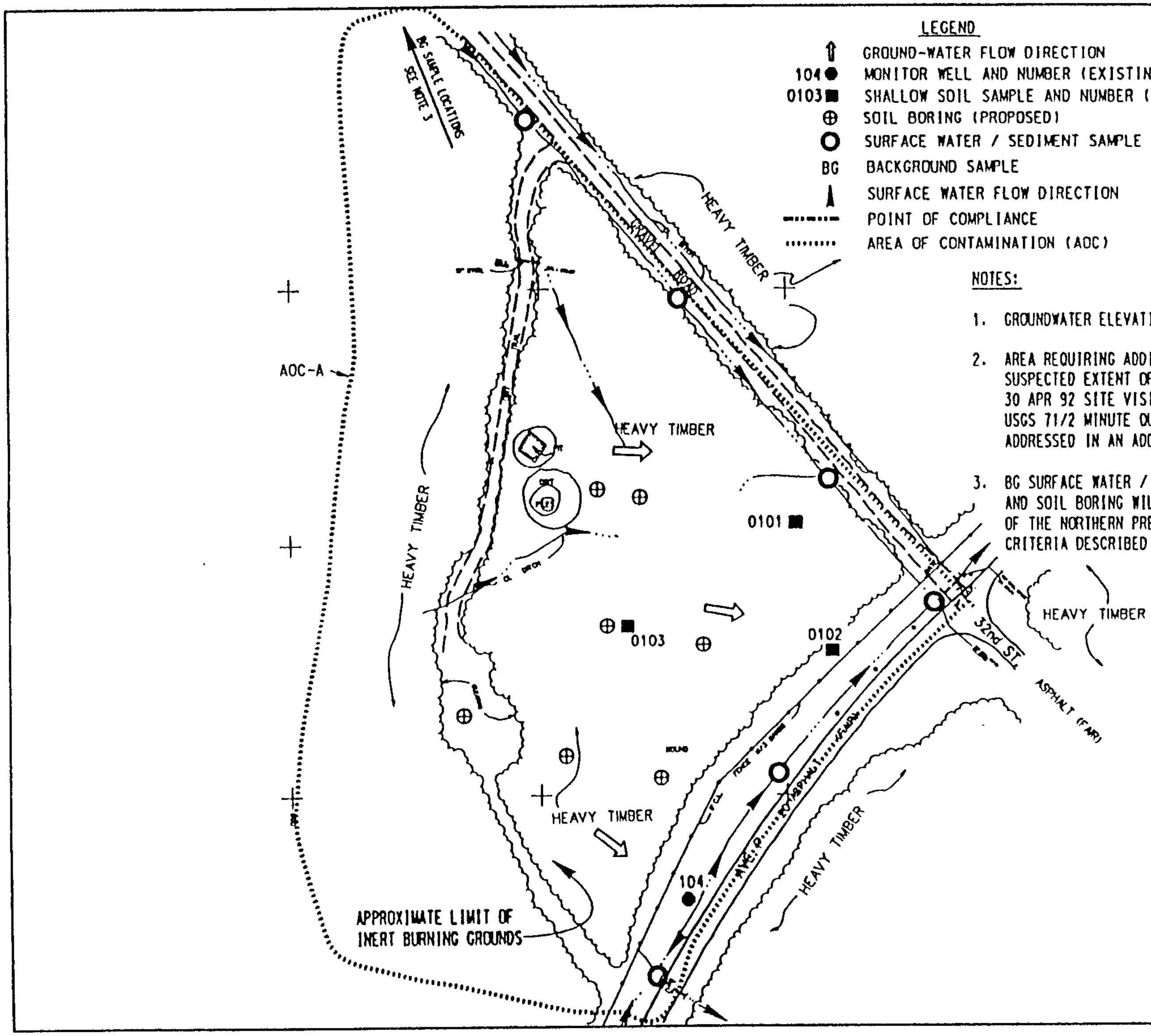
DATE: JUNE 1992	FIGURE C-10

009145

009146



LEGEND
GROUND WATER FLOW DIRECTION
SURFACE WATER FLOW DIRECTION
0201 SHALLOW SOIL SAMPLE AND NUMBER (PREVIOUS)
004 SURFACE WATER/SEDIMENT SAMPLE AND NUMBER (PREVIOUS)
113 198.78 MONITOR WELL AND NUMBER (EXISTING) WITH GROUND-WATER ELEVATION (SEE NOTE)
5' SOIL BORING AND DEPTH (PROPOSED)
SURFACE WATER/SEDIMENT SAMPLE (PROPOSED)
BG BACKGROUND SAMPLE LOCATION
BH BACKHOE SAMPLE LOCATION (PROPOSED)
POINT OF COMPLIANCE
AREA OF CONTAMINATION (AOC)
60 30 0 60 120
SCALE IN FEET
NOTE:
GROUND-WATER ELEVATION NOV 89.
N
003
GOOSE PRAIRIE CREEK
APPROXIMATE LIMIT OF FORMER TNT WASTE DISPOSAL PLANT
COOLING WATER NEUTRALIZATION PLANT
FORMER "BLUE WATER" (COOLING WATER) DITCH
FORMER EVAPORATOR BUILDING FOUNDATION W/ PARTIAL BASEMENT
BARE AREAS
FORMER INCINERATOR FACILITY FOUNDATIONS
CONCRETE ROOFED EQUALIZATION TANKS
DETENTION POND
0201
004
3118
0202
0203
113
198.78
WET WELL
TANK SUPPORT PADS
FORMER CHANGE HOUSE FOUNDATION
"RED AND YELLOW LIQUOR" WASTEWATER PIPELINE
APPROXIMATE LIMIT OF FORMER TNT WASTE DISPOSAL PLANT
AVE. "D"
AVE. "C"
1st STREET
BG
BH
CORPS OF ENGINEERS
TULSA DISTRICT
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
RI/FS WORK PLAN
LHAAP - 32
FORMER TNT WASTE DISPOSAL PLANT
AREA OF CONTAMINATION WITH
PROPOSED SAMPLE LOCATIONS
DATE: JUNE 1992
FIGURE C-11



LEGEND

- ⇧ GROUND-WATER FLOW DIRECTION
- 104 ● MONITOR WELL AND NUMBER (EXISTING)
- 0103 ■ SHALLOW SOIL SAMPLE AND NUMBER (PREVIOUS)
- ⊕ SOIL BORING (PROPOSED)
- O SURFACE WATER / SEDIMENT SAMPLE (PROPOSED)
- BG BACKGROUND SAMPLE
- SURFACE WATER FLOW DIRECTION
- POINT OF COMPLIANCE
- AREA OF CONTAMINATION (AOC)

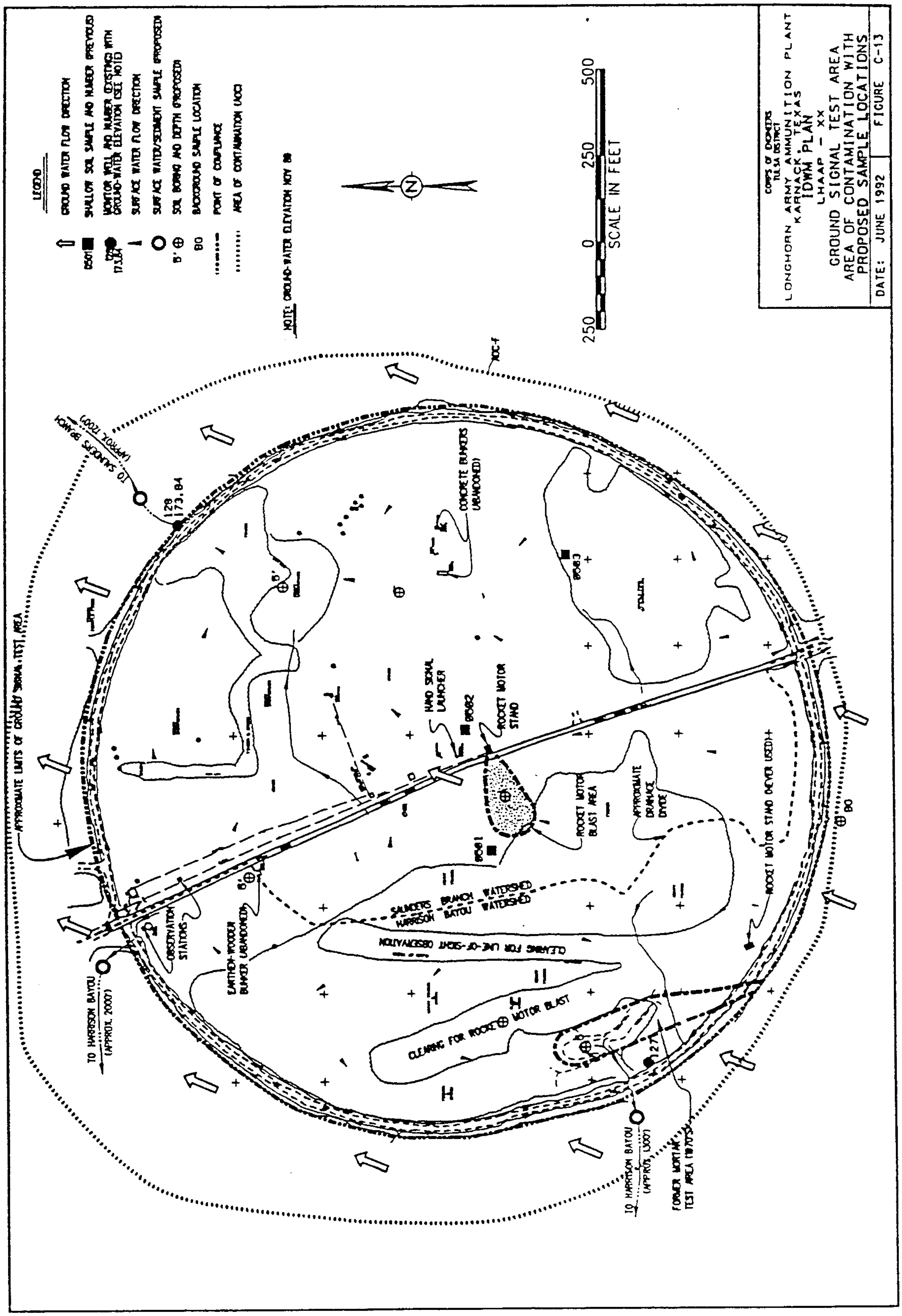
NOTES:

1. GROUNDWATER ELEVATION NOV 1989.
2. AREA REQUIRING ADDITIONAL INVESTIGATION SHOWS SUSPECTED EXTENT OF INERT BURNING GROUNDS BASED ON 30 APR 92 SITE VISIT, AERIAL PHOTOS, AND 1963 USGS 71/2 MINUTE QUAD. THIS AREA WILL BE ADDRESSED IN AN ADDENDUM TO THE RI/FS WORK PLAN.
3. BG SURFACE WATER / SEDIMENT SAMPLE LOCATION AND SOIL BORING WILL BE SITED UP SLOPE AND UPSTREAM OF THE NORTHERN PRELIMINARY SITE BOUNDARY USING CRITERIA DESCRIBED IN PARA 4. 10.

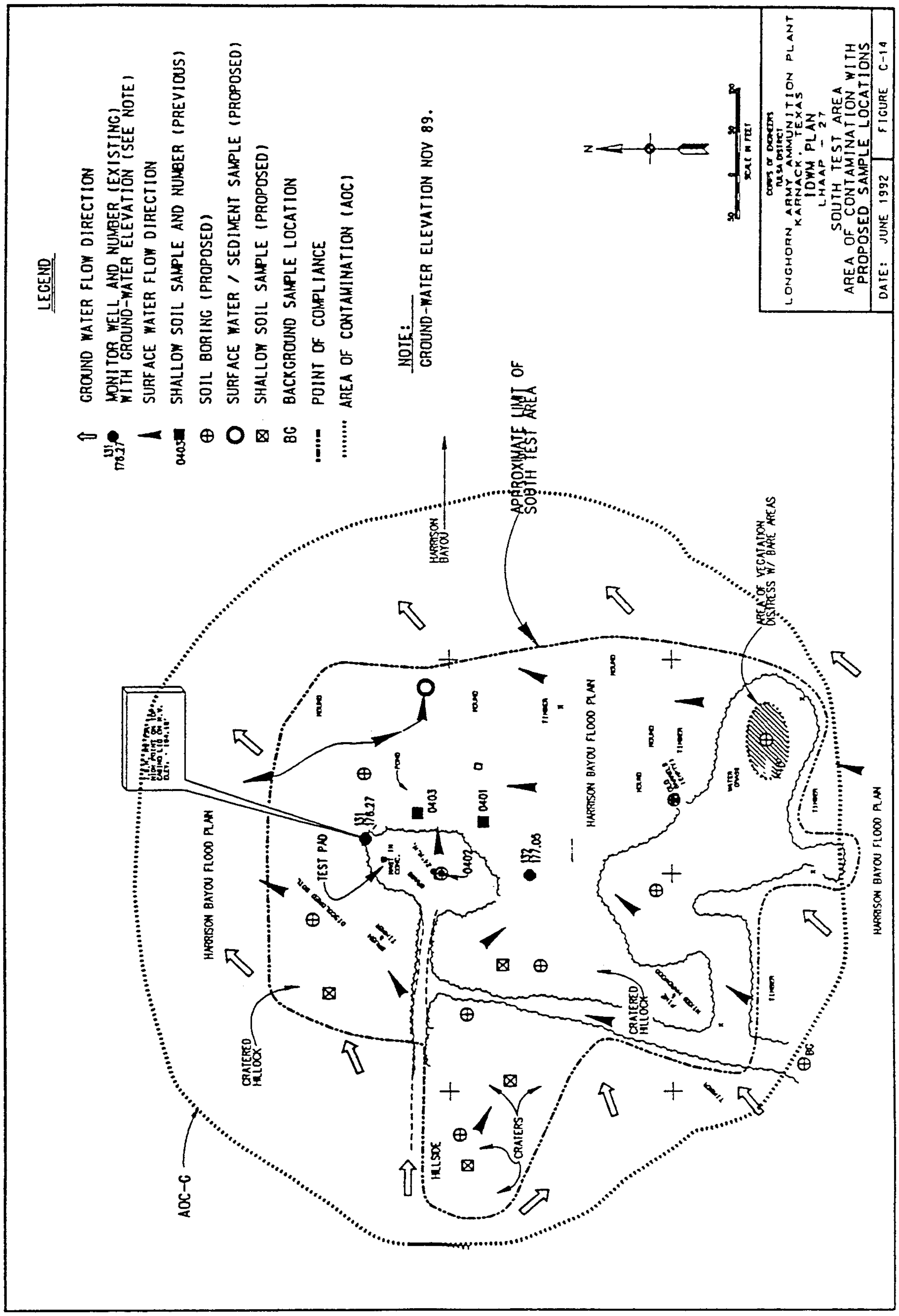
CORPS OF ENGINEERS
TULSA DISTRICT
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
IDWM PLAN
LHAAP - 1
INERT BURNING GROUNDS
AREA OF CONTAMINATION WITH
PROPOSED SAMPLE LOCATIONS

DATE: JUNE 1992	FIGURE C-12

009148



LEGEND
GROUND WATER FLOW DIRECTION
SHALLOW SOIL SAMPLE AND NUMBER (PREVIOUS)
MONITOR WELL AND NUMBER (EXISTING) WITH GROUND-WATER ELEVATION (SEE NOTE)
SURFACE WATER FLOW DIRECTION
SURFACE WATER/SEDIMENT SAMPLE (PROPOSED)
SOIL BORING AND DEPTH (PROPOSED)
BACKGROUND SAMPLE LOCATION
POINT OF COMPLIANCE
AREA OF CONTAMINATION (AOC)
NOTE: GROUND-WATER ELEVATION NOV 88
250 0 250 500
SCALE IN FEET
CORPS OF ENGINEERS TULSA DISTRICT
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
IDWM PLAN
LHAAP - XX
GROUND SIGNAL TEST AREA
AREA OF CONTAMINATION WITH
PROPOSED SAMPLE LOCATIONS
DATE: JUNE 1992
FIGURE C-13
AOC-F
TO SAUNDERS BRANCH (APPROX. 700')
129
173.84
CONCRETE BUNKERS (ABANDONED)
BS03
HAND SIGNAL LAUNCHER
BS02
ROCKET MOTOR STAND
ROCKET MOTOR BLAST AREA
APPROXIMATE DRAINAGE DIVIDE
ROCKET MOTOR STAND (NEVER USED)
BG
BS01
APPROXIMATE LIMITS OF GROUND SIGNAL TEST AREA
SAUNDERS BRANCH WATERSHED
HARRISON BAYOU WATERSHED
CLEARING FOR LINE-OF-SIGHT OBSERVATION
OBSERVATION STATIONS
EARTHEN-WOODEN BUNKER (ABANDONED)
TO HARRISON BAYOU (APPROX. 2000')
CLEARING FOR ROCKET MOTOR BLAST
127
TO HARRISON BAYOU (APPROX. 1300')
FORMER MORTAR TEST AREA (1970'S)


LEGEND
GROUND WATER FLOW DIRECTION
131 178.27 MONITOR WELL AND NUMBER (EXISTING) WITH GROUND-WATER ELEVATION (SEE NOTE)
SURFACE WATER FLOW DIRECTION
0403 SHALLOW SOIL SAMPLE AND NUMBER (PREVIOUS)
SOIL BORING (PROPOSED)
SURFACE WATER / SEDIMENT SAMPLE (PROPOSED)
SHALLOW SOIL SAMPLE (PROPOSED)
BG BACKGROUND SAMPLE LOCATION
POINT OF COMPLIANCE
AREA OF CONTAMINATION (AOC)
NOTE:
GROUND-WATER ELEVATION NOV 89.
AOC-C
HARRISON BAYOU FLOOD PLAIN
CRATERED HILLOCK
TEST PAD
131 178.27
0403
0401
0402
132 177.05
HILLSIDE
CRATERS
HARRISON BAYOU
APPROXIMATE LIMIT OF SOUTH TEST AREA
AREA OF VEGETATION DISTRESS W/ BARE AREAS
BG
N
SCALE IN FEET
CORPS OF ENGINEERS
TULSA DISTRICT
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
IDWM PLAN
LHAAP - 27
SOUTH TEST AREA
AREA OF CONTAMINATION WITH
PROPOSED SAMPLE LOCATIONS
DATE: JUNE 1992
FIGURE C-14

4. Waste Management Plan (WMP).

4.1. Drill Cuttings WMP. On site disposal immediately upon generation is planned at background investigations. On-site disposal of containerized soil cuttings will occur after test results from site characterization soil samples indicate that hazardous constituents are all below regulatory limits at sites LHAAP 11, 13, 14, 16, 17, 29, 12, 32, 1, xx, and 27, where the borings and monitoring wells will be installed within the AOC's and there is no evidence indicating that the disposal of drill cuttings on-site will in any way degrade the surface conditions at the site or cause harm to human health or the environment beyond what is presently existing at these sites. No cuttings will be generated from LHAAP 18 & 24. If borings are performed at LHAAP 18 & 24 during the second phase of investigations, the cuttings will be managed as RCRA hazardous waste.

4.1.1. Containerization. The cuttings from all investigations except background investigations will be containerized within D.O.T. approved drums, containers, roll-off bins, dumpsters, or vessels and properly labeled stored. The containers will be made of material that is non-reactive with the waste constituents present at the site. The labels will include the type of material contained, (soil, water, etc.) site name, boring or well number, accumulation start date, EPA waste number (obtained from the EPA) and telephone number(s) for the site manager and/or installation site coordinator. The containers will be labeled using a permanent, non-soluble substance or devise. Containers will be labeled on the side not on the top, or lid. Cuttings from different borings will not be mixed.

4.1.2. Sampling. The IDW cutting samples will be collected in accordance with the CDAP and TCLP testing will be performed to determine if cuttings are characteristically hazardous waste. TCLP testing will include inorganic and organic species identification and quantification by the method described in the CDAP under procedures set forth in 40 CFR 260.20 and 260.21.

° LHAAP 11, 13, 14, 17, 29, 12, 32, 1, xx, and 27 - only required if site characterization samples indicate that TCLP constituents are present within regulatory limits (samples will be taken every five feet as part of the site characterization)

° Background sites - not required (these sites are by definition in non-contaminated areas)

° LHAAP 16 (and 18 & 24 if later borings) - required

4.1.3. Storage. After filling or when the boring is completed the containers will be stored, on a location within the AOC that is outside the floodplain limits, until test results are received. If no storage area outside of the floodplain is available at an AOC the waste will be stored at an adjacent AOC storage area. If metal drums are utilized, they will be stored on pallets and covered with a plastic tarp. After test results are received if any of the waste are determined to be above the TCLP regulatory limits, that container will be taken to the LHAAP 90 day RCRA storage facility to await TCLP results and disposal. Waste that is determined to be contaminated but not characteristically hazardous will be stored on site until the remedial activity is constructed. If remedial construction is expected to take over 1 year to begin, a more permanent storage facility will be required. IDW cuttings from LHAAP 16 (and 18 & 24, if later borings are required) will be stored as hazardous waste at the LHAAP 90 day RCRA storage facility.

4.1.4. Disposal.

° LHAAP 11, 13, 14, 17, 29, 12, 32, 1, xx, 27, and background - On-Site if not contaminated - Off-Site if characteristically hazardous

° LHAAP 16 (and 18 & 24 if later borings) - Off-Site

4.1.4.1. On-Site. If the cuttings are not contaminated disposal will be on site. The cuttings will be spread around the bore hole and monitoring well locations in such a manner to minimize wind or surface water erosion. This will be accomplished by spreading the soil out over a minimum area at least 10 feet from the well in a downgradient area within the AOC. If the cuttings are spread thicker than 4 inches then, grass seed suitable for the area will be spread over the cuttings and raked in.

4.1.4.2. RCRA Hazardous Waste. If the test results (or for LHAAP 18 & 24 there is listed RCRA hazardous waste) indicate that cuttings are characteristically hazardous, the waste will be disposed of at a fully permitted RCRA Subtitle C facility that is permitted to receive CERCLA waste. The facility must meet the requirements of Land Disposal Restrictions (LDR) (waste may require pretreatment for constituents listed in the LDR before disposal) and the CERCLA section 121(d)(3) and the Off-Site Policy.

4.1.4.3. Contaminated Non-Hazardous. If the test results indicate that cuttings are not characteristically hazardous but do contain hazardous constituents, the waste will be stored and treated on-site during remediation at the site.

4.1.4.4. Stored Off-Site Non-Contaminated. If the test results do not indicate the presence of any contamination, the cuttings will be disposed on the LHAAP facility as inert materials.

4.2. Development, Purge, and Decontamination Water WMP. On site storage of water is planned at 11 of the sites (LHAAP 11, 13, 14, 16, 17, 29, 12, 32, 1, xx, and 27) and at background investigations outside of the AOC's in accordance with Reference 1. On site disposal will occur at the sites where the water is determined to be non-contaminated. Contaminated non-hazardous IDW water will be stored on site and processed during the remedial action. Off-site disposal is anticipated at one site (LHAAP 18 & 24) in accordance with the EPA guidance document, Superfund Management of Investigation-Derived Wastes During Site Inspections, May 1991. Review of past investigations and site history indicate that the IDW water at this site will be classified as hazardous waste after the test results are in.

4.2.1. Containerization. The IDW water will be containerized within D.O.T. approved drums, containers, roll-off bins, dumpsters, or vessels and properly labeled. The labels will include the type of material contained, (soil, water, etc.) site name, boring or well number, accumulation start date, EPA waste number (obtained from the EPA) and telephone(s) for the site manager and/or installation site coordinator. The containers will be labeled using a permanent, non-soluble substance or devise. Containers will be labeled on the side not on the top, or lid.

4.2.2. Sampling. The IDW samples will be collected in accordance with the CDAP. TCLP testing will be performed to determine if the IDW waters are characteristically hazardous waste. TCLP testing will include inorganic and organic species identification and quantification by the method described in the CDAP under procedures set forth in 40 CFR 260.20 and 260.21.

If contaminated, IDW water from LHAAP 18 & 24 will be classified as listed hazardous waste due to the contained in rule from the F listed waste code present in the soil and groundwater.

4.2.3. Storage. On site storage of IDW water is planned at 11 of the sites (LHAAP 11, 13, 14, 16, 17, 29, 12, 32, 1, xx, and 27) and at background investigations outside of the AOC's. After filling or when the purging of site wells are completed the containers from LHAAP 18 & 24 will be taken to the LHAAP 90 day RCRA storage facility to await test results.

4.2.4. Disposal.

4.2.4.1. RCRA Hazardous Waste. If the test results (or for LHAAP 18 & 24 there is listed RCRA hazardous waste) indicate that cuttings are characteristically hazardous, the waste will be disposed of at a fully permitted RCRA Subtitle C facility that is permitted to receive CERCLA waste. The facility must meet the requirements of Land Disposal Restrictions and the CERCLA section 121(d)(3) and the Off-Site Policy.

4.2.4.2. Contaminated Non-Hazardous. If the test results indicate that the water is not characteristically hazardous but is contaminated with hazardous constituents, the water will be classified according to TWC rules, and then treated along with the other water present at the site during remedial action.

4.2.4.3. Non-Contaminated. If the test results indicate that the water is not contaminated, it will be placed in the on-site waste water treatment plant facility.

4.3. Personnel Protective Equipment (PPE) and Disposable Equipment (DE) WMP.

4.3.1. Containerization. At sites LHAAP 11, 13, 14, 16, 17, 29, 12, 32, 1, xx, and 27 the PPE and DE from each site will be contained in double, ultraviolet degradation resistant, 20 gallon plastic bags. The bags will be tagged with a label that gives date, sample location, and site name. Review of the past investigations results does not indicate that this IDW will be hazardous. PPE and DE from LHAAP will be bagged as above and placed in a dumpster (or other suitable container).

4.3.2. Sampling. No sampling of this IDW is required.

4.3.3. Storage. At sites LHAAP 11, 13, 14, 16, 17, 29, 12, 32, 1, xx, and 27 the PPE and DE from each site will be stored in a dumpster on site. PPE and DE from LHAAP 18 & 24 will be stored at the LHAAP RCRA 90-day storage facility.

4.3.4. Disposal. At sites LHAAP 11, 13, 14, 16, 17, 29, 12, 32, 1, xx, and 27 the PPE and DE from each site will be disposed in the LHAAP active landfill. PPE and DE from LHAAP 18 & 24 will be disposed of at a fully permitted RCRA Subtitle C facility that is permitted to receive CERCLA waste. The facility must meet the requirements of Land Disposal Restrictions and the CERCLA section 121(d)(3) and the Off-Site Policy.

4.5. Documentation/Notification. The information contained in this section applies to all IDW managed during these investigations. Field records will be kept of all disposal activities the logs will contain the following information:

1) Description Generating Activities
2) Location of Generation (including depth if applicable)
3) Type of Waste
4) Date and Time of Generation
5) Date and Time of Disposal of each Type
6) Disposal Location of each Type
7) Disposal Method
8) Description of any waste sampling including:
    - type of test
    - laboratory sample to be sent to
    - sampling method

name of sampler

9) Name of person recording information

10) Name of Field Manager at time of Generation and at time of Disposal

11) The test results must also be provided

4.5.1. RCRA Hazardous Waste. All hazardous waste must be accompanied by a Hazardous Waste Manifest (and other forms required by Texas Law). The treatment, disposal (not restricted waste), storage (TDS) facility must be notified prior to sending the IDW. The following items must accompany the Notification:

1) EPA hazardous waste codes

2) Manifest number

3) Wasted analysis data

4) If the waste is also restricted, corresponding concentration-based or technology-based treatment standards, or prohibition

4.5.2. Contaminated Non-Hazardous. If it is transported off-site the IDW must have a Bill of Lading.

4.5.3. Non-Contaminated. No notification or other documentation is required.

5. References.

1. USEPA/540/G-91/009, Superfund Management of Investigation-Derived Wastes During Site Inspections, May 1991.

2. USEPA, OSWER 9934.0-1A, Land Disposal Restrictions, Summary of Requirements, February 1991.

3. USACE, Longhorn Army Ammunitions Plant RI/FS Work Plan Volume 1, General, February 1992.

APPENDIX C-1

EPA/540/G-91/009, Superfund Management of Investigation-Derived Wastes During Site Inspections, May 1991

Wade Anderson

United States
Environmental Protection
Agency

Office of Research and
Development
Washington, DC 20460

EPA/540/G-91/009
May 1991

Superfund

EPA

Management of Investigation-Derived Wastes During Site Inspections

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EPA/540/G-91/009
OERR Directive 9345.3-02
May 1991

Management of Investigation-Derived Wastes During Site Inspections

Office of Emergency and Remedial Response
U.S. Environmental Protection Agency
Washington, DC 20460

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NOTICE

The policies and procedures set forth here are intended as guidance to Agency and other government employees. They do not constitute rulemaking by the Agency, and may not be relied on to create a substantive or procedural right enforceable by any other person. EPA officials may decide to follow the guidance provided in this directive, or to act at variance with the guidance, based on analysis of specific site circumstances. The Agency also reserves the right to change this guidance at any time without public notice.

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LIST OF FIGURES

This guidance presents a general regulatory background and options for management of investigation-derived wastes (IDW) generated during Superfund site inspections (SIs). These wastes include soil cuttings, drilling muds, purged ground water, decontamination fluids (water and other fluids), disposable sampling equipment (DE), and disposable personal protective equipment (PPE). The National Contingency Plan (NCP) requires that management of IDW generated during SIs complies with all applicable or relevant and appropriate requirements (ARARs) to the extent practicable. In addition, other legal and practical considerations may affect the handling of IDW. Therefore, site inspection managers and other involved parties should be familiar with this guidance, as well as the requirements of the NCP, ARARs, and EPA's interpretation of these requirements.

IDW from SIs may contain hazardous substances as defined by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Some CERCLA hazardous substances are hazardous wastes under Subtitle C of the Resource Conservation and Recovery Act (RCRA), while other substances are regulated by other federal laws such as the Safe Drinking Water Act (SDWA), Clean Air Act (CAA), Toxic Substances Control Act (TSCA), and the Clean Water Act (CWA). EPA estimates that RCRA hazardous IDW have been generated at fewer than 15 percent of CERCLA sites. However, RCRA regulations, and in particular the RCRA Land Disposal Restrictions (LDRs), are very important as potential ARARs since they regulate treatment, storage, and disposal of many of the most toxic and hazardous materials.

EPA's strategy for managing RCRA hazardous IDW presented in this guidance is based on:

- The NCP directive that SIs comply with ARARs to the extent practicable.
- The Area of Contamination (AOC) unit concept.

The most important elements of the IDW management approach are as follows:

- Leaving a site in no worse condition than existed prior to the investigation.
- Removing those wastes that pose an immediate threat to human health or the environment.
- Leaving on-site wastes that do not require off-site disposal or extended above-ground containerization.
- Complying with federal ARARs, to the extent practicable.
- Complying with state ARARs, as practicable.
- Careful planning and coordination for IDW management.
- Minimizing the quantity of generated wastes.

The specific elements of the approach are as follows:

- Characterizing IDW through the use of existing information (manifests, Material Safety Data Sheets, previous test results, knowledge of the waste generation process, and other relevant records) and best professional judgment.
- Delineating an AOC unit for leaving RCRA hazardous soil cuttings within the unit.

- Containerizing and disposing of RCRA hazardous ground water, decontamination fluids, and PPE and DE (if generated in excess of 100 kg/month) at RCRA Subtitle C facilities.

- Leaving on-site RCRA nonhazardous soil cuttings, ground water, and decontamination fluids preferably without containerization and testing.

EPA does not recommend removal of wastes from all sites and, in particular, from those sites where IDW do not pose any immediate threat to human health or the environment. Removing wastes from all sites would not benefit human health and the environment and would result in spending a significant portion of the total funds available for the site assessment program, thus impairing EPA's ability to successfully meet the goals of the program.

1.0 INTRODUCTION

In the process of collecting environmental samples during Superfund site inspections (SIs), site investigators generate many different types of potentially contaminated investigation-derived wastes (IDW) that include soil, ground water, used personal protective equipment (PPE), decontamination fluids, and disposable sampling equipment (DE). The National Contingency Plan (NCP)[1] requires that managing (handling) of IDW attains all applicable or relevant and appropriate requirements (ARARs) to the extent practicable considering the exigencies of the situation. To comply with ARARs, site managers need to be familiar with these requirements and how the Environmental Protection Agency interprets them.

1.1 PURPOSE

This document provides guidance on determining and interpreting ARARs, and highlights EPA's recommended approach to handling IDW in compliance with these requirements. The guidance is intended to assist site inspection managers (SM), EPA regional project officers (RPOs), EPA Site Assessment Managers (SAMs), state environmental agencies, potentially responsible parties (PRPs), and others involved in Superfund site assessment work. The approach presented reflects EPA's goal to protect human health and the environment, addresses the most typical scenarios that the SM may encounter, and describes cost-efficient methods of handling both hazardous and non-hazardous IDW.

1.2 ORGANIZATION OF THE GUIDANCE

This guidance consists of seven sections:

- Section 1 - Introduction.
- Section 2 describes regulatory requirements and policy concerns, with emphasis on Resource Conservation and Recovery Act (RCRA)[2] regulations.
- Section 3 discusses the distinction between IDW containing Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) hazardous substances and RCRA hazardous wastes based on their regulatory definitions.
- Section 4 stresses planning for IDW generation and management as the most important factor of the comprehensive approach to handling IDW. This section also presents the IDW disposal decision tree intended as a quick reference for site inspection managers.
- Section 5 describes the implementation of the IDW management plan.
- Section 6 discusses costs involved in both on-site and off-site IDW handling.
- Section 7 briefly describes available subcontracting procedures for IDW transportation and disposal.

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2.0 REGULATORY REQUIREMENTS AND POLICY CONCERNS

A variety of IDW are generated during CERCLA SIs. Many of these wastes contain substances considered hazardous under CERCLA or regulated under various federal statutes such as the Toxic Substances Control Act (TSCA), Clean Water Act (CWA), Safe Drinking Water Act (SDWA), Clean Air Act (CAA), and RCRA. Even though all of these statutes can be ARARs for CERCLA actions, the application of these laws to handling IDW generated during the SI can be difficult and confusing, since none specifically addresses the management of IDW generated during the SI.

The National Contingency Plan (NCP)[1] and the proposed amendment to the NCP[2] ("Procedures for Planning and Implementing Off-Site Response Actions") codifying the CERCLA off-site policy[4], present EPA's interpretation of how these laws apply to response action investigations such as SIs.

2.1 REQUIREMENTS OF CERCLA AND THE NCP

CERCLA authorizes EPA to respond to releases or threats of releases of hazardous substances into the environment. CERCLA response actions include removal actions, remedial investigations, and other response actions financed by Superfund. CERCLA Section 101 (23) defines "removal" to include actions that may be necessary to monitor, assess, and evaluate the release or threat of release of hazardous substances. Thus, CERCLA studies, site assessments, and field investigations are considered removal actions. The NCP directs that removal actions attain ARARs "to the extent practicable considering the exigencies of the situation" (unless the ARAR is waived) (see Section 300.415 (i) of the NCP). Practicability is assessed by examining factors such as the urgency of the situation and the scope of the removal action to be conducted. Section 2.2 of this guidance discusses procedures for CERCLA off-site actions.

The preamble to the NCP clarifies the extent to which ARARs apply to removal actions:

> "[Because] the purpose of removal actions generally is to respond to a release or threat of release of hazardous substances, pollutants, or contaminants so as to prevent, minimize, or mitigate harm to human health and the environment... [and] removals are distinct from remedial actions in that they may mitigate or stabilize the threat rather than comprehensively address all threats at a site... removal actions cannot be expected to attain all ARARs...Indeed, the imposition by Congress of limits on the amount of time and Fund money that may be spent conducting a removal action often precludes comprehensive remedies by removal actions alone" (55 FR 8695, March 8, 1990) (emphasis added).

Because investigative activities are categorized as removal actions, the preamble to the NCP sets out the following IDW management approach:

> "... the field investigation team should, when handling, treating or disposing of investigation-derived waste on-site, conduct such activities in compliance with ARARs to the extent practicable, considering the exigencies of the situation. Investigation-derived waste that is transported off-site (e.g., for treatability studies or disposal) must comply with applicable requirements of the CERCLA off-site policy" (55 FR 8756, March 8, 1990) (emphasis added).

In determining what is "practicable" in the context of an SI, the Agency may take into account the very limited scope and purpose of the activity, and in particular the fact that it is not intended to address contamination at the site (other than to gather information about it). This means that, as a general matter, actions taken at the SI that leave conditions essentially unchanged (such as returning soil cuttings to the location from which they were taken) should not require a detailed analysis of ARARs or assurance that conditions at the site after the action is taken will comply with ARARs. At the same time, site personnel should ensure that their handling of IDW does not create additional hazards at the site. (For example, leaving highly contaminated soil cuttings on the surface could create an additional risk of direct exposure.)

Potential ARARs include (but are not limited to) RCRA[2], TSCA, CWA, CAA, and state legally enforceable regulations. The most important ARARs for managing IDW are RCRA and TSCA (addressed in Sections 2.4 and 2.5 of this guidance). The preamble to the NCP discusses when CERCLA actions (including activities during SIs) constitute "land disposal," which triggers several significant requirements, including RCRA land disposal restrictions (LDRs)[5] (55 FR 8759-8762).

Section 300.400(g) (4) of the NCP defines state ARARs as "those state standards that are promulgated, are identified by the state in a timely manner, and are more stringent than federal requirements." Section 2.7 of this guidance discusses the issue of state ARARs.

Before ARARs can be determined, it is necessary to determine what contaminants, if any, are present in the IDW. Section 3.0 of this guidance discusses the process of identifying contaminants. In general, such identification should be done based on available information about the site and professional judgment rather than testing.

In brief, compliance with the NCP can generally be assured by:

(1) Identifying contaminants, if any, present in IDW based on existing information and best professional judgment; testing is not required in most circumstances.

(2) Determining ARARs (particularly RCRA and state laws), and the extent to which it is practicable to comply with them.

(3) Delineating an area of contamination (AOC) unit based on existing information and visual observation if soil cuttings are RCRA hazardous (see Section 2.4.2).

(4) Burying RCRA hazardous soil cuttings within the AOC unit, so long as no increased hazard to human health and the environment will be created. Containerization and testing are not required.

(5) Containerizing RCRA hazardous ground water and other RCRA hazardous IDW such as PPE, DE, and decontamination fluids for off-site disposal.

The following sections of this guidance provide guidelines for determining ARARs and identifying IDW.

2.2 OFF-SITE RESPONSE ACTIONS POLICY

CERCLA Section 121 (d) (3) requires that hazardous substances, pollutants, or contaminants that are transferred off-site for treatment, storage, or disposal during CERCLA response actions must be sent to facilities operating in compliance with RCRA and other applicable laws or regulations. In 1987, EPA issued a more detailed policy (the "off-site policy" – OSWER Directive No. 9834.11, November 13, 1987[6]) that describes procedures that must be followed when a response action under CERCLA involves off-site management of CERCLA wastes. This policy applies to all IDW that are transported to an off-site disposal facility, but does not itself require that all RCRA hazardous wastes and CERCLA hazardous substances be disposed off-site. Sections 2.4.3, 2.4.4, 2.5 and 2.6 of this guidance present the criteria that RCRA Subtitle C facilities, RCRA Subtitle D facilities, TSCA and CWA-regulated facilities must meet. The off-site policy is complex, and questions that arise should be referred to the appropriate EPA Office of Regional Counsel.

The off-site policy provides acceptability criteria for facilities that receive wastes from CERCLA-authorized or -funded response actions, including RCRA land disposal, treatment, storage, and permit-by-rule facilities, and for non-RCRA Subtitle C facilities (such as facilities permitted to receive waste under TSCA) that receive non-RCRA wastes. Section 2.4.3 of this guidance discusses requirements for RCRA facilities that receive such wastes. In addition, the off-site policy lists procedures for implementing off-site response actions, incorporates the SARA requirements, and provides detailed procedures for issuing and reviewing unacceptability determinations. Off-site actions must comply with applicable requirements of this policy.

The off-site policy also establishes criteria for selecting an appropriate disposal facility. The policy requires that all RCRA hazardous wastes and CERCLA hazardous substances (which include RCRA hazardous wastes as a subset) generated during CERCLA response actions that are transferred off-site be managed in facilities that are not only in compliance with RCRA and other federal and state requirements, but also meet the compliance and release criteria outlined in the policy.

EPA has proposed an off-site rule (Part 300.440 of the NCP) that would codify the requirements of CERCLA Sections 121 (d) (3) and the off-site policy, and prevent CERCLA response actions from contributing to present or future environmental problems "by directing these wastes to management units determined to be environmentally sound" (53 FR 48218, November 29, 1988[?]). Once the rule is issued in final form, it will supersede the policy. Note that the proposed off-site rule contains provisions regarding materials sent to laboratories for testing and analysis. These provisions do not relate to the types of IDW discussed in this guidance.

2.3 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

ARARs must be identified on a site-specific basis, and the site manager must determine whether a requirement is applicable and, if not, whether the requirement is relevant and appropriate. A requirement under environmental laws may be either "applicable" or "relevant and appropriate," but not both.

For dealing with IDW, the most important federal ARAR is RCRA because it specifically regulates all aspects of transportation, treatment, storage, and disposal of hazardous wastes. Other major federal ARARs of concern include CWA, CAA, SDWA, and TSCA. State ARARs should be attained where they are promulgated and legally enforceable (see Section 2.7 of this guidance).

Much of what is discussed in this guidance is directly applicable; however, there are instances where requirements may not be legally applicable, but are nethertheless relevant (addressing a similar situation or problem) and appropriate (being well-suited to a particular site). Relevant and appropriate requirements should be considered in the same way as those that are directly applicable. For instance, such situations might include circumstances where a highly toxic waste constituent is suspected, a large volume of waste may be generated or the nature of the property (e.g. residential or proximity to public facilities) is of concern. Section 4.6 of this guidance discusses factors identified for off-site disposal of IDW and management options when an ARAR has been determined.

2.4 RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)

The Resource Conservation and Recovery Act (RCRA) of 1976, an amendment to the Solid Waste Disposal Act (SWDA) of 1965, was passed to protect human health and the environment, to conserve energy and natural resources, and to quickly reduce or eliminate the generation of hazardous wastes. RCRA currently has 10 discrete sections (Subtitles) that address specific waste management activities. Two of these Subtitles, and their implementing regulations, may be ARARs for IDW handling: Subtitle C (Hazardous Waste Management) and Subtitle D (Solid Waste Management).

The RCRA Hazardous and Solid Waste Amendments (HSWA) of 1984 established land disposal restrictions (LDRs) for RCRA hazardous wastes and mixtures of RCRA hazardous wastes with other substances, including those regulated under TSCA. Under RCRA regulations, restricted RCRA wastes may only be land disposed after treatment to specified levels. RCRA may be an ARAR for IDW handling if the IDW generated during the SI contain RCRA hazardous wastes. In that case, the SM should evaluate compliance (to the extent practicable) with LDRs.

2.4.1 LAND DISPOSAL RESTRICTIONS

Land disposal, as defined by RCRA Section 3004 (k), includes any placement of RCRA hazardous waste in a landfill, surface impoundment, waste pile, injection well, land treatment facility, salt dome or salt bed formation, or underground mine or cave. For LDR purposes, the Agency commonly uses "land disposal" and "placement" as synonymous terms.

For the purpose of the LDRs, HSWA divides RCRA hazardous wastes into several groups (e.g., First Third, Second Third, California list wastes) and specifies dates, referred to as the statutory deadlines, by which treatment standards for each group must be established. The final statutory deadline for wastes listed or identified before November 8, 1984 was May 8, 1990. For wastes identified after November 8, 1984, EPA must determine whether these wastes will be prohibited from land disposal within 6 months of listing or identification. If EPA fails to promulgate treatment standards within 6 months for newly identified wastes, the wastes can be land disposed without restriction until the appropriate treatment standards are promulgated. After the statutory deadline for wastes identified before November 8, 1984, the wastes are "restricted" or "prohibited" and cannot be disposed in land unless:

- The wastes are treated to meet promulgated treatment standards.
- It can be demonstrated that hazardous constituents will not migrate from the land disposal unit as long as the wastes remain hazardous.
- The wastes are subject to treatment standard variances.
- The specific waste has received a national capacity variance.

It should be noted that the NCP establishes a presumption that treatment to best demonstrated available technology (BDAT) standards is inappropriate as a standard for soil removed from CERCLA sites, and that a treatability variance is appropriate in such circumstances (see 55 FR 8760-8762).

To determine if LDRs are applicable to IDW management, the SM must evaluate whether:

(1) The IDW are RCRA hazardous waste.

(2) The RCRA hazardous waste is regulated under the LDRs.

(3) The anticipated approach to IDW management constitutes "placement" (land disposal) of the generated wastes. (For the purpose of the LDRs, EPA considers itself a waste generator when the response action involves treatment, storage, or disposal of RCRA hazardous wastes. If the SI does not involve RCRA hazardous IDW disposal, RCRA regulations are not triggered.)

LDRs apply only if the answer to all three questions is "yes." In some cases, as discussed in section 2.3, LDRs may be "relevant and appropriate" even if not strictly applicable.

2.4.2 AREA OF CONTAMINATION CONCEPT AND ITS IMPLICATIONS

An important consideration in determining whether LDRs apply is whether land disposal of IDW has occurred. If IDW are merely being moved within the same "area of contamination" (AOC), EPA does not consider "land disposal" to have occurred, so that LDRs are not triggered, even if IDW contain RCRA hazardous material. Therefore, if IDW are being moved only within an AOC, it is unnecessary to determine whether they are subject to LDRs.

EPA has not promulgated a regulatory definition of an AOC. However, the preamble to the NCP (55 FR 8760) states that "EPA generally equates the CERCLA area of contamination with a single RCRA land-based unit, usually a landfill." EPA noted that under RCRA, the term " 'landfill' could include a non-discrete land area on or in which there is generally dispersed contamination." The contamination in an AOC may vary in concentration and type of contaminant. Further guidance on the AOC concept is provided in 55 FR 8760 (March 8, 1990), 53 FR 51444 (December 21, 1988), and in Superfund LDR Guide #5 (OSWER Directive 9347.3-05, July 1989).

The AOC concept applies only to contaminated soil (and sediments) from the inspected site. The AOC concept does not affect the approach for managing IDW that did not come from the AOC, such as PPE, DE, decontamination fluids, and ground water. The latter materials, if RCRA hazardous, must be containerized and disposed off-site.

Examples of AOCs include: a waste source such as waste pit, landfill, waste pile along with the surrounding contaminated soil, or the sediments in a contaminated stream. Depending on site characteristics, one or more AOCs may be delineated. CERCLA sites often consist of several AOCs. To determine if separate AOCs can be delineated within the site, and if RCRA regulated wastes are present within the AOCs, the site manager should collect sufficient information about the site as early as possible, preferably prior to starting field work. Determining AOCs may prove difficult if there is little available information or no visual contamination. In such cases, site managers may use their best professional judgment to delineate AOCs (e.g., a small area immediately adjacent to a borehole may be part of an AOC if the area is covered with surface soil similar to soil from the borehole).

Once the AOC units are determined, the site manager must evaluate whether an anticipated IDW handling approach constitutes land disposal. In general, land disposal does not occur when wastes are:

- Moved within the unit.
- Capped in place.
- Treated in situ (without placing the waste in another unit for treatment).
- Processed within the AOC to improve structural stability (without placing the waste into another unit for processing).

Superfund LDR Guide #5, "Determining when Land Disposal Restrictions (LDRs) are Applicable to CERCLA Response Actions,"[5] states that land disposal occurs when:

- Wastes from different AOCs are consolidated into one AOC.
- Wastes are moved outside of an AOC (for treatment and storage) and returned to the same or a different AOC.
- Wastes are excavated from an AOC, transferred to a separate unit such as a tank, surface impoundment, or incinerator that is within the AOC, and then redeposited into the AOC.

In addition, land disposal occurs if wastes removed from an AOC are stored (e.g., placed in drums outside the AOC) prior to being returned to the AOC.

Thus, under the NCP, the AOC unit concept means that:

- Land disposal does not occur when wastes are left in place, or moved or stored within a single AOC unit.
- Leaving RCRA hazardous soil on-site within the AOC unit does not constitute disposal and does not

trigger RCRA regulations, unless the SM determines that the wastes would significantly increase risks to human health and the environment (e.g., fire or explosion) and must be disposed of off-site.

- RCRA hazardous ground water, decontamination fluids, PPE, and DE should be containerized and disposed off-site.
- Moving RCRA hazardous soil cuttings from one AOC to another AOC triggers the LDRs.

If IDW cannot be deposited within the delineated AOC, the site manager must comply with all LDRs to the extent practicable. This means that the IDW should be transferred to an off-site RCRA Subtitle C hazardous waste treatment, storage, or disposal facility that complies with the off-site policy.

2.4.3 REQUIREMENTS FOR RCRA SUBTITLE C TREATMENT, STORAGE, AND DISPOSAL FACILITIES

The RCRA Subtitle C standards[7] cover hazardous waste treatment, storage, and disposal (TSD) facilities. The specific standards govern installation, operation, inspection, and closure of containers, tanks, surface impoundments, waste piles, land treatment units, landfills, incinerators, and other units.

Off-site TSD facilities receiving IDW must have RCRA permits to operate. Facilities that are permitted under another statute to receive hazardous wastes are eligible for RCRA permits without filing RCRA permit applications. These facilities, referred to as "permit-by-rule," include ocean disposal barges or vessels, injection wells, and publicly-owned treatment works (POTWs). The NCP exempts EPA from the RCRA permitting requirement while conducting CERCLA actions on-site. However, EPA should attempt to consider RCRA storage regulations as relevant and appropriate when containerizing and storing wastes on-site, even though a permit application will not be filed.

Generally, the RCRA storage regulations require a generator to: (1) place the waste in containers or tanks; (2) satisfy the standards for containers or tanks; (3) clearly indicate the waste accumulation date on the containers; (4) mark the containers and tanks as "hazardous waste"; and (5) comply with the requirements for owners and operators of hazardous waste TSD facilities. In addition, LDRs prohibit the storage of RCRA restricted waste unless the storage is to accumulate sufficient quantities of the waste to promote proper disposal, treatment, or recovery. When storing hazardous waste for more than 90 days, the SM should consider the storage requirements of 40 CFR Parts 262 and 264 as relevant and appropriate and comply with them to the extent practicable unless the site falls within one of the following categories of waste generators:

1. Conditionally exempt small quantity generators (producing no more than 100 kilograms of hazardous waste in a calendar month), and
2. Small quantity generators producing between 100 kg and 1,000 kg of hazardous waste in a calendar month.

In the cases listed above, the SM will have to comply with the guidelines provided in 40 CFR Part 261.5(g)(2) and 40 CFR Part 262.34.

Any facility receiving IDW containing hazardous wastes must comply with all RCRA Subtitle C design, operation, and closure requirements. In addition, the off-site policy presents additional criteria for selecting an appropriate disposal facility. The most important criteria[4] that a RCRA Subtitle C facility must meet if it receives RCRA hazardous IDW are:

- There must be no record of any relevant violations at or affecting the receiving unit.
- There must be no releases at receiving units of land disposal, treatment, or storage facilities. Note that

a land disposal facility may consist of one or more land disposal units, including landfills, surface impoundments, land treatment units, and piles.

- There must be no significant releases (as determined by EPA) from non-receiving units at treatment and storage facilities that are not controlled by corrective action.
- Waste cannot be disposed of at any unit of a land disposal facility, if any one unit at the facility has releases that are not controlled by corrective action.
- The land disposal facility must demonstrate compliance with the minimum technology requirements of RCRA Section 3004 (o).

The off-site policy also applies to RCRA permit-by-rule facilities receiving RCRA hazardous waste. These facilities are subject to the same requirements as other RCRA Subtitle C facilities and must be inspected for compliance with the applicable RCRA requirements, as well as be inspected by the appropriate authorities for compliance with other applicable laws. Permit-by-rule facilities that receive only nonhazardous materials do not need RCRA permits but must be inspected by local agencies for compliance with applicable laws.

2.4.4 APPLICATION OF RCRA REQUIREMENTS TO IDW MANAGEMENT

RCRA requirements apply to management of IDW during SIs in the following manner: if IDW is stored or disposed off-site, then the SM must comply with all RCRA and ARAR storage requirements; if IDW are stored on-site, then the SM must comply with RCRA to the extent practicable.

Off-site management of RCRA hazardous IDW may also involve treatment, storage, and disposal of RCRA hazardous wastes in accordance with all applicable guidelines. For TSD facilities constructed solely as part of a CERCLA response action, RCRA operating permits are not required.

IDW generated during the SI may require on-site storage in containers while awaiting off-site disposal. Although CERCLA exempts response actions conducted entirely on-site from permit requirements (see CERCLA Section 121 (e) (1)), EPA's policy is to follow the storage regulation practices required for RCRA generators who wish to avoid obtaining permits (40 CFR Parts 240-280). These requirements are applicable if the site manager determines that the containerized IDW are RCRA hazardous waste. RCRA hazardous IDW containerized and stored on-site must be properly disposed within a regulatory timeframe. There are cases where this may not be possible and storage does not require a permit, although EPA should try to expedite removal as much as possible. Note that accumulation of IDW, even on-site, in units other than containers or tanks may result in creation of RCRA units that are subject to various RCRA requirements such as closure, permitting, and ground water monitoring.

2.4.5 CRITERIA FOR RCRA SUBTITLE D FACILITIES

RCRA Subtitle D[2] regulates disposal of nonhazardous wastes in facilities such as municipal landfills. RCRA nonhazardous IDW, such as personal protection equipment (PPE) and disposable equipment (DE), may be disposed of in a Subtitle D facility. Other RCRA nonhazardous IDW (e.g., soil cuttings or ground water) should go to a Subtitle D facility only in very rare circumstances (these wastes should be disposed on-site). The off-site policy establishes requirements for selecting an appropriate RCRA Subtitle D facility for IDW disposal:

- The facility must have a compliance inspection prior to receiving CERCLA IDW and this inspection must not identify any noncompliance with relevant federal and state regulations at or affecting the receiving unit.
- Environmentally significant releases (as determined by EPA) of hazardous substances must be controlled by corrective action.

2.5 TOXIC SUBSTANCES CONTROL ACT

RCRA nonhazardous IDW containing PCBs or asbestos must, in certain circumstances, be disposed of at facilities regulated under the Toxic Substances Control Act (TSCA). While asbestos is not a common contaminant at CERCLA sites, PCBs can be found at about 17 percent of CERCLA sites. Regulations governing the management of IDW containing PCBs, which are generally based on PCB concentrations in waste, are found at 40 CFR 761.60.

TSCA requirements for handling PCBs[6] call for incineration of PCB-contaminated liquid material with concentrations greater than 500 ppm. For liquid material with PCB concentrations between 50 and 500 ppm, the principal alternative to incineration is disposal in a TSCA chemical waste landfill. Any receiving unit must meet the compliance and release criteria for non-RCRA units as set out in the off-site policy, in order to be acceptable. These PCBs may also be destroyed by using a TSCA-approved method that provides a level of performance equivalent to incineration. Nonliquid PCBs at concentrations greater than or equal to 50 ppm may be incinerated, treated by a equivalent TSCA-approved method, or disposed in a TSCA chemical landfill. PCB-contaminated material with concentrations less than 50 ppm are generally not regulated under TSCA, and may be disposed in acceptable Subtitle D facilities.

Even though IDW containing PCBs alone are not RCRA hazardous wastes, IDW containing PCBs mixed with RCRA hazardous wastes are regulated under RCRA LDRs as part of the California list wastes[4,5]. Since PCBs can be governed by RCRA and TSCA, the SM must determine whether RCRA (in the case of PCBs mixed with RCRA wastes) or TSCA regulations, or both, are applicable.

2.6 CLEAN WATER ACT

The Clean Water Act (CWA) addresses site-specific pollutant discharge limitations and performance standards for specified industries to protect surface water quality. At the SI, the most likely situation involves indirect discharge of IDW water, regulated under CWA, to POTWs for treatment and disposal. A less likely situation may involve direct discharge, either on-site or off-site, to surface water.

RCRA hazardous wastewater can be disposed of at POTWs that have a RCRA permit-by-rule and that meet the off-site policy criteria for a facility receiving RCRA hazardous waste. Disposal at a POTW of nonhazardous wastewaters from CERCLA sites is an option[7,8] if the POTW is acceptable under the off-site policy (Appendix C). EPA regulations cover general and specific prohibitions on discharges[9] to POTWs.

The following criteria [10] should be used in selecting an appropriate POTW facility:

- Compliance with all applicable laws.
- The quantity and quality of the CERCLA IDW must be compatible with the POTW.
- The POTW must have no unpermitted "releases."
- The concentration of any hazardous substance must meet applicable pretreatment standards (CERCLA IDW cannot upset the facility's operation and violate the permit).
- The POTW must be in compliance with its National Pollutant Discharge Elimination System (NPDES) permit.
- The transport of IDW to the POTW and its placement in an impoundment must not create a potential for ground water contamination.

2.7 STATE REQUIREMENTS

State ARARs present an array of specific problems for CERCLA sites because their goals and methods often differ from federal environmental laws. CERCLA Section 121 and Section 300.400 (g) of the NCP provide that only those state standards that are promulgated, identified by the state in a timely manner, and more stringent than federal requirements may generally be ARARs. To be considered "promulgated," a standard must be legally enforceable and of general applicability. A waiver is available if the state standard is applied only to CERCLA sites[1]. When dealing with IDW, SMs must comply (to the extent practicable) with state promulgated and enforceable requirements that are more stringent than federal requirements.

State hazardous waste regulations are among the most important environmental laws that may differ, in some states, from federal law. EPA has authorized some states to administer and enforce RCRA hazardous waste management programs. Regulations in these states may be more stringent or have a greater scope of coverage than the federal RCRA requirements. If the CERCLA site is in a state with an authorized RCRA program, the RCRA requirements promulgated by the state will replace the federal requirements as potential ARARs.

In addition to state RCRA regulations, other state legally enforceable standards may govern the handling of wastes. However, the SM should be aware that ARAR waivers are generally available for state requirements specifically aimed at CERCLA sites (see CERCLA section 121(d)(4)(E); 40 CFR 300.430(f)(1)(ii)(C)(5).

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3.0 IDENTIFICATION OF INVESTIGATION-DERIVED WASTES

To properly deal with IDW from SIs, the SM must know whether IDW contain CERCLA hazardous substances, and whether these hazardous substances constitute either RCRA hazardous wastes or contaminants regulated under other statutes. This section is intended to help the SM ascertain the types of IDW generated during the SI and, in particular, to determine whether IDW are either RCRA listed or characteristic hazardous waste.

There are several types of IDW generated during the SI. Examples include the following: (1) soil cuttings and drill mud from soil boring or monitoring well installations; (2) purge water removed from wells before ground water samples are collected; (3) water, solvents, or other fluids used to decontaminate field equipment and PPE; and, (4) PPE and DE. These IDW can be contaminated with various CERCLA hazardous substances. To handle IDW in compliance with regulations, reasonable efforts should be made to characterize the wastes.

3.1 EXTENT OF EFFORTS TO CHARACTERIZE WASTES

The efforts made to characterize IDW should be consistent with the limited scope and purpose of the SI. In most cases, the limited scope of an SI makes it impracticable to characterize wastes to the same extent that might be done in a remedial investigation/feasibility study (RI/FS). In particular, Contract Laboratory Program (CLP) testing would not be warranted in most cases; instead, the nature of the wastes should be assessed by applying best professional judgment, using readily available information about the site (such as manifests, storage records, preliminary assessments, and results of earlier studies that may have been conducted and are available to the Agency, as well as direct observation of the IDW for discoloration, odor, or other indicators of contamination). The Agency has specifically indicated that IDW may be assumed not to be "listed" wastes under RCRA unless available information about the site suggests otherwise (53 FR 51444, December 21, 1988). Similarly, RCRA procedures for determining whether a waste exhibits RCRA hazardous characteristics do not require testing if the decision can be made by "applying knowledge of the hazard characteristic in light of the materials or process used" (40 CFR 262.11(c)). The level of such knowledge required to make a determination with respect to IDW may take into account considerations of practicability and should reflect the limited scope of the activity. In most instances, a determination may be possible based on available information and professional judgment.

The fact that extensive resources need not be used in characterizing IDW does not mean that IDW can be assumed to be nonhazardous unless clearly proven otherwise. Rather, the question is whether, given the limited information that is likely to be available, the SM considers it more likely than not that the wastes are hazardous.

It should be noted that characterizing IDW is only the first step. For example, once it has been determined that a RCRA hazardous waste is involved, the guidelines discussed in Section 2.4 for determining the extent to which RCRA requirements must be complied with should be considered. Furthermore, the degree of certainty with which IDW are characterized during site inspections will be less than during remedial actions. Therefore, even if the waste is deemed not to be RCRA hazardous, RCRA requirements may be considered relevant and appropriate under the specific circumstances at the site (see section 3.2.1).

3.2 RCRA HAZARDOUS WASTES AND CERCLA HAZARDOUS SUBSTANCES

Some CERCLA hazardous substances are RCRA hazardous wastes. Another category of CERCLA hazardous substances are PCBs, which are fairly common at CERCLA sites. Identification of RCRA hazardous wastes and PCB-contaminated IDW is important for making appropriate management decisions (see Sections 2.5, 3.2.1, and 3.2.2 of this guidance). The SM must know the difference between RCRA hazardous wastes and other CERCLA hazardous substances because the presence of RCRA hazardous IDW invokes special technical considerations and management decisions due to RCRA regulations (particularly the LDRs). EPA recommends using knowledge of IDW rather than testing the wastes to characterize them.

The SM should not assume that all IDW contaminated with CERCLA hazardous substances are RCRA hazardous wastes, in the absence of positive evidence (e.g., manifests, records, knowledge of generation processes) to support such an assumption. At the same time, however, the SM should determine whether IDW are RCRA hazardous wastes, to the extent practicable, as discussed above.

The most important characterization decision is whether IDW contain "hazardous waste" under RCRA. This is relevant to the ARAR status of LDRs and other RCRA requirements, and whether waste disposed of off-site must be disposed of in a Subtitle C or Subtitle D facility. A solid waste is a RCRA hazardous waste[7] if it contains a listed waste or exhibits any of the hazardous characteristics and is not excluded from regulation as a hazardous waste. (For purposes of the RCRA Subtitle C regulations, a solid waste is any discarded material (solid, sludge, liquid, and compressed gas) that is not excluded under SWDA.) IDW generated during the SI may either exhibit a RCRA characteristic or contain RCRA listed waste.

Under EPA regulations, soil and ground water may be considered contaminated environmental media. If they contain listed hazardous waste, they must be managed as RCRA hazardous wastes as long as they "contain" the listed waste. If IDW exhibit RCRA characteristics, they also have to be managed as RCRA hazardous wastes.

To properly handle IDW, the SM must make a reasonable effort to ascertain if they are RCRA hazardous. When the SM determines that IDW do not fall in any listed waste category and does not display RCRA characteristics, the wastes are not RCRA hazardous. Sections 3.2.1 and 3.2.2 help determine if IDW are RCRA characteristic wastes or if they contain RCRA hazardous listed wastes.

Even if the IDW do not contain RCRA "hazardous waste," the SM should determine whether they contain other CERCLA hazardous substances. CERCLA hazardous substances include, in addition to RCRA hazardous wastes, substances, elements, compounds, solutions, or mixtures designated as hazardous or toxic under CERCLA itself or under the authority of other laws such as TSCA, CWA, CAA, and SDWA. Therefore, even where RCRA is not applicable, one of these statutes may be an ARAR. EPA presents a list of these hazardous substances in 40 CFR Part 302.4, Table 302.4.

3.2.1 RCRA CHARACTERISTIC WASTES

A solid waste is a RCRA characteristic hazardous waste if it exhibits the characteristic of ignitability, corrosivity, reactivity (as defined in 40 CFR Part 261, Subpart C), or toxicity (toxicity characteristic leaching procedure, TCLP, as described in 55 FR 11796-11877, March 29, 1990[11]).

IDW exhibit ignitability if:

- They are a liquid, other than an aqueous solution containing less than 24 percent alcohol by volume, and have a flash point lower than 60°C (140°F).
- They are not a liquid and are capable, under standard temperature and pressure, of causing fire and, when ignited, create a hazard.
- They are an ignitable compressed gas as defined in 49 CFR 173.300.
- They are an oxidizer as defined in 49 CFR 173.151.

IDW exhibit <u>corrosivity</u> if:

- They are aqueous and have a pH less than or equal to 2 or greater than or equal to 12.5.
- They are a liquid and corrode steel at a rate greater than 6.35 mm (0.25 inch) per year at a test temperature of 55°C (130°F).

IDW exhibit <u>reactivity</u> if:

- They are normally unstable and readily undergo violent change without detonating.
- They react violently with water.
- They form potentially explosive mixtures with water.
- When mixed with water, they generate toxic gases, vapors or fumes that pose a danger to human health or the environment.
- They are a cyanide- or sulfide-bearing waste capable of (at the pH range of 2 to 12.5) generating toxic gases that can present a danger to human health or the environment.
- They are capable of detonation or explosive decomposition.
- They are a forbidden explosive as defined in 49 CFR 173.51.

IDW exhibit <u>TCLP-toxicity</u> when its leachate contains certain contaminants at levels exceeding their regulatory thresholds[10]. The TCLP has replaced the EP-toxicity test for identifying RCRA characteristic wastes. The new procedure expands the number of chemicals regulated as hazardous wastes by adding 25 organic constituents to the previous RCRA list of toxic chemicals, and by establishing regulatory levels for these chemicals (Appendix C). The TCLP is designed to determine the mobility of both organic and inorganic contaminants present in liquid, solid, and multiphasic wastes. A water containing less than 0.5 percent dry solid material, filtered through a 0.6 to 0.8-um glass fiber filter, is defined as the TCLP extract. If this extract contains a regulated compound above its threshold level, then the water is hazardous by TCLP characteristic. If the filtered extract from the solid phase contains a regulated compound above its threshold level, then the solid material is RCRA hazardous.

To identify RCRA characteristic waste[1], the SM may rely on knowledge of the properties of the substances from, for example, the Material Safety Data Sheets (MSDS) prepared by manufacturers, or on the results of tests described in 40 CFR 261.21 - 261.24. EPA recommends using knowledge of the properties of materials instead of testing since most CERCLA wastes do not exhibit these RCRA characteristics. Therefore, the SM should not test IDW, particularly if they are a soil of known RCRA characteristics, the AOC concept is applicable, and the wastes will be buried on-site.

3.2.2 RCRA LISTED HAZARDOUS WASTES

Any type of IDW that contains listed hazardous wastes should be considered a RCRA hazardous waste. EPA has developed four lists of RCRA hazardous wastes according to the sources of their origin and toxicity (40 CFR Part 261, Subpart D). These lists contain:

- Wastes from nonspecific sources (F wastes). Examples include spent halogenated solvents (tetrachloroethylene, methylene chloride), nonhalogenated solvents (xylene, acetone, ethyl ether), still bottoms from the recovery of these spent solvents, and some wastewater treatment sludges.

- Wastes from specific sources (K wastes). Examples include wastewater treatment sludges from the production of zinc yellow and chrome green pigments, and still bottoms from the distillation of benzyl chloride.

- Discarded commercial chemical products, manufacturing intermediates, off-specification (off-spec) chemicals (which, if they met specifications, would be listed), and container and spill residues that are "acutely hazardous" (P-wastes). Examples include aldrin and phosgene.

- Discarded commercial chemical products, manufacturing chemical intermediates, or off-spec commercial chemical products that are "toxic" (U-wastes). Examples include chlorobenzene and mercury.

To ascertain whether IDW constitute RCRA listed hazardous waste, the SM must first determine if the IDW contain a component that may be a listed hazardous waste, and then decide whether that component meets the regulatory description of that listed waste.

For example, to determine if solvents contaminating IDW are RCRA spent solvent F001-F005 wastes, the SM must know if:

- The solvents are spent and cannot be reused without reclamation or cleaning.

- The solvents were used exclusively for their solvent properties.

- The solvents are spent mixtures and blends that contained, before use, a total of 10 percent or more (by volume) of the solvents listed in F001, F002, F004, and F005.

If the solvents contained in the IDW are RCRA listed wastes, the IDW are RCRA hazardous waste. When the SM does not have guidance information on the use of the solvents and their characteristics before use, the IDW cannot be classified as containing a listed spent solvent. When the solvents are not listed and IDW are not a characteristic waste, the IDW should be declared nonhazardous.

For other F and K wastes, the SM must know the generation process information (about each waste contained in the RCRA waste) described in the listing. For example, for IDW to be identified as containing K001 wastes that are described as "bottom sediment sludge from the treatment of wastewaters from wood preserving processes that use creosote and/or pentachlorophenol," the SM must know the manufacturing process that generated the wastes (treatment of wastewaters from wood preserving process), feedstocks used in the process (creosote and pentachlorophenol), and the process identification of the wastes (bottom sediment sludge).

P and U wastes cover only unused and unmixed commercial chemical products, particularly spilled or off-spec products. Not every waste containing a P or U chemical is a hazardous waste. To determine whether a CERCLA IDW contains a P or U waste, the SM must have direct evidence of product use. In particular, the SM should ascertain, if possible, whether the chemicals are:

- Discarded (as described in 40 CFR 261.2(a) (2)).

- Either off-spec commercial products or a commercially sold grade.

- Not used (soil contaminated with spilled unused wastes is a P or U waste).

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- The sole active ingredient in a formulation.

Identification of a listed waste requires a great deal of care on the part of the SM, particularly if the IDW have to be disposed off-site. For instance, depending on its source and prior use benzene may be an F waste, U waste, or not a RCRA hazardous waste at all. The waste identification process requires access to manifests, storage records, records of waste sources and their prior use, and other information that is reasonably ascertainable during the SI. Visual inspection of the site or the waste generating process will sometimes be sufficient.

IDW from many SIs will not fit the definition of RCRA hazardous listed waste due to limited information. If there is a probability that investigation-derived soil cuttings contain a RCRA listed waste, and a site manager intends to leave them on-site within the AOC unit, a thorough evaluation of the waste is not necessary.

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4.0 PLANNING FOR IDW GENERATION AND MANAGEMENT

The most important phase of IDW management is planning for waste generation and handling before field activity starts. In the planning phase of work, the SM must decide if IDW can be left on-site or must be disposed off-site. Since some sites may have both RCRA hazardous and RCRA nonhazardous IDW, the SM must be familiar with the NCP, and appropriate sections of RCRA, TSCA, CWA, and other relevant statutes.

Handling of RCRA hazardous IDW and IDW with high PCB concentrations (greater than 50 ppm) may involve either moving the IDW within an AOC unit, or containerization, storage, testing, treatment, and off-site disposal. Handling of RCRA nonhazardous IDW usually involves various methods of on-site disposal. EPA prefers to leave both RCRA hazardous and nonhazardous IDW on-site whenever it complies with regulations and does not pose any immediate threat to human health and the environment. This approach speeds up the site assessment process while avoiding high costs of off-site disposal, particularly when off-site disposal does not result in any benefits to human health and the environment.

The approach to IDW generating and handling must be described in the SI work plan which is subject to EPA approval. The SM must base the approach on available information and best professional judgment. The work plan should describe the logic behind the proposed approach to IDW handling, and in particular:

- Methods of waste quantity minimization.
- Types of waste.
- Quantity of waste.
- ARARs of concern, and limits of practicability in light of the scope of the SI.
- On-site and off-site handling methods, where necessary.
- Delineated AOCs for RCRA waste to be handled on-site.
- Containerization, storage, testing, and pick-up methods for wastes to be disposed off-site.

The description of the approach to IDW handling must be as detailed as possible, so the inspection team can execute the work plan without any major problems in the field. If the SI results in generating any IDW off-site, they should be handled the same way as if they were generated on-site.

4.1 AUTHORITY TO MANAGE IDW

EPA views IDW management as an inherent part of the site investigation process authorized under CERCLA Section 104 (e) (4). Should a site owner refuse to provide access, EPA has the authority to issue an administrative order, or seek a court order, to gain site access for environmental sampling. Non-compliance with such an order may result in imposing the sanctions authorized under CERCLA Section 104 (e) (5), including penalties.

EPA believes the approach contained in this guidance to be reasonable and protective of human health and the environment. The limited scope and purpose of the SI activity is not intended to address contamination at a particular site (other than to gather information about it). Generally, SI activities that leave conditions essentially unchanged (e.g., returning soil cuttings to the location from which they were taken) will comply with ARARs. The SM should seek to obtain the appropriate management approach for IDW outlined in this guidance when negotiating site access agreements.

Note, however, that some site circumstances may warrant exceptions to the IDW management approach outlined in this guidance. The SM should use professional judgment in recognizing situations where special steps are required to avoid creating additional threats to human health and the environment. When substantial doubt exists regarding the scope of EPA's authority to carry out the proposed plan for IDW management, the SM should consult legal counsel.

4.2 WASTE MINIMIZATION

The SM should select investigation methods that minimize the generation of IDW, particularly RCRA hazardous wastes. The SI team should limit contact with contaminants, and use drilling and decontamination methods (such as steam cleaning) that minimize PPE, DE, decontamination fluids, and soil cuttings. In particular, the inspection team should minimize the amounts of solvents used for decontamination or eliminate solvents. Minimizing the amount of wastes generated reduces the number of IDW handling problems and costs of disposal. The waste minimization approach should be addressed in the SI workplan.

4.3 TYPES, HAZARDS, AND QUANTITIES OF IDW

To handle IDW properly, the SM must determine the types (such as soil cuttings, ground water, decon fluids, PPE or DE), characteristics (whether RCRA hazardous or containing other CERCLA hazardous substances), and quantities of anticipated wastes. As discussed in Section 3.1, testing will generally not be required to characterize waste to the extent appropriate for an SI. In addition to direct observation of the IDW for evidence of contamination, the SM should review and analyze all available information about the site such as:

- Results of previous EPA preliminary assessments or site investigations.
- Environmental permits.
- Results of inspections by state, local, or federal agencies, or private parties.
- Records from community relations interviews.
- Any other helpful data such as tax records or aerial photography.

Upon ascertaining the types of anticipated IDW, the SM should determine IDW characteristics, in particular whether the anticipated waste is RCRA hazardous (see Section 3.2 of this guidance) or contains high concentrations of PCBs. For RCRA hazardous IDW, the SM should determine whether the IDW pose an increased hazard to human health and the environment relative to conditions that existed prior to the SI. Whenever field analytical screening instruments are used during the SI, the SM may plan to evaluate the analytical results as helpful indicators of IDW characteristics. However, the SM must remember that most of these tests are not RCRA tests, and that the test results usually do not identify RCRA hazardous wastes. The SM must also determine the exact properties of RCRA nonhazardous IDW to select an appropriate disposal facility (e.g., POTW) when the circumstances require off-site disposal.

Upon determining the types and characteristics of IDW to be generated, the SM must assess the anticipated quantities which vary depending on the size of a site and the scope of the SI. As a point of reference, a typical SI may result in generating a range of 1 to 3 drums of PPE and DE, 50 to 1,500 gallons of decontamination water, 1 to 3 pints of other decontamination fluids (e.g., organic solvents) and, depending on the number of wells installed or sampled, 0 to 13 drums of soil cuttings and 0 to 200 gallons of well purge water. The SM should calculate the quantity of the anticipated soil cuttings and ground water from the dimensions of wells and the depth to the ground water table. The SM should use experience to assess the amount of decontamination fluids (decontamination water and organics), PPE, and DE.

4.4 DECISION TREE

Upon designating IDW either RCRA hazardous or RCRA nonhazardous, the SM should determine the appropriate handling approach. The SM should use the decision tree (Figures 1, 2, and 3) which, combined with the SM's best professional judgment, will help select the best approach for IDW management and the steps that are involved in executing the approach. The decision tree indicates when and how IDW should be handled on-site or disposed off-site.

The decision tree summarizes basic elements of planning for IDW handling such as waste minimization, characterization, and management. It shows the steps that must be followed in the process. For example, the "Plan for Waste Management According to IDW Characteristic" branch (Figure 1) indicates that the SM has two options: either to handle IDW on-site or to dispose of it off-site. If the SM's decision is to leave IDW on-site, then the "On-Site Handling" branch (Figure 2) indicates what choices and steps can be involved in this approach depending on the type of IDW. The "Off-Site Disposal" branch (Figure 3) of the decision tree presents options available for handling IDW off-site and steps involved in executing these options. The SM should select one of the available options for a given type of IDW.

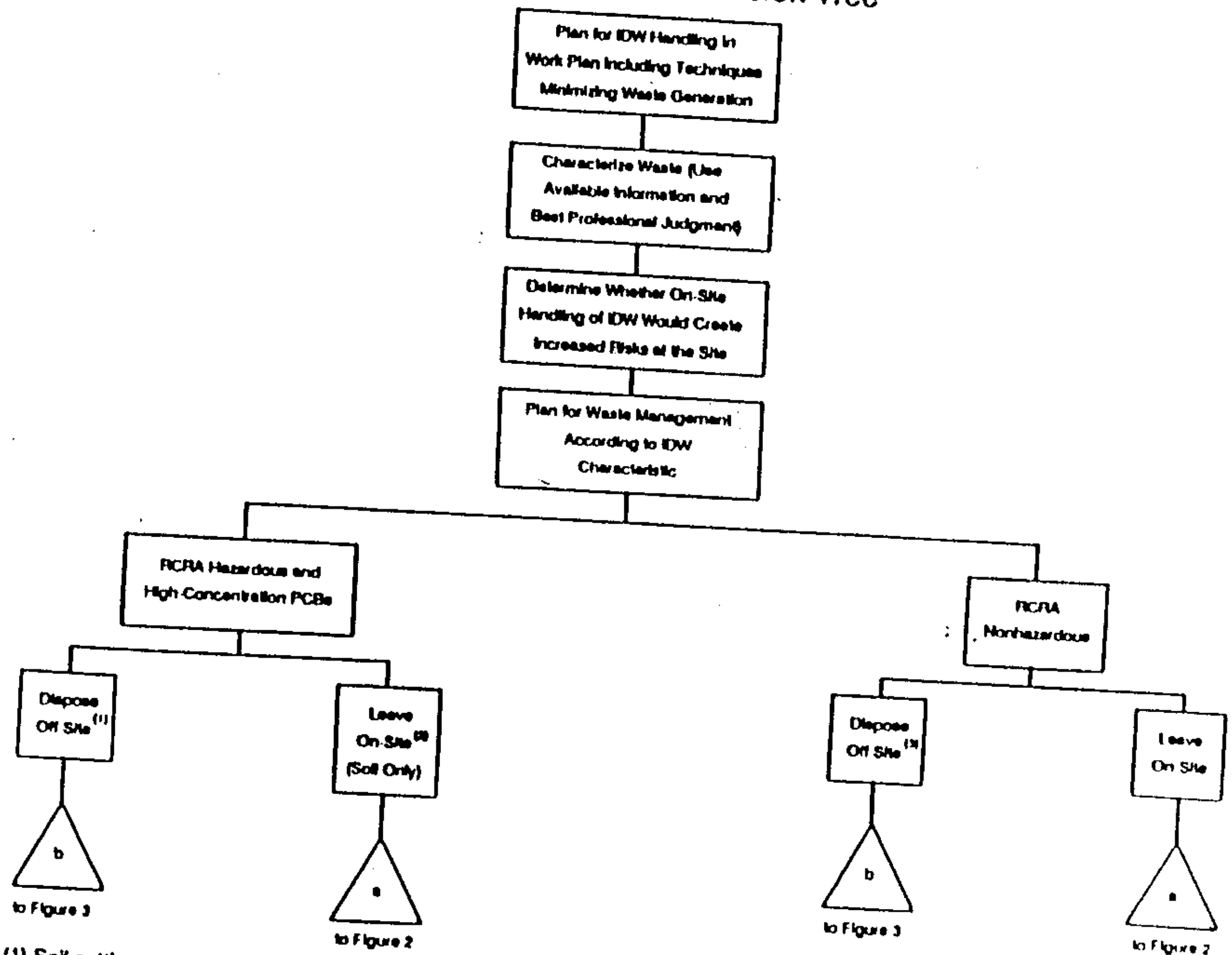
For example, when IDW from the same site are expected to encompass ground water, PPE, DE, decontamination fluids, and soil cuttings that are RCRA hazardous (or contaminated with PCBs) wastes, the decision tree (Figures 1, 2) calls for either handling the cuttings on-site in an AOC unit, or in the site's existing treatment or disposal unit (TDU), or disposing of them off-site. EPA prefers to handle most IDW on-site, but if circumstances require, the off-site option is also available. If PPE and DE can be decontaminated and, according to the SM's best professional judgment, rendered nonhazardous, the decision tree indicates (Figure 3) that these wastes should be double-bagged, and deposited either in an industrial dumpster (on-site or at the EPA warehouse), or in a municipal landfill (RCRA Subtitle D facility). If the SM anticipates that PPE and DE cannot be rendered RCRA nonhazardous after decontamination and the total quantity of IDW generated exceeds 100 kg at an individual site, the decision tree indicates (Figures 1,2) that the wastes should be drummed and disposed off-site at an appropriate facility by a subcontractor, and the SM should start the subcontracting process before field activity begins. If the total quantity of RCRA hazardous PPE and DE is less than 100 kg and this quantity represents the entire amount of IDW generated during the SI, the small quantity waste generator exemption applies and the wastes can be disposed of in a municipal landfill with state approval. However, EPA prefers to send even small quantities of RCRA hazardous PPE and DE to RCRA hazardous waste facilities.

The decision tree points out that when the ground water is RCRA nonhazardous (the most common situation), the water may be managed on-site (Figure 2) using one of a few simple techniques. If decontamination fluids are RCRA nonhazardous, they should be handled similarly. The decision tree indicates (Figure 3) that RCRA hazardous organic decontamination fluids should be handled off-site.

Sections 4.5 and 4.6 of this guidance present the details of EPA-preferred approaches to IDW management.

Figure

IDW Management Decision Tree



(1) Soil cuttings, ground water, and decontamination fluids creating increased hazards at the site should be disposed off-site. Before and after the SI, determine anticipated waste quantity and applicable regulations for waste generators.

(2) If not prohibited by other legally enforceable requirements such as state ARARs.

(3) Justified only in rare circumstances when a RCRA nonhazardous waste is a state hazardous waste and state legally enforceable requirements call for waste removal, or if leaving the waste on-site would significantly affect human health and the environment.

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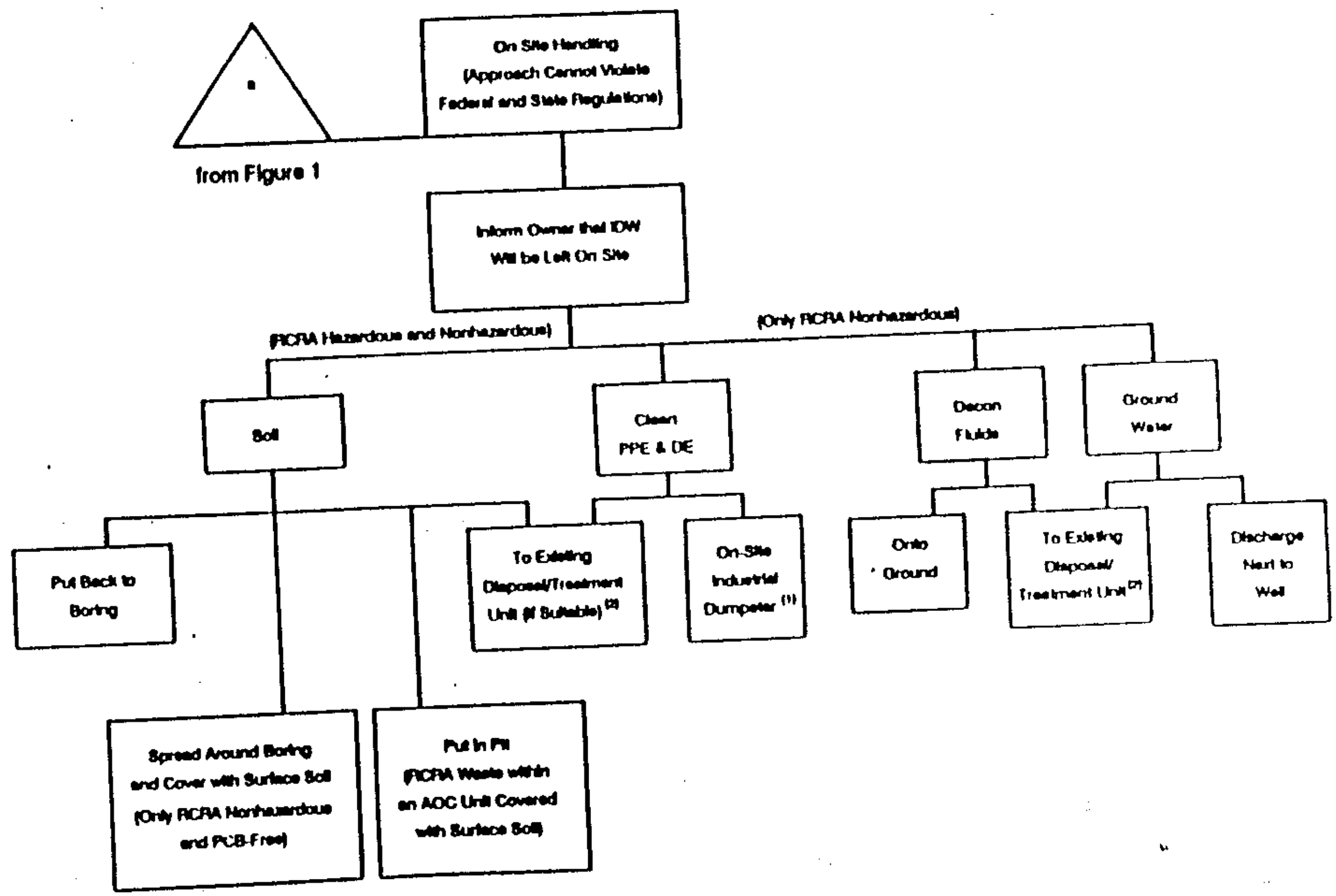
Figure 2

IDW Management Decision Tree

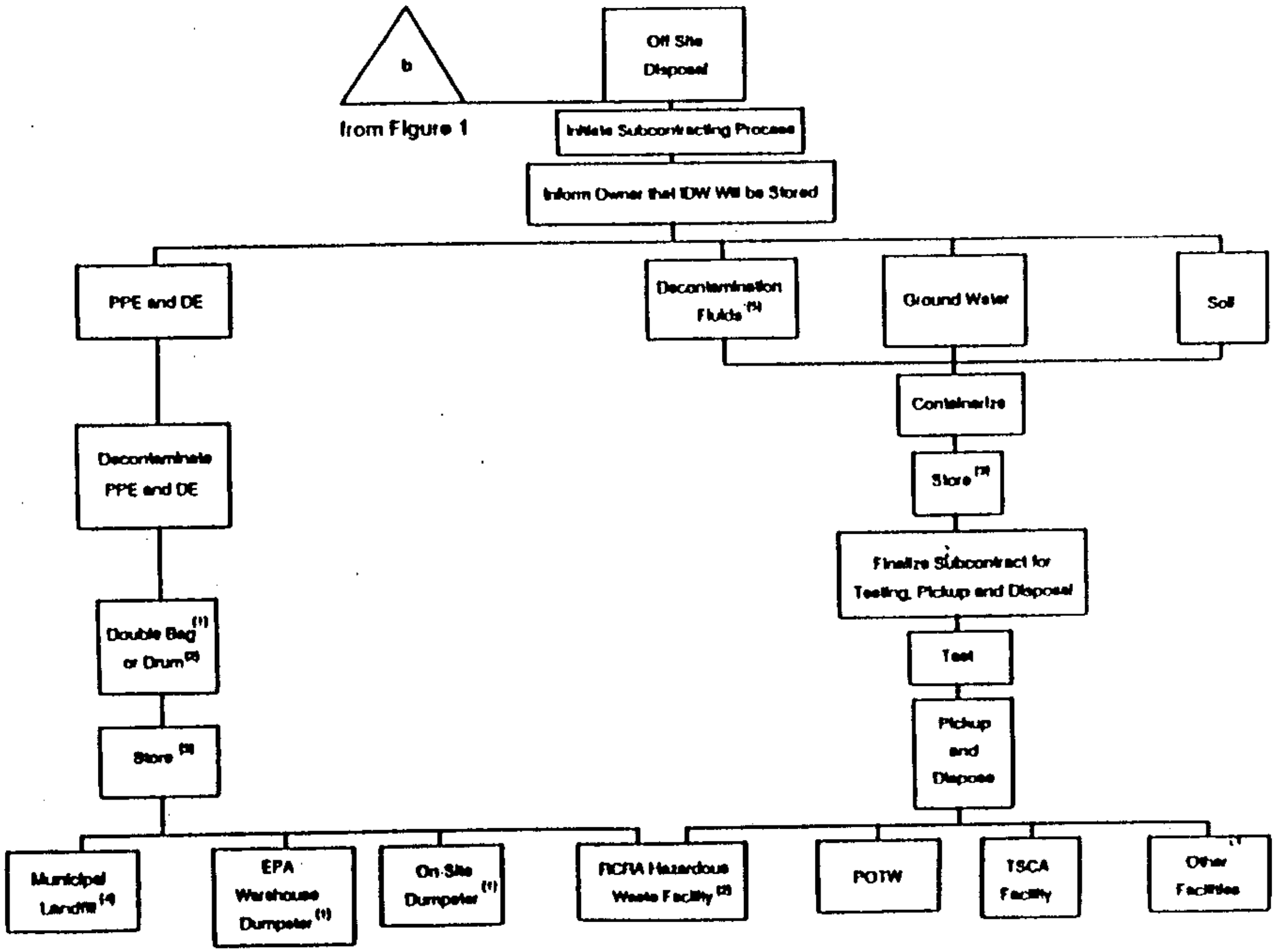


(1) Clean PPE and DE may also go to the nearest landfill or to an EPA warehouse dumpster.

(2) If the receiving unit meets the off-site policy acceptability criteria.

Figure 3

IDW Management Decision Tree



(1) Only RCRA nonhazardous waste.

(2) Only RCRA hazardous waste generated in quantities greater than 100 kg/month when sent off-site.

(3) In accordance with accumulation requirements for RCRA hazardous wastes.

(4) Only if the conditionally exempt small quantity generator exception applies.

(5) If the conditionally exempt small quantity generator exception applies, off-site disposal of decon fluids may not require subcontracting

4.5 ON-SITE IDW HANDLING AND MANAGEMENT OPTIONS

If IDW are RCRA nonhazardous soil or water, they should be left on-site unless other circumstances, such as a state ARAR or a high probability of serious community concerns, require off-site disposal. RCRA hazardous soil also may be left on-site within an AOC unit. The SM must determine procedures for handling IDW on-site and notify the site owner in the site access agreement form that IDW such as soil cuttings and water will be left on-site. If the SM intends to leave IDW on-site, the waste should not be containerized and tested.

The on-site handling options available to the SM when IDW are RCRA nonhazardous are listed below.

- For soil cuttings:

  1. Spread around the well
  2. Put back to the boring
  3. Put into a pit within an AOC
  4. Dispose of at the site's operating TDU.

- For ground water:

  1. Pour onto ground next to the well to allow infiltration
  2. Dispose of at the site's TDU.

- For decontamination fluids:

  1. Pour onto ground (from containers) to allow infiltration
  2. Dispose of at the site's TDU.

- For decontaminated PPE and DE:

  1. Double bag and deposit in the site or EPA dumpster, or in any municipal landfill
  2. Dispose of at the site's TDU.

If IDW are considered RCRA nonhazardous due to lack of information on the waste hazard, the inspection team should have an alternative plan for handling IDW if field conditions indicate that these wastes are hazardous. In such a case, the minimum requirement is to have an adequate number of containers available for collecting ground water, decontamination water, or soil cuttings.

If IDW consist of RCRA hazardous soils that pose no immediate threat to human health and the environment, the SM should plan on leaving it on-site within a delineated AOC unit. However, before deciding to leave RCRA hazardous soil on-site, the SM must consider the proximity of residents and workers in the surrounding area. The SM must always use best professional judgment to make such decisions. Planning for leaving RCRA hazardous soil on-site involves:

- Delineating the AOC unit.

- Determining pit locations close to the borings within the AOC unit for waste burial.

- Covering hazardous IDW in the pits with surficial soil.

- Not containerizing and testing wastes designated to be left on-site.

Another alternative for handling RCRA hazardous soil is disposal in a TDU located on the same property as the AOC under investigation. If the TDU is outside the AOC, it must comply with the off-site policy. If any organic decon fluids are generated (which are RCRA hazardous wastes), they should be disposed of off-site in compliance with the off-site policy or in compliance with the conditionally exempt small quantity generator exemption. Small quantities (i.e., no more than 100 kg/month) of organic decon fluids may be containerized off-site prior to delivery to a hazardous waste facility.

4.6 OFF-SITE DISPOSAL OF IDW AND MANAGEMENT OPTIONS

IDW should be disposed off-site in the following situations:

- They are RCRA hazardous water.
- They are RCRA hazardous soil that may pose a substantial risk if left at the site.
- They are RCRA hazardous PPE and DE.
- If leaving them on-site would create increased risks at the site.

RCRA nonhazardous wastes could be disposed of off-site at appropriate RCRA nonhazardous facilities that are in compliance with CERCLA section 121(d)(3) and the off-site policy when it is necessary to comply with legally enforceable requirements such as state ARARs that preclude onsite disposal. IDW designated for off-site disposal must be properly containerized, tested, and stored before pick-up and disposal. Decontaminated PPE and DE should be double-bagged if sent to an off-site dumpster or a municipal landfill.

Planning for off-site disposal should include the following EPA guidelines:

- Incorporating a provision in the site access agreement form to inform the site owner that containerized IDW may be temporarily stored on-site while awaiting pickup for off-site disposal. The agreement should also request the owner's cooperation.

- Initiating the bidding process for IDW testing, pick-up, and disposal. If there are any subcontracting needs in planning for off-site disposal, EPA should specify what means of disposal will be needed (i.e. various types of treatment, landfilling, etc.). Since RCRA hazardous IDW must go to RCRA hazardous waste disposal facilities that comply with the off-site policy, the SM should obtain a list of available facilities from the RPO. Each EPA region maintains a list of RCRA hazardous TSD facilities that meet the conditions of the off-site policy. The recent addition of 25 new toxicity characteristic constituents to the list of toxic chemicals subject to RCRA hazardous waste regulations may result in fewer facilities available to handle IDW in the future. The SM must also check the selected facility's compliance before IDW pick-up. If IDW are RCRA nonhazardous, the SM must also check if the receiving RCRA nonhazardous waste facility complies with the off-site policy.

- Coordinating IDW generation with testing and pick-up. IDW samples should be collected in accordance with the "Test Methods for Evaluating Solid Waste" guidance manual (SW 846), and shipped for RCRA tests (and other tests, if necessary) as early as possible during the SI. This approach shortens the storage time and reduces the number of site visits to pick up waste. IDW need not be analyzed by a CLP laboratory. The SM should use the laboratory services of the pickup and disposal subcontractor, obtain an EPA ID number and manifest form for RCRA hazardous IDW, and a bill of lading for RCRA nonhazardous IDW.

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- Preparing adequate numbers and types of containers. Drums should be used for collecting small amounts of IDW. Larger amounts of soil and water can be contained in Baker tanks, poly tanks, and bins. PPE and DE should be double-bagged for disposal at a municipal landfill or collected in drums for disposal at a hazardous waste facility.
- Designating a storage area (either within the site's existing storage facility, existing fenced area, or within a temporary fence constructed for the SI). No humans, children in particular, may have access to the storage area. If a temporary storage facility is to be constructed, its location and size must be agreed upon with the site owner, and all construction materials should be delivered to the site before or on the first day of the SI.

EPA expects that complying with this guidance will limit on-site storage to, at most, the time required to complete any testing (usually less than 6 weeks) required by subcontractors in order to arrange for transportation. In most cases, this will not result in exceeding the regulatory 90 day storage time for quantities greater than 1,000 kg/month regardless of the quantity of IDW. In cases where the regulatory 90 day storage time for quantities greater than 1,000 kg/month is exceeded, the SM must initiate a subcontract bidding process to remove IDW wastes off-site and a permit is not required.

All IDW shipped off-site, whether RCRA hazardous or not, must go to facilities that comply with the off-site policy, and the SM must check that subcontractors operate in accordance with this policy.

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5.0 IMPLEMENTING THE IDW MANAGEMENT PLAN

The work plan describing the anticipated approach and procedures for IDW management should be clear, detailed, and concise to allow the field team to follow without problems. The plan should also be flexible enough to allow slight modifications due to unexpected and unforeseen field conditions. The SM should document implementation of the work plan in the field log book and describe the appearance of IDW as well as any modifications to the original handling approach. The SM must also ensure that IDW is handled in a fashion that does not generate public concerns.

5.1 ON-SITE IDW MANAGEMENT

If ground water or decontamination fluids are to be collected during the SI, adequate numbers and types of containers must be delivered to the site before the SI starts. The SM must check if the containers are clean and measure the pH of containerized waters even if these waters were originally determined to be RCRA nonhazardous. When the work plan calls for ground water to be poured onto the ground next to the well, then the SM must verify the original determination (e.g., pH testing) before allowing the water to infiltrate the ground.

If the SM, using best professional judgment, renders PPE and DE RCRA nonhazardous after decontamination, the materials are to be double-bagged and the SI team should take them to either the on-site or EPA warehouse dumpster, or to a municipal landfill. The location of PPE and DE disposal should be described in the field log book.

If the work plan calls for on-site management of <u>RCRA hazardous soil cuttings</u>, a shallow pit should be made close to the borings within a delineated AOC unit. IDW should then be buried in this pit and covered with surficial soil. The SM may decide to have more than one IDW burial pit within an AOC unit. The appearance of the generated IDW, and the size and location of the pit, must be described in the field log book.

If the work plan indicates that both RCRA hazardous and nonhazardous IDW are to be disposed in an operating treatment and disposal unit located on the same property as the IDW sources (but outside the AOC), then the SM must verify that the unit complies with the requirements of the off-site policy at the time of disposal.

5.2 OFF-SITE DISPOSAL OF IDW

Off-site disposal of RCRA hazardous and nonhazardous IDW involves the following common elements:

- Coordinating IDW handling.
- Identifying and verifying an acceptable disposal facility before the SI.
- Finalizing the subcontract.
- Containerizing IDW.
- Labeling containers.
- Storing containers.
- Sampling and testing of IDW.
- Transporting IDW off-site.

- Disposing at a disposal facility.

- Documenting the process.

Coordination of IDW handling is important because it affects the schedule and costs of the SI. Most coordination must be done before field activity starts. Before starting the field work, a subcontractor should be selected so the SM can coordinate field work and IDW generation with the subcontractor's sampling, testing, pick-up, and disposal activities. Before containerizing IDW, the SM should check the containers to ensure they are clean and do not contain any residues from past use. All filled containers should be dated and labeled as either RCRA hazardous or RCRA nonhazardous and stored in a safe manner in compliance with relevant regulations. The SM should also obtain an EPA ID number for a RCRA hazardous waste from the RPO.

If a temporary storage facility must be constructed, the SM should have all construction materials, such as chain-link fencing, posts, and other needed materials, delivered to a location agreed upon with the site owner before the SI. The SM should ensure that the storage time is short and never exceeds the regulatory 90 days for RCRA hazardous waste even if the small quantity generator exemption applies.

The SM should check that the subcontractor collects IDW analytical samples for the disposal facility "profile analysis" using EPA-recommended methods described in "Test Methods for Evaluating Solid Waste Physical/Chemical Methods" - SW 846. One composite sample should be collected from each large container or from a group of drums. Small samples of soil cuttings or drilling mud should be taken from several locations and depths of the handling containers, homogenized in a decontaminated bucket, and placed in sampling jars. Sampling of PPE and DE should be avoided. The SM should also ensure that the chain-of-custody form for shipping IDW samples is used. When the subcontractor's analysis confirms that IDW is a RCRA restricted hazardous waste, the SM should check that the subcontractor:

- Treats the IDW to meet the treatment standards (if needed) before land disposal.

- Complies with the LDR notification requirements of 40 CFR Part 268.

Containerized and tested RCRA hazardous IDW must be accompanied by a Hazardous Waste Manifest (and other forms required by state laws) if hauled off-site. RCRA nonhazardous IDW should have a bill of lading if transported off-site. The SM must obtain all required forms, fill them out clearly and completely, and have the forms signed by the RPO. The SM, if authorized, may sign the forms on behalf of EPA. Before transporting IDW to the selected facility, the SM must verify the facility's compliance with the off-site policy at the time of disposal. If the facility's status has changed since the award of the contract, (due to receiving citations or fines), the SM is responsible for finding a replacement facility without delay. The SM must receive a copy of the IDW analytical results and a confirmation of disposal from the subcontractor.

6.0 IDW HANDLING COSTS AND SUBCONTRACTING

This section presents and compares the costs of both on-site and off-site IDW management with emphasis on the costs of off-site disposal. The costs presented here are for general reference.

The costs of off-site IDW disposal have been increasing for several years and this trend is expected to continue in the future. Off-site IDW handling involves the use of a subcontractor to haul and dispose IDW in an appropriate facility that complies with the off-site policy. Most wastes generated during the SI and designated for off-site disposal are liquids, either RCRA hazardous or nonhazardous, which go to either RCRA wastewater treatment plants or POTWs. Solid IDW usually go to land disposal facilities.

On-site IDW handling, the EPA-preferred approach, involves the use of a variety of simple techniques for leaving the IDW in existing waste areas. These techniques include pouring RCRA nonhazardous decontamination fluids and ground water onto the ground, and burying soil cuttings in a shallow pit in the investigation area.

6.1 ON-SITE IDW MANAGEMENT

On-site IDW handling generally incurs no costs and does not delay the SI. Drums may be needed for collecting water. However, these drums will be recovered and reused on other SIs, so the cost of purchasing drums, distributed over several SIs, is negligible. The cost of digging shallow pits can be covered under the drilling subcontract. Spreading soil cuttings around the boring, or pouring ground water onto the ground, incurs no costs.

6.2 OFF-SITE DISPOSAL OF IDW

Handling IDW off-site involves hiring a subcontractor to provide transportation, testing, and disposal services. This approach allows the waste generator to select the most technically advanced and economically suitable disposal facility that complies with regulations. However, off-site management has several disadvantages including: (1) increasing costs of the services; (2) loss of control over the fate of IDW while still being liable for the waste; (3) potential for accidental spills during transportation; (4) difficulty in finding a suitable disposal facility; and (5) the reluctance of states to accept out-of-state wastes for disposal.

The costs of off-site IDW handling consist of the following elements: (1) containerization; (2) testing; (3) transportation; and (4) disposal. The costs of containers (usually 55-gallon drums) used to collect waste is about $50/drum. These containers may be purchased by either EPA or the subcontractor. The cost of containers purchased by subcontractors is usually higher, therefore, the SM may decide to purchase all necessary containers.

The cost of the "profile analysis," performed by the subcontractor to verify the waste hazard prior to transport is between $40 and $300/sample. The total cost of the analysis depends on the number of samples and the parameters analyzed. The cost of transportation varies depending on factors such as the distance between the site and the disposal facility, the number of drums (the price per drum is lower when more drums are transported), and whether the pickup service is set for an individual generator or for several waste generators which is less expensive. In 1990, the estimated price range for waste transportation (regardless of whether IDW are hazardous) was between $35 to $600/drum.

The costs of disposal depend on the waste hazard, matrix, and amount. The ranges of costs per drum are presented below:

- RCRA nonhazardous liquid: $12.50 - 345/drum
- RCRA hazardous liquid: $155 - 550/drum
- RCRA nonhazardous solid: $66 - 135/drum
- RCRA hazardous solid: $145 - 615/drum

Additional costs of handling IDW off-site include:

- Storage.
- Field trips (to assist in waste sampling and pickup).
- Procurement expenses.

If IDW on-site storage is not available before pickup, a chain-link fence can be built at an average cost of $600 ($300 for the materials and $300 for labor). The cost of procurement is estimated at about $300 per site. The cost of the field trips depends on the coordination of waste generation, testing, and pickup.

The site manager must select a subcontractor before field work is completed, so the subcontractor can collect IDW samples for the "profile analysis" while the SM is still on-site. This approach requires only one more field trip to assist in the waste pickup. If two additional trips are needed (one for collecting IDW samples and one for IDW pickup), the costs of IDW disposal increase significantly. For example, if there are two drums to dispose of, the transportation, testing, and disposal cost is $700, and one field trip costs $500, the total cost of IDW handling is $1,200. An additional field trip would result in a total cost of $1,700, a 42 percent increase.

The approximate cost ranges of managing one drum of IDW off-site, depending on the waste hazard, are presented below:

WASTE	CONTAINER ($)	TEST ($)	TRANSPORTATION ($)	DISPOSAL ($)	STORAGE PROCUREMENT AND FIELD TRIPS ($)	TOTAL* ($)
RCRA Hazardous Solid	50	20-150	35-600	145-615	233	500-1650
RCRA Non-Hazardous Solid	50	20-150	35-600	66-135	233	400-1200
RCRA Hazardous Liquid	50	20-150	35-600	155-550	233	500-1600
RCRA Non-Hazardous Liquid	50	20-150	35-600	12.50-345	233	350-1400

* Based on the following assumptions: (1) 6 drums/site, (2) 1 sample/2 drums and, (3) only one field trip required for waste pickup at a cost of $500/6 drums ($83/drum).

The role of the SM in coordinating field activities, the subcontracting process, and IDW management is crucial to reducing the costs of IDW management. Disposing IDW off-site always results in high costs regardless of the waste hazard because there is no significant difference between the costs of disposal of hazardous and nonhazardous wastes. The SM should apply the most efficient management techniques to lower the costs of IDW handling whenever possible, and when such practices do not threaten human health and the environment.

6.3 SUBCONTRACTING

To implement subcontracting services for off-site disposal of IDW, the SM should refer to Federal guidelines. These guidelines are available from the Federal Aquisition Regulations (FAR). Federal Superfund contractors generally follow these guidelines.

Names of these subcontractors are available from either a local telephone directory, a state environmental agency list (in some states), or from the Hazardous Materials Control Directory (published annually by the Hazardous Materials Control Research Institute. Waste management facilities of all prospective bidders must be in compliance with the off-site policy during the bidding process and when the IDW are transported and disposed of. The SM and EPA are responsible for verifying the subcontractor's facility compliance with the policy. If the selected facility's status changes before the date of transport and disposal, the subcontract should be immediately awarded to the next lowest bidder if this bidder is able to meet the regulatory storage time limits.

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REFERENCES

1. 40 CFR Part 300, National Oil and Hazardous Substances Pollution Contingency Plan, Final Rule, 55 FR 8666-8865, March 8, 1990 (see Appendix A - Relevant Parts of the NCP).

2. 40 CFR Parts 240-280, Solid Waste Regulations, 1988.

3. 40 CFR Part 300.440, Amendment to the National Oil and Hazardous Substances Pollution Contingency Plan; Procedures for Planning and Implementing Off-Site Response Actions; Proposed Rule, 53 FR 48218-48234, November 29, 1988.

4. OSWER Directive 9834.11, November 13, 1987 - "EPA Off-Site Policy."

5. OSWER Directive 9347.3-05 FS, July 1989 - Superfund LDR Guide #5 (see Appendix B).

6. 40 CFR 761.60 - 761.79 - TSCA Regulations, 1988.

7. OSWER Directive 9330.2-4, April 15, 1986 - "Discharge of Wastewater from CERCLA Sites into POTWs" (see Appendix C).

8. "CERCLA Site Discharges to POTWs" - Guidance Manual (EPA/540/G-90/005, August 1990).

9. 40 CFR 403.5 CWA Regulations, 1988.

10. "CERCLA Compliance with Other Laws Manual" (Part I - EPA/540/G-89/006, Part II - EPA/540/G-89/009, 1989).

11. 40 CFR Part 261 et al., Hazardous Waste Management System; Identification and Listing of Hazardous Waste; Toxicity Characteristics Revisions; Final Rule 1990 (see Appendix D - TCLP Constituents Table).

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APPENDIX A to EPA/540/G-91/009

RELEVANT PARTS OF THE NCP

009201

federal register

Thursday
March 8, 1990

Part II

Environmental Protection Agency

40 CFR Part 300

National Oil and Hazardous Substances Pollution Contingency Plan; Final Rule

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300.420(c)(5) describes the information contained in a lead-agency report following completion of a remedial site investigation, including documentation as well as sampling data and potential risks to humans and the environment.

Response to comments: A commenter asked that the NCP state that reasonable efforts will be made during the site investigation phase to identify PRPs and provide them copies of the preliminary assessment/site investigation (PA/SI) report and an opportunity to comment.

The removal and remedial processes as currently outlined in the NCP provide PRPs with a reasonable opportunity to review and comment on lead agency actions at a site when the proposed plan is made available. Before this time, documents placed in the administrative record, including the PA/SI, are available for public inspection. In addition, PRPs that are interested in more extensive involvement in the investigation process may agree to undertake removal or remedial actions through a settlement agreement with EPA. They may be granted substantially more site involvement than non-settling PRPs.

Extending the formal review and comment period to PRPs as far back in the removal and remedial process as the PA/SI stage would unnecessarily slow down preliminary fact-gathering at a site. In cases where removal actions are considered emergency or time-critical, such review and comment time would unjustifiably delay response to a dangerous situation. Also, in most cases, the PRP search has not been completed or even started in a comprehensive manner at the time of the PA/SI. Accordingly, specifying formal procedures for PRP involvement at that time is not practical.

Final rule: EPA is promulgating §§ 300.410(c)(2) and 300.420(c)(5) as proposed.

Name: Section 300.410(g). Notification of natural resource trustee.

Final rule: Section 300.410(g) is revised as follows (see preamble discussion on § 300.615):

If natural resources are or may be injured by the release, the OSC or lead agency shall ensure that state and federal trustees of the affected natural resources are promptly notified in order that the trustees may initiate appropriate actions, including those identified in subpart G of this part. The OSC or lead agency shall seek to coordinate necessary assessments, evaluations, investigations, and planning with such state and federal trustees.

Name: Sections 300.415(b)(4) and 300.420(c)(4). Sampling and analysis plans.

Proposed rule: Proposed § 300.415 did not describe sampling requirements. Proposed § 300.420(c)(4) described the procedures necessary for preparing a site-specific sampling plan for a remedial site inspection.

Response to comments: One commenter stated that EPA should revise § 300.420(c)(4) to specify review of the sampling plan to ensure that appropriate sampling and quality control procedures are followed. In response, EPA is revising the description of the site-specific sampling plan in proposed § 300.420(c)(4) to conform with the purpose of the quality assurance project plan (QAPP) defined in § 300.5 and the QAPP and sampling and analysis plan described in § 300.430(b)(8), which states that such plans will be approved by EPA. This change emphasizes the similarity of these activities in the site evaluation and remedial investigation parts of the program. In addition, EPA believes that, when samples will be taken, it is appropriate to describe sampling requirements for non-time-critical removal actions to ensure that data of sufficient quality and quantity will be collected for this type of action.

EPA also notes that portions of the QAPP may incorporate by reference non-site-specific standardized portions of already-approved QAPPs, especially those portions addressing policy and organization, or describing general functional activities to be conducted at a site to ensure adequate data. This eliminates the necessity to reproduce non-site-specific quality assurance procedures for every site.

Final rule: Proposed §§ 300.415(b)(4) and 300.420(c)(4) are revised as follows:

1. In § 300.415(b)(4), a requirement has been added for developing a sampling and analysis plan, when samples will be taken.

2. Section 300.420(c)(4) is revised to better describe the required contents of the sampling and analysis plan.

Section 300.415. Removal Action.

Name: Section 300.415(b)(5)(ii). Removal action statutory exemption.

Proposed rule: CERCLA section 104(c)(1)(C) provides a new exemption to the statutory limits on Fund-financed removal actions of $2 million and 12 months. This exemption, stated in the NCP in § 300.415(b)(5)(ii), is applicable when continued response is otherwise appropriate and consistent with the remedial action to be taken. EPA expects to use the exemption primarily for proposed and final NPL sites, and only rarely for non-NPL sites (see 53 FR 51409).

Response to comments: One commenter supported EPA's proposal to allow waiver of the limits on Fund-financed removal payments if such an exemption is consistent with remedial actions.

One commenter stated that the decision to engage in a removal action should be based on site conditions and their impact on health and the environment, not cost or time; that once EPA concludes that a removal action is appropriate, the various alternatives should be analyzed at both likely NPL and non-NPL sites equally. The commenter felt that EPA should use the consistency exemption more liberally where time, rather than money, was the complicating factor.

In response, Congress has made the determination that cost and time are relevant factors in deciding how extensive a Fund-financed removal action may be; thus, contrary to the commenter's remark, EPA will continue to consider such factors. Further, Congress did not differentiate between time and dollar limits in setting the exemptions; EPA notes that exceeding the time limit will often also increase the cost of a removal action, even though it does not necessarily raise the cost to over $2 million. Thus, EPA does not believe it should set different criteria for their use.

The new exemption from the time and dollar limits applies to any Fund-financed removal and thus encomp[illegible]es state-lead as well as EPA-lead responses. Actions where EPA has the lead, but is to be reimbursed by private parties or other federal agencies, are still subject to the statutory limits and provisions for exemption.

Because the exemption requires consistency with the remedial action to be taken, its use is well suited to proposed or final NPL sites where remedial action is likely to be taken. It may also be appropriate to use this exemption at some non-NPL sites where justified on a case-by-case basis.

Final rule: EPA is promulgating the rule as proposed.

Name: Section 300.415(i). Removal action compliance with other laws.

Existing rule: The current NCP in § 300.65(f) requires that Fund-financed removal actions and removal actions pursuant to CERCLA section 106 attain or exceed, to the greatest extent practicable considering the exigencies of the circumstances, applicable or relevant and appropriate federal public health and environmental requirements. Other federal criteria, advisories, and guidance and state standards are to be

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responses and responses conducted by PRPs (emergency and time-critical removals are not covered by this policy). This notification should specify the type and quantity of waste involved, the name and location of the receiving facility and the expected schedule for the transfer of the CERCLA waste. Such notification will enable the recipient state to obtain from its permitted facilities any other information it may need in order to support the out-of-state action. Although this notification is neither mandated by CERCLA nor required by this regulation, EPA believes that adherence to this procedure will help to ensure that these waste transfers occur in a safe and expedient manner. The policy is explained in more detail in OSWER Directive No. 9330.2-07 (September 14, 1989).

Because CERCLA actions may be carried out under a number of mechanisms and by a number of parties (e.g., lead state agencies, other federal agencies, PRPs), EPA plans to issue additional guidance or regulations, if appropriate, to implement this notification policy.

Final rule: There is no rule language on this issue.

Applicable or Relevant and Appropriate Requirements

Introduction. The November 20, 1985 revisions to the NCP required that, for all remedial actions, the selected remedy must attain or exceed the federal applicable or relevant and appropriate requirements (ARARs) in environmental and public health laws. It also required removal actions to attain ARARs to the greatest extent practicable, considering the exigencies of the circumstances. The preamble to the 1985 revisions to the NCP stated that ARARs could be determined only on a site-by-site basis, and it included from EPA's October 2, 1985 Compliance Policy a list of potentially applicable or relevant and appropriate requirements. The preamble also provided a list of federal non-promulgated criteria, advisories and guidance, and state standards "to be considered," called TBCs. EPA also provided five limited circumstances in which ARARs could be waived.

On October 17, 1986, CERCLA was reauthorized with additional new requirements. Section 121 of CERCLA requires that, for any hazardous substance that will remain on-site, remedial actions must attain requirements under federal environmental or state environmental or facility siting laws that are applicable or relevant and appropriate under the circumstances of the release or threatened release at the completion of the remedial action. The statute also retained most of the waivers, with a few additions.

Although section 121(d)(2) basically codified EPA's 1985 policy regarding compliance with other laws, the section also requires that state standards are also potential ARARs for CERCLA remedial actions when they are promulgated, more stringent than federal standards, and identified by the state in a timely manner.

Furthermore, the CERCLA amendments provide that federal water quality criteria established under the Clean Water Act (CWA) and maximum contaminant level goals (MCLGs) established under the Safe Drinking Water Act, must be attained when they are relevant and appropriate under the circumstances of the release.

Today's revision to the NCP continues the basic concept of compliance with ARARs for any remedy selected (unless a waiver is justified). ARARs will be determined based upon an analysis of which requirements are applicable or relevant and appropriate to the distinctive set of circumstances and actions contemplated at a specific site. Unlike the 1985 revisions to the NCP, where alternatives were developed based on their relative attainment of ARARs, in today's rule recognition is given to the fact that ARARs may differ depending on the specific actions and objectives of each alternative being considered (for more discussion of this point, see preamble of proposal at 53 FR 51438, section 9).

In today's rule, EPA retains its policy established in the 1985 NCP of requiring attainment of ARARs during the implementation of the remedial action (where an ARAR is pertinent to the action itself), as well as at the completion of the action, and when carrying out removal actions "to the extent practicable considering the exigencies of the situation."

For ease of identification, EPA divides ARARs into three categories: chemical-specific, location-specific, and action-specific, depending on whether the requirement is triggered by the presence or emission of a chemical, by a vulnerable or protected location, or by a particular action. (More discussion of these types can be found in the preamble of the proposal at 53 FR 51437, section 6).

Response to comments: EPA received a few comments on general ARARs policies. One commenter argued that the remedial action should not necessarily have to attain the most stringent applicable or relevant and appropriate requirement if a less stringent requirement provides adequate protection of human health and the environment.

EPA disagrees. CERCLA requires that remedial actions comply with all requirements that are applicable or relevant and appropriate. Therefore, a remedial action has to comply with the most stringent requirement that is ARAR to ensure that all ARARs are attained. In addition, CERCLA requires that the remedies selected be protective of human health and the environment *and* attain ARARs. A requirement does not have to be determined to be necessary to be protective in order to be an ARAR. Conversely, the degree of stringency of a requirement is not relevant to the determination of whether it is an ARAR at a site and must be attained (except for state ARARs).

Another commenter asked for confirmation that variance or exemption provisions in a regulation can be potential ARARs as well as the basic standards. EPA agrees that meeting the conditions and requirements associated with a variance or exemption provision can be a means of compliance with an ARAR. For example, EPA expects that CERCLA sites will frequently be complying with the terms of the treatability variance under the RCRA land disposal restrictions (LDR) for soil and debris when LDR is an ARAR.

Limitations in a regulation, such as the quantity limitations that define small quantity generators under RCRA and affect what requirements a generator must comply with, will also affect what requirements are applicable at a CERCLA site. However, it is possible that a requirement could be relevant and appropriate even though the requirement is not applicable because of a limitation in the regulation.

Indian tribe commenters contended that ARARs should not be defined as promulgated laws, regulations, or requirements because some Indian tribe laws, which could apply to a Superfund cleanup, may not be promulgated in the same fashion as state or federal laws. CERCLA section 126 directs EPA to afford Indian tribes substantially the same treatment as states for certain specified subsections of CERCLA sections 103, 104 and 105; EPA believes, as a matter of policy, that it is similarly appropriate to treat Indian tribes as states for the purpose of identifying ARARs under section 121(d)(2). EPA realizes that tribal methods for promulgating laws may vary, so any evaluation of tribal ARARs will have to

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water; thus, the removal action might be limited to removal of the drums and surface debris and excavation of highly contaminated soil. Requirements pertaining to the cleanup of ground-water contamination would not be ARARs for that action because the removal action is not intended to address ground water; rather, requirements pertaining to the drums, surface debris, or contaminated soil may be ARARs for the specific removal action. Once the lead agency makes the determination that the requirements are ARARs for a removal, then it must determine whether compliance is practicable.

It will generally be practicable for removal actions to comply with ARARs that are consistent with the goals and focus of the removal. However, as stated above, removals are intended to be responses to near-term threats, with the ability to respond quickly when necessary; thus, ARARs that would delay rapid response when it is necessary, or cause the response to exceed removal goals, may be determined to be impracticable. Of course, even where compliance with specific ARARs is not deemed practicable, the lead agency for a removal must use its best judgment to ensure that the action taken is protective of human health and the environment within the defined objectives of the removal action.

In order to better explain how a lead agency can determine when compliance with an ARAR is practicable, the preamble to the proposed NCP included three factors for consideration: Exigencies of the situation, scope of the removal action and the statutory limits (53 FR 51410-11). Upon consideration of comments, EPA has decided to enumerate in the rule only two of those three factors as important for determining practicability: Urgency (simply renaming exigencies) of the situation, and scope of the removal action. EPA believes that statutory limits, because they relate to the authority to conduct removal actions, are easier to consider within, rather than apart from, the factor of scope of the removal action when determining whether compliance with an ARAR is practicable.

The factor of urgency of the situation relates to the need for a prompt response. In many cases, appropriate response activities must be identified and implemented quickly in order to ensure the protection of human health and the environment. For example, if leaking drums pose a danger of fire or explosion in a residential area, the drums must be addressed immediately, and it will generally be impracticable to identify and comply with all potential ARARs.

The second factor, the scope of the removal action relates to the special nature of removals in that they may be used to minimize and mitigate potential harm rather than totally eliminate it. Removals are further limited in the amount of time and Fund money that may be expended at any particular site in the absence of a statutory exemption. Again, using the example above, even though standards requiring cleanup of the lower level soil contamination would be an ARAR to that medium, they would be outside the scope of the removal action when such cleanup is not necessary for the stabilization of the site, or when it would cause an exceedance of the statutory limits and no exemption applied. Hence, such soil standards, while ARARs, would not be practicable to attain considering the exigencies of the situation. Of course, such standards may be ARARs for any remedial action that is subsequently taken at the site.

EPA disagrees with the comment that requiring PRPs to comply with ARARs to the extent practicable discourages PRPs from conducting removals because the statutory limits do not apply to non-Fund-financed actions. Although the limits apply by law to Fund-financed actions only, EPA has the discretion under CERCLA section 104(c)(1) to take removal actions that exceed those limits, in emergency situations or where the action is otherwise appropriate and consistent with the remedial action that may be taken at the site. EPA will select the appropriate remedy, even where an extensive removal action is warranted, regardless of whether the site is Fund-lead or PRP-based. The only difference is that if the site is Fund-lead, an exemption must first be invoked in order to proceed with the action. Thus, the time and dollar limitations generally will not result in PRPs performing a more extensive removal than EPA itself would conduct. That is, EPA's selection of a removal action, including what ARARs will be attained, will not be based on who will be conducting the removal.

Finally, as stated in the preamble to the proposed NCP (53 FR 51411), even if attainment of an ARAR is practicable under the factors described above, the lead agency may also consider whether one of the statutory waivers from compliance with ARARs is available for a removal action. EPA is developing guidance on the process of complying with ARARs during removal actions. EPA generally will only require documentation of ARARs for which compliance is determined to be practicable, in order not to burden OSCs with substantial paperwork requirements.

Final rule: Proposed § 300.415(j) (renumbered as final § 300.415(i)) is revised as follows:

1. The following has been added to identify factors that are appropriate for consideration in determining the practicability of complying with ARARs:

In determining whether compliance with ARARs is practicable, the lead agency may consider appropriate factors, including the following:

(1) The urgency of the situation; and

(2) The scope of the removal action to be conducted.

2. The reference to advisories, criteria or guidance has been modified (see preamble section below on TBCs).

3. The description of ARARs has been reworded (see preamble section below on the definition of "applicable.")

Name: Sections 300.5, 300.415(g) and (h), 300.500(a), 300.505 and 300.525(a). State involvement in removal actions.

Existing rule: Sections 300.61 and 300.62 of the current NCP encourage states to undertake actions authorized under subpart F. Such actions include removal and remedial actions pursuant to CERCLA section 104(a)(1). The regulation notes further that CERCLA section 104(d)(1) authorizes the federal government to enter into contracts or cooperative agreements with the state to take Fund-financed response actions authorized under CERCLA, when the federal government determines that the state has the capability to undertake such actions.

Proposed rule: Proposed § 300.415(h) and (i) (renumbered as final § 300.415(g) and (h)) and § 300.525(a) would codify EPA's existing policy of entering into cooperative agreements with states to undertake Fund-financed removal actions, provided that states follow all the provisions of the NCP removal authorities. The preamble to the proposed rule suggested that non-time-critical actions are the most likely candidates for state-lead removals (53 FR 51410). Proposed § 300.510(b) provided further that facilities operated by a state or political subdivision require a minimum cost share of 50 percent of the total response costs if a remedial action is taken. Section 300.505 describes what EPA and a state may agree to in a Superfund Memorandum of Agreement (SMOA) regarding the nature and extent of interaction on EPA-lead and state-lead response. The preamble clarified that, where practicable, a SMOA may include general provisions

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considered, as appropriate, in formulating a removal action.

Proposed rule: Proposed § 300.415(j) (renumbered as 300.415(i) in the final rule) required that removal actions attain, to the extent practicable considering the exigencies of the situation, all state as well as federal applicable or relevant and appropriate requirements (ARARs).[4] Other federal and state criteria, advisories, and guidance shall, as appropriate, be considered in formulating the removal action. The proposed revisions also note that statutory waivers from attaining ARARs may be used for removal actions. In addition, the preamble to the proposed revisions provided guidance clarifying three factors to be considered in determining the "practicability" of complying with ARARs: The exigencies of the situation, the scope of the removal action to be taken, and the effect of ARAR attainment on the removal statutory limits for duration and cost (53 FR 51410–11).

Response to comments: Several commenters supported the proposed revision to the NCP requiring that both federal and state ARARs be complied with when conducting removal actions. One commenter asked what documentation is required to show that ARARs have been identified and requested that EPA develop guidance providing hypothetical conditions describing the extent to which ARAR analysis should be performed. Another commenter stated that non-Fund-financed removal actions conducted at federal facilities also should be required to comply with ARARs.

In opposition to the proposal, a number of commenters pointed out that Congress did not intend that removal actions be required to comply with ARARs. The commenters suggested that, based on the legislative history, Congress intended that only remedial actions be subject to compliance with ARARs. According to one commenter, the legislative history states that ARARs do not apply during removal actions because removal actions are short-term, relatively low-cost activities of great urgency that should be free of the delays that may arise if it is necessary to identify and attain ARARs.

Other commenters suggested that attainment of ARARs should not be required during removal actions because removal actions are not intended to completely clean up a site, but rather to quickly eliminate or control an immediate threat. The commenters argued that compliance with ARARs is based on what remains on site after an entire remedy is completed, not after a particular problem is controlled. In addition, several commenters argued that the main purpose of the removal program is quick mitigation of threats, and that requiring ARARs to be complied with during removal actions undermines this purpose by slowing down the cleanup process. The commenters suggested that such procedural delays as identification of ARARs will hinder the removal program's ability to respond to emergencies swiftly.

Several additional commenters suggested that requiring attainment of ARARs discourages PRPs from undertaking removal actions. Fund-financed removals can use the statutory limits to limit attainment of ARARs; those limits do not apply to PRP actions.

One commenter opposed the provision that requires OSCs to justify why they are not attaining ARARs during a specific removal action. The commenter argued that the prospect of an OSC being required to justify why he or she is not attaining all ARARs is inconsistent with removal program objectives.

Other commenters believed that the current policy concerning compliance with ARARs during removal actions should be replaced with a more discretionary policy. They suggested that OSCs should only be required to comply with ARARs that are most crucial to the proper stabilization of the site and protection of public health and the environment.

In response, EPA has carefully reviewed this issue in light of the public comments, and believes a number of clarifying points need to be made. First, as a threshold matter, EPA agrees that Congress did not, in the 1986 amendments to CERCLA, "require" EPA to meet ARARs during removal actions. However, it has been EPA's policy since 1985, established in the NCP, to attain ARARs during removals to the extent practicable, considering the exigencies of the situation. EPA believes that this is still a sound policy. Reference to requirements under other laws (i.e., ARARs) help to guide EPA in determining the appropriate manner in which to take a removal action at many sites.

If, for example, a component of the removal action is to discharge treated waste to a nearby river or stream, effluent limitations based on federal or state water quality criteria will be useful in determining the extent of such treatment. Today's policy is consistent with section 105 of CERCLA which directs that the NCP include methods and criteria for determining the appropriate extent of removals. Thus, EPA is maintaining the policy described in the preamble to the proposed NCP, although EPA has modified the factors to be considered in determining practicability.

A number of other comments questioned the extent to which removals should attempt to attain ARARs. In responding to such comments, it is important to note that the policy that removals comply with ARARs to the extent practicable is defined in large part by the purpose of removal actions.

The purpose of removal actions generally is to respond to a release or threat of release of hazardous substances, pollutants, or contaminants so as to prevent, minimize, or mitigate harm to human health and the environment. Although all removals must be protective of human health and the environment within their defined objectives, removals are distinct from remedial actions in that they may mitigate or stabilize the threat rather than comprehensively address all threats at a site. Consequently, re[illegible] actions cannot be expected to atta[illegible] ARARs. Remedial actions, in contrast, must comply with all ARARs (or invoke a waiver). Indeed, the imposition by Congress of limits on the amount of time and Fund money that may be spent conducting a removal action often precludes comprehensive remedies by removal actions alone. Removal authority is mainly used to respond to emergency and time-critical situations where long deliberation prior to response is not feasible. All of these factors—limits on funding, planning time, and duration, as well as the more narrow purpose of removal actions—combine to circumscribe the practicability of compliance with ARARs during individual removal actions. Indeed, the vast majority of removals involve activities where consideration of ARARs is not even necessary, e.g., off-site disposal, provision of alternate water supply, and construction of fences, dikes and trenches.

Further, it should be noted that requirements are ARARs only when they pertain to the specific action being conducted. If, for example, a site has leaking drums, widespread soil contamination, and significant gr[illegible] water contamination, the removal [illegible]on at the site might only involve actions necessary to reduce the near-term threats, such as direct contact and further deterioration of the ground

[4] Note that proposed § 300.415(e) has been deleted (see preamble section above on "Listing sites in CERCLIS," and the remaining sections in § 300.415 have been renumbered.

be made on a case-by-case basis. Tribal requirements, however, are still subject to the same eligibility criteria as states, as described in § 300.400(g)(4).

Another commenter disagreed with EPA's position that environmental laws do not apply to a CERCLA response action unless incorporated by CERCLA section 121(d). This commenter argued that EPA has confused the ARARs concept with one of preemption of state law.

In response, SARA established a process, in CERCLA sections 121(d)(2) and (d)(4), for how federal and state environmental laws should apply to on-site CERCLA remedial actions, i.e., the ARARs process. Based on these provisions, CERCLA remedies will incorporate (or waive) state standards, as appropriate under CERCLA. Thus, although other environmental laws do not independently apply to CERCLA response actions, the substantive requirements of such laws will be applied to such actions, consistent with section 121(d) and NCP § 300.400(g).

EPA's interpretation that CERCLA response actions are required to meet state (and other federal) environmental law standards only to the limited degree set out in CERCLA is also necessary to comply with the special mandates in CERCLA to respond quickly to emergencies, and to perform Fund-balancing. The position that on-site CERCLA response actions are not independently subject to other federal or state environmental laws is a long-standing one, based on a theory of implied repeal or pre-emption. See, e.g., 50 FR 47912, 47917–18 (Nov. 20, 1985); 50 FR 5862, 5865 (Feb. 12, 1985); "CERCLA Compliance With Other Environmental Laws" Opinion Memorandum, Francis S. Blake, General Counsel, to Lee M. Thomas, Administrator, Nov. 22, 1985.

Following are summaries of major comments and EPA's responses on specific sections of the ARARs policy.

Name: Sections 300.5 and 300.400(g)(1). Definition of "applicable."

Proposed rule: "Applicable requirements" means those cleanup standards, standards of control, or other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site. The preamble to the proposed rule pointed out that there is generally little discretion in determining whether the circumstances at a site match those specified in a requirement (53 FR 51435–37).

Response to comments: One commenter suggested that language used in § 300.400(g)(4) of the proposed NCP which provides that "only those state standards that are promulgated and more stringent than federal requirements may be applicable or relevant and appropriate" be added to the definition of ARARs found in § 300.5.

In response, EPA notes that the definition it proposed already includes the condition that standards, whether federal or state, must be promulgated in order to be potential ARARs. EPA accepts this comment on stringency and has revised both §§ 300.5 and 300.400(g) to specify that in order to be considered ARARs, state requirements must be more stringent than federal requirements. EPA notes that, in general, state regulations under federally authorized programs are considered federal requirements.

A commenter supported the discussion of ARARs in the preamble to the proposed NCP, but remarked that the definitions of ARARs do not adequately reflect many of the important aspects mentioned in the preamble. EPA believes that the definitions stated in the rule are sufficiently comprehensive and that the information contained in the preamble to the proposed and final rules will help the public in applying the definitions.

One commenter asked why EPA had deleted rule language that applicable requirements are those requirements that would be legally applicable if the response action were not undertaken pursuant to CERCLA. In working with this definition, EPA found the previous definition confusing because it was stated in the conditional, i.e., requirements that would apply if the action were not under CERCLA. EPA revised the definition to explain more specifically what it means by applicable requirements to avoid any confusion. However, the 1985 wording is still a correct statement of the applicability concept. EPA is modifying the definition, however, to make it clear that the standards, etc. do not have to be promulgated specifically to address CERCLA sites.

Final rule: The proposed definition of "applicable" in §§ 300.5 and 300.400(g)(1) are revised as follows:

1. Consistent with the language in CERCLA section 121(d)(2), the description of federal and state laws in § 300.5 is revised to read:

"* * * requirements, criteria or limitations promulgated under federal *environmental* or state *environmental or facility siting law* * * *"

[Comparable changes are made in §§ 300.415(i), 300.430(e)(2)(i)(A), 300.430(e)(9)(iii)(B) and 300.430(f)(1)(ii)(C).]

2. The following sentence is added to § 300.5: "Only those state standards that are identified by a state in a timely manner and that are more stringent than federal requirements may be applicable."

3. In §§ 300.5 and 300.400(g)(1), the word "found" is added before "at a CERCLA site."

Name: Sections 300.5 and 300.400(g)(2). Definition of "relevant and appropriate."

Proposed rule: "Relevant and appropriate requirements" means those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site.

Section 300.400(g)(2) identified criteria that must be considered, where pertinent, to determine whether a requirement addresses problems or situations that are sufficiently similar to the circumstances of the release or remedial action that it is relevant and appropriate. The preamble to the proposed rule emphasized that a requirement must be both relevant and appropriate; this determination is based on best professional judgment. Also, the preamble stated that with respect to some statutes or regulations, only some of the requirements may be relevant and appropriate to a particular site, while others may not be (53 FR 51436–37).

Response to comments: 1. *General.* Several commenters expressed support in general for the revised definition of relevant and appropriate requirements and for the approach described in the proposal to identifying such requirements. Commenters in particular supported statements that a requirement must be both relevant, in that the problem addressed by a requirement is similar to that at the site, and appropriate, or well-suited to the circumstances of the release and the site, to be considered a relevant and appropriate requirement.

A few commenters recommended changes to the definition of relevant and appropriate requirements. One commenter suggested adding to the proposed definition that a relevant and appropriate requirement must be

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"generally pertinent," a phrase used in the preamble of the proposed NCP in discussing the analysis of the relevance of a requirement, while another suggested adding "pertinent" to the circumstances of the site, expressing concern that "generally pertinent" was overly broad. EPA believes that the concept of "pertinence" is adequately considered as part of the evaluation of what is relevant and appropriate (see discussion of factors for determining relevant and appropriate requirements, below). EPA does not believe that the suggested changes should be made in the definition itself.

Another commenter suggested revising the definition to emphasize the jurisdictional prerequisites of a potentially relevant and appropriate requirement, recommending that a relevant and appropriate requirement be defined as one that, "while not applicable, sufficiently satisfies the jurisdictional prerequisites for legal enforceability." EPA disagrees, because the jurisdictional prerequisites, while key in the applicability determination, are not the basis for relevance and appropriateness. Rather, the evaluation focuses on the purpose of the requirement, the physical characteristics of the site and the waste, and other environmentally- or technically-related factors.

Another commenter objected to the policy that some portions of a regulation could be found relevant and appropriate, while other portions would not be. The commenter believed that this policy would lead to confusion and inconsistency, although the commenter agreed that the application of this policy to RCRA closure requirements, described in the proposal, was useful. EPA believes that this policy is appropriate and reflects its experience in evaluating RCRA closure requirements and other requirements as relevant and appropriate. Finding some parts of a regulation relevant and appropriate, and others not, allows EPA to draw on those standards that contribute to and are suited for the remedy and the site, even though all components of a regulation are not appropriate.

This approach has been particularly valuable as applied to RCRA closure, where the two applicable regulations, clean closure and landfill closure, address only the two poles of a potential continuum of closure responses. When RCRA closure is relevant and appropriate, Superfund may use a combination of these two regulations, known as hybrid closure, to fashion an appropriate remedy for a site that is protective of both ground water and direct contact (for more discussion of hybrid closure, see preamble to the proposed NCP at 53 FR 51446).

2. *Factors for determining relevant and appropriate requirements.* One commenter suggested referencing the criteria described in § 300.400(g)(2) in the definition. EPA believes this is not appropriate because it could lead to confusion about the role of the criteria and result in greater emphasis on rigidly applying the criteria than is warranted.

Based on this latter comment and others about specific criteria in the proposal, EPA wants to clarify the role of the factors. (Note that the rule now refers to "factors" rather than "criteria.") EPA intends that the factors in § 300.400(g)(2) should be considered in identifying relevant and appropriate requirements, but does not want to imply that the requirement and site situation must be similar with respect to each factor for a requirement to be relevant and appropriate. At the same time, similarity on one factor alone is not necessarily sufficient to make a requirement relevant and appropriate. Rather, the importance of a particular factor depends on the nature of the requirement and the site or problem being addressed and will vary from site to site. While the factors are useful in identifying relevant and appropriate requirements, the final decision is based on professional judgment about the situation at the site and the requirement as a whole.

In addition, as EPA discussed in the proposal, a requirement must be both "relevant," in that it addresses similar situations or problems, and "appropriate," which focuses on whether the requirement is well-suited to the particular site. Consideration of only the similarity of certain aspects of the requirement and the site situation constitutes only half of the analysis of whether a requirement is relevant and appropriate.

After review of comments it received, EPA has revised the language in § 300.400(g)(2) because it is concerned that it was misleading. Some commenters viewed the analysis required by this section as requiring consideration only of the similarity of the requirement and the problems or situation at the CERCLA site. While non-substantive for the most part, the changes to § 300.400(g)(2) make clearer that a requirement and a site situation must be compared, based on pertinent factors, to determine both the relevance and appropriateness of the requirement. The rule also now uses the term "factors," rather than "criteria," a change instituted to avoid confusion with the nine criteria for remedy selection in § 300.430.

One commenter suggested that factors be developed for use in evaluating whether a requirement is "appropriate." EPA does not believe this is necessary. Decisions about the appropriateness of a requirement are based on site-specific judgments using the same set of factors already identified. In the abstract it is very difficult to separate out those factors to be considered for relevance and those to be considered for appropriateness. In specific cases it would be possible to say, for example, that a requirement is relevant in terms of the substances but not appropriate in terms of the facility covered.

Several commenters questioned whether certain factors could legitimately be considered in identifying relevant and appropriate requirements. These and other comments on individual factors are discussed below; a brief description of each factor as described in the proposed NCP is given after the name of the factor.

(i): Purpose of the requirement. This factor compared the purpose of a requirement to the specific objectives of the CERCLA action. One commenter was concerned that the "objectives for the CERCLA action" could include the implementability of the remedy, its cost, and even the acceptability of the action to the community. This is not what EPA meant by "objectives." Rather, EPA intended that this factor consider the technical, or health and environmental purpose of the requirement compared to what the CERCLA action is trying to achieve. For example, MCLs are promulgated to protect the quality of drinking water; this is similar in purpose to a CERCLA action to restore ground water aquifers to drinkable quality. To avoid confusion, EPA has simplified the factor, which now states, "the purpose of the requirement and the purpose of the CERCLA action."

(ii): The medium regulated by the requirement. This factor compared the medium addressed by a requirement to the medium contaminated or affected at a CERCLA site. No comments were received on this factor, and the final rule is essentially unchanged from the proposal.

(iii): The substances regulated by the requirement. This factor compared the substances addressed by a requirement to the substances found at a CERCLA site. Several commenters argued that RCRA requirements for hazardous waste should not be potentially relevant and appropriate to wastes "similar" but not identical to a hazardous waste, and

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that this criterion should be dropped. EPA disagrees and has discussed this issue in the section of this preamble on RCRA ARARs.

(iv): The entities or interests affected or protected by the requirement. This factor compared the entities or interests addressed by a requirement and those affected by a CERCLA site. Two commenters expressed concern about this factor. One commenter was concerned that it could be used to disqualify standards from being relevant and appropriate simply because the requirement regulated entities different from those at a CERCLA site. In contrast, another commenter was concerned that EPA would broadly apply requirements to entities that were never intended to be subject to the requirement. EPA agrees that this factor is confusing. EPA believes that the characteristics intended to be addressed by this factor are adequately covered under other factors, such as purpose and type of facility. Therefore, this factor has been eliminated.

(v): The actions or activities regulated by the requirement. This factor compared the actions or activities addressed by a requirement to those undertaken in the remedial action at a CERCLA site. No comments were received on this factor, and the final rule is essentially unchanged from the proposal.

(vi): Any variances, waivers, or exemptions of the requirement. This factor considered the availability of variances, waivers, or exemptions from a requirement that might be available for the CERCLA site or action. One commenter asked for clarification on this factor and expressed his view that the CERCLA waiver provisions for ARARs were the only waivers allowable. However, EPA believes that it is reasonable to consider the existence of waivers, exemptions, and variances under other laws because generally there are environmental or technical reasons for such provisions. These provisions are generally incorporated into national regulations because there are specific circumstances where compliance with a requirement may be inappropriate for technical reasons or unnecessary to protect human health and the environment. Again, this factor is only one that should be considered; even if a waiver provision in a requirement matches the circumstances at the CERCLA site, there may be other reasons why the requirement is still relevant and appropriate.

(vii): The type and size of structure or facility regulated by the requirement. This factor compared the characteristics of the structure or facility addressed by a requirement to that affected by or contemplated by the remedial action. One commenter argued that regulations routinely contain cut-offs based on type or size of the structure or facility for administrative or enforcement convenience. EPA agrees that cut-offs based solely on administrative reasons may not be critical in determining whether a requirement is relevant and appropriate. However, EPA believes that it is necessary and appropriate to consider the physical type or size of structure regulated because requirements may be neither relevant nor appropriate to structures or facilities that are dissimilar to those that the requirement was intended to regulate. In many cases, this factor is a very basic one: in identifying requirements relevant to landfills, one would turn to standards for landfills, not for tanks.

(viii): Consideration of use or potential use of affected resources in the requirement. This factor compared the resource use envisioned in a requirement to the use or potential use at a CERCLA site. One commenter objected to this factor based primarily on opposition to EPA's proposed ground water policy, which, along with the comments EPA has received on this issue, is discussed in the section on ground-water policy in the preamble discussion of § 300.430. EPA believes it is appropriate to compare the resource use considerations in a requirement with similar considerations at a CERCLA site.

Final rule: 1. The following sentence is added to the proposed definition of "relevant and appropriate" in § 300.5 (see preamble discussion above on "applicable"): "Only those state standards that are identified by a state in a timely manner and that are more stringent than federal requirements may be relevant and appropriate."

2. Proposed § 300.400(g)(2) is revised as follows:

(2) If, based upon paragraph (g)(1) of this section, it is determined that a requirement is not applicable to a specific release, the requirement may still be relevant and appropriate to the circumstances of the release. In evaluating relevance and appropriateness, the factors in paragraphs (g)(2)(i) through (viii) shall be examined, where pertinent, to determine whether a requirement addresses problems or situations sufficiently similar to the circumstances of the release or remedial action contemplated, and whether the requirement is well-suited to the site, and therefore is both relevant and appropriate. The pertinence of each of the following factors will depend, in part, on whether a requirement addresses a chemical, location, or action. The following comparisons shall be made, where pertinent, to determine relevance and appropriateness:

(i) The purpose of requirement and the purpose of the CERCLA action;

(ii) The medium regulated or affected by the requirement and the medium contaminated or affected at the CERCLA site;

(iii) The substances regulated by the requirement and the substances found at the CERCLA site;

(iv) The actions or activities regulated by the requirement and the remedial action contemplated at the CERCLA site;

(v) Any variances, waivers, or exemptions of the requirement and their availability for the circumstances at the CERCLA site;

(vi) The type of place regulated and the type of place affected by the release or CERCLA action;

(vii) The type and size of structure or facility regulated and the type and size of structure or facility affected by the release or contemplated by the CERCLA action;

(viii) Any consideration of use or potential use of affected resources in the requirement and the use or potential use of the affected resource at the CERCLA site.

Name: Section 300.400(g)(3). Use of other advisories, criteria or guidance to-be-considered (TBC).

Proposed rule: The preamble to the proposed rule provided that advisories criteria or guidance to-be-considered (TBC) that do not meet the definition of ARAR may be necessary to determine what is protective or may be useful in developing Superfund remedies (53 FR 51438). The ARARs preamble described three types of TBCs: health effects information with a high degree of credibility, technical information on ho[w] to perform or evaluate site investigations or remedial actions, and policy.

For example, proposed § 300.400(g)(3) stated that other advisories, criteria, and guidance to be considered (TBCs) shall be identified, as appropriate, because they may be useful in developing CERCLA remedies. Proposed § 300.415(j)(§ 300.415(i) in the final rule) stated that other federal and state criteria, advisories, and guidance shall, as appropriate, be considered in formulating the removal action. Proposed § 300.430(b) stated that during project scoping the lead agency shall initiate a dialogue with the support agency on potential ARARs and TBCs. Proposed § 300.430(e)(2) provided that other pertinent information may be used to develop remediation goals. Proposed § 300.430(e)(8) provided that the lead agency shall notify the support agency of the alternatives to be analyzed to facilitate the identification of ARARs and TBCs. Proposed § 300.430(f) on selecting a remedy, however, referred to compliance with ARARs only, not TBCs. Proposed subpart F required that the

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Final rule: References to TBCs will be changed in the following sections to make it clear that their use is discretionary rather than mandatory: §§ 300.400(g)(3), 300.415(i), 300.430(b)(9), 300.430(d)(3), 300.430(e) (8) and (9), 300.505(d)(2)(iii), 300.515(d) and (d) (1) and (2), and 300.515(h)(2).

Name: Sections 300.400 (g)(4) and (g)(5). ARARs under state laws.

Proposed rule: Section 300.400(g) specified that only promulgated state standards may be considered potential ARARs. A promulgated state standard must be legally enforceable and of general applicability. The term "legally enforceable," according to the preamble to the proposed NCP, means that state laws or standards which are considered potential ARARs must be issued in accordance with state procedural requirements and contain specific enforcement provisions or be otherwise enforceable under state law. The preamble also explained that "of general applicability" means that potential state ARARs must be applicable to all remedial situations described in the requirement, not just CERCLA sites (53 FR 51437–38).

The preamble also discussed a dispute resolution process to be followed if there is disagreement about the identification of ARARs, as well as policies to be followed if a state insists that a remedy attain a requirement not determined to be ARAR (see 53 FR 51437 and 51457).

Response to comments: Commenters on this subject called for EPA to establish a formal procedure to be followed by states to demonstrate that proposed state ARARs are legally enforceable and of generally applicability. Commenters suggested that states be required to provide legal citations from appropriate sections of state laws, as well as appropriate citations to legal authority for issuing compliance orders, obtaining injunctions, or imposing civil or criminal penalties in the event of noncompliance. These citations, according to commenters, would demonstrate that proposed ARARs are legally enforceable.

Commenters suggested that general applicability could be demonstrated by requiring states to identify the chemicals, locations, and cleanup actions to which a proposed ARAR would apply.

The proposed NCP did not prescribe a specific procedure to be used in evaluating state standards as potential ARARs. A formal process for demonstrating that state requirements are promulgated is not required by CERCLA. EPA believes that the imposition of a formal procedure on states would be a large administrative burden and could impede the cleanup process.

EPA expects, however, that states will substantiate submissions of potential ARARs by providing basic evidence of promulgation, such as a citation to a statute or regulation and, where pertinent, a date of enactment, effective date, or description of scope. Because a citation is the minimum needed to positively identify a requirement, EPA has added regulatory language requiring both lead and support agencies to provide citations when identifying their ARARs.

Section 300.400(g)(4) specifies that only promulgated state standards that are more stringent than federal requirements and are identified by the state in a timely manner may be considered potential ARARs. If a question is raised as to whether a requirement identified by a state conforms to the requirements for being a potential state ARAR, or is challenged on the basis that it does not conform to the definition, the state would have the burden of providing additional evidence to EPA to demonstrate that the requirement is of general applicability, is legally enforceable, and meets the other prerequisites for being a potential ARAR. If EPA does not agree that a state standard identified by a state is an ARAR, EPA will explain the basis for this decision.

Furthermore, the language of CERCLA section 121(d)(2)(A) makes clear, and program expediency necessitates, that the specific requirements that are applicable or relevant and appropriate to a particular site be identified. It is not sufficient to provide a general "laundry" list of statutes and regulations that might be ARARs for a particular site. The state, and EPA if it is the support agency, must instead provide a list of requirements with specific citations to the section of law identified as a potential ARAR, and a brief explanation of why that requirement is considered to be applicable or relevant and appropriate to the site.

Other comments on this section raised objections to EPA's acceptance of general goals as potential ARARs. One commenter questioned whether such general goals were implementable and satisfied the requirements of a promulgated standard, requirement, criteria, or limitation contained in CERCLA section 121(d). Another commenter argued that attempts to interpret compliance with a general goal will lead to confusion and delay. Several commenters requested clarification of the status of state nondegradation goals and whether such goals qualified as potential ARARs.

In response, it is necessary to examine the nature of a general goal in order to determine whether it may be an ARAR. General goals that merely express legislative intent about desired outcomes or conditions but are non-binding are not ARARs. EPA believes, however, that general goals, such as nondegradation laws, can be potential ARARs if they are promulgated, and therefore legally enforceable, and if they are directive in intent. The more specific regulations that implement a general goal are usually key in identifying what compliance with the goal means.

For example, in the preamble to the proposed NCP, EPA cited the example of a state antidegradation statute that prohibits the degradation of surface water below a level of quality necessary to protect certain uses of the water body (53 FR 51438). If promulgated, such a requirement is clearly directive in nature and intent. State regulations that designate uses of a given water body and state water quality standards that establish maximum in-stream concentrations to protect those uses define how the antidegradation law will be implemented are, if promulgated, also potential ARARs.

Even if a state has not promulgated implementing regulations, a general goal can be an ARAR if it meets the eligibility criteria for state ARARs. However, EPA would have considerable latitude in determining how to comply with the goal in the absence of implementing regulations. EPA may consider guidelines the state has developed related to the provision, as well as state practices in applying the goal, but such guidance or documents would be TBCs, not ARARs.

Final rule: 1. EPA has revised § 300.400(g)(4) as follows:

(4) Only those state standards that are promulgated, are identified by the state in a timely manner, and are more stringent than federal requirements may be applicable or relevant and appropriate. For purposes of identification and notification of promulgated state standards, the term "promulgated" means that the standards are of general applicability and are legally enforceable.

2. Also, language has been added to § 300.400(g)(5) requiring that specific requirements for a particular site be identified as ARARs, and that citations be provided.

Name: Section 300.515(d)(1). Timely identification of state ARARs.

Proposed rule: Section 300.515(d)(1) stated that the lead and support agencies shall identify their respective

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case of "applicable" requirements. However, the determination of whether a requirement is relevant and appropriate is not based on its stringency; rather, other criteria are used, as discussed in the section on relevance and appropriateness, and the remedy must comply with the most stringent requirement determined to be ARAR. EPA also believes that, in some situations, the availability of certain requirements that more fully match the circumstances of the site may result in a decision that another requirement is not relevant and appropriate. EPA believes that one such situation is when an MCL or non-zero MCLG and an FWQC for human health are available for the same contaminant when a current or potential source of drinking water is of concern, and there are no impacts to aquatic organisms.

As discussed in this preamble, EPA believes that an MCL or non-zero MCLG is generally the relevant and appropriate requirement for ground water that is a current or potential source of drinking water. EPA also believes that an MCL or non-zero MCLG, promulgated specifically to protect drinking water, generally is the appropriate standard for ground water even if an FWQC for human health is also available for the contaminant, for the following reasons.

CERCLA section 121(d)(2)(B)(i) lists, among other factors, the purpose for which the criteria were developed and the designated or potential use of the water as factors in determining whether FWQC are relevant and appropriate. Since FWQC for human health are promulgated for exposures that include drinking water and consuming fish, on the one hand, and consuming fish only, on the other, it is not directly the purpose of such criteria to provide drinking water standards per se, although levels that protect such a use can be mathematically derived from these two values. Furthermore, such derived values for drinking water will not reflect the contribution of other sources (through an apportionment factor), as MCLs and MCLGs do. Finally, for carcinogens FWQC are recommended at zero, although values corresponding to risks of 10^{-5}, 10^{-6}, and 10^{-7} are also given. For the reasons given in the discussion of MCLs and MCLGs above, the zero value is not considered relevant and appropriate under CERCLA; MCLs, however, represent a level determined to be both protective of human health for drinking water and attainable by treatment.

For the same reasons, EPA believes that MCLs or non-zero MCLGs generally [illegible] standards for surface water designated as a drinking water supply, unless the state has promulgated water quality standards (WQS) for the water body that reflect the specific conditions of the water body. However, surface water bodies may be designated for uses other than drinking water supply, and therefore an FWQC intended to be protective of such uses, such as the FWQC for consumption of fish or for protection of aquatic life, may very well be relevant and appropriate in such cases. Also, where a contaminant does not have an MCL or MCLG, FWQC adjusted to reflect drinking water use may be used as relevant and appropriate requirements.

Final rule: EPA is including in the final rule at § 300.430(e)(2)(i)(E) language stating that FWQC are to be attained where relevant and appropriate under the circumstances of the release or threatened release.

Name: Section 300.435(b)(2). Compliance with applicable or relevant and appropriate requirements (ARARs) *during* the remedial action.

Proposed rule: CERCLA section 121 requires that, at the completion of a remedial action, a level or standard of control required by an ARAR will be attained for wastes that remain on-site. However, consistent with the 1985 NCP (§ 300.68(i), § 300.435(b)) of the proposed NCP also required compliance with ARARs during implementation of the action, stating that *during the course of the remedial design/remedial action (RD/RA)*, the lead agency shall be responsible for ensuring that all federal and state ARARs identified for the action are being met, unless a waiver is invoked. Examples of such requirements given in the preamble to the proposed rule included RCRA treatment, storage, and disposal requirements, Clean Air Act national ambient air quality standards, and Clean Water Act effluent discharge limitations (53 FR 51440).

Response to comments: EPA received a number of comments that the NCP should not require compliance with ARARs during the remedial action. Commenters argued that this policy is inconsistent with the statute, which requires compliance with ARARs only at the completion of the remedial action, and questioned EPA's authority to require compliance with ARARs during remedial design/remedial action.

Several commenters pointed out that CERCLA section 121(d)(1) states that remedial actions must be protective and "must be relevant and appropriate under the circumstances," and argued that this standard should govern how the action itself is carried out. Design and operation of the remedial action should be based on best professional judgment and undertaken in a manner that is protective. Other commenters suggested requiring compliance only with those ARARs that "can reasonably be achieved," or listing specific types of ARARs that must be met during RD/RA.

Commenters were particularly concerned about problems created by requiring compliance with RCRA requirements and the land disposal restrictions in particular for remedial actions.

EPA disagrees with these commenters. EPA believes that it is appropriate to require that remedial activities comply with the substantive requirements of other laws that apply or are relevant and appropriate to those activities. The reasons for complying with such laws during the conduct of the remediation are basically the same as the reasons for applying ARARs as remediation objectives: the laws help define how the activity can be carried out safely and with proper safeguards to protect human health and the environment. EPA is concerned that, if the narrowest possible interpretation were applied to ARARs compliance, compliance with laws critical to protection of health and the environment would become subject to debate, laws such as those that govern surface water discharges or air emissions, or that set operational standards for incineration of hazardou[s] waste.

Several commenters also stated tha[t] chemical-specific ARARs used as remediation goals, such as MCLs as ARARs for ground water remediation, cannot be attained during implementation. EPA wants to clarify that it recognizes that ARARs that are used to determine final remediation levels apply only at the completion of the action.

It is worthwhile to point out, in the context of this policy on complying w[ith] ARARs pertaining to the remedial activity itself, that CERCLA provides [a] waiver from ARARs for interim actio[ns] provided the final action will attain [the] waived standard. If there is doubt a[bout] whether an ARAR represents a fina[l] remediation goal or an interim stan[dard] and it cannot be met during the acti[on], this waiver could be invoked.

Comments were also received on EPA's discussion of compliance wi[th] ARARs during remedial investigati[on] in the preamble to the proposed NC[P] (53 FR 51442–43). In that discussion, E[PA] stated that on-site handling, treatm[ent] or disposal of investigation-derive[d] waste must satisfy ARARs and th[e]

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field investigation teams should use best professional judgment in determining when such wastes contain hazardous substances. One commenter recommended that investigation-derived samples be required to be handled, treated, and disposed in accordance with applicable RCRA requirements.

In response, EPA wishes to clarify the discussion in the preamble to the proposed NCP. CERCLA section 101(23) defines "removal" to include "such actions as may be necessary to monitor, assess, and evaluate the release or threat of release of hazardous substances * * * [including] action taken under section 104(b) of [CERCLA]." EPA has stated, therefore, that studies and investigations undertaken pursuant to CERCLA section 104(b), such as activities conducted during the RI/FS, are considered removal actions (54 FR 13298, March 31, 1989). EPA's policy, explained elsewhere in today's preamble, is that removal actions will comply with ARARs to the extent practicable, considering the exigencies of the circumstances. Thus, the field investigation team should, when handling, treating or disposing of investigation-derived waste on-site, conduct such activities in compliance with ARARs to the extent practicable, considering the exigencies of the situation. Investigation-derived waste that is transported off-site (e.g., for treatability studies or disposal) must comply with applicable requirements of the CERCLA off-site policy (OSWER Directive No. 9834.11 (November 13, 1987)) and § 300.440 when finalized (see 53 FR 48218, November 29, 1988).[20] EPA notes that CERCLA section 104(c)(1) provides that the statutory limits on removals do not apply to investigations, monitoring, surveying, testing and other information-gathering performed under CERCLA section 104(b).

Final rule: EPA is promulgating the rule as proposed except for minor editing revisions.

Name: 300.5. Distinction between substantive and administrative requirements.

Proposed rule: The proposed definitions of "applicable" and "relevant and appropriate" stated that they are cleanup standards, standards of control, and other substantive environmental protection requirements, criteria or limitations. The preamble to the proposed rule explained that requirements that do not in and of themselves define a level or standard of control are considered administrative (53 FR 51443). Administrative requirements include the approval of, or consultation with, administrative bodies, issuance of permits, documentation, and reporting and recordkeeping. Response actions under CERCLA are required to comply with ARARs, which are defined not to include administrative requirements.

Response to comments: Many comments were received on EPA's differentiation between substantive and administrative requirements. Some commenters supported the distinction between substantive and administrative requirements. Other commenters disagreed with EPA's interpretation for various reasons.

Several commenters argued that Superfund actions should not be exempt from consultation requirements. One commenter argued that consultation with a state may be necessary to determine how state ARARs apply to the remedy. A commenter contended that it is virtually impossible to meet substantive requirements without consultation. One commenter asserted that state procedures or methodology necessary to determine permit levels should be considered state ARARs. Another argued that not requiring consultation runs opposite to the spirit of cooperation with states. One commenter suggested narrowing the exemption to allow for consultation through existing Superfund mechanisms such as consent orders, SMOAs, and cooperative agreements.

Commenters also objected to the exemption from reporting and recordkeeping requirements. One contended that EPA had no legal authority for such exemption. Others argued that reporting and recordkeeping are necessary to ensure proper control of hazardous substances that will remain on-site and are also necessary for activities with local impacts: Long-term water diversions and air or surface water releases. Commenters asserted that the lead agency must meet reporting requirements to avoid gaps in a state's environmental data. One commenter noted that there are a number of federal and state programs that require the maintenance of complete databases and that the NCP's approach is inconsistent with such programs. Under these programs, a state needs all discharge information in order to evaluate surface water toxicity impacts in a stream or to establish total maximum daily loads.

The concern was also raised that maintaining reporting and recordkeeping procedures on a site-by-site basis would undermine a state's standardized reporting requirements, e.g., ground-water monitoring report forms, NPDES forms, etc. Also, unique site approaches to reporting and recordkeeping may result in problems not detected by a state. Further, these commenters stated that they were not aware of Superfund recordkeeping and reporting requirements. One commenter stated that reporting requirements and compliance mechanisms during remedy implementation and O&M periods should be specified through Superfund mechanisms, as appropriate. One commenter contended that if Superfund insists on this distinction, a determination whether a requirement is substantive or administrative must be documented.

EPA has reviewed these comments, but concludes, as stated in the preamble to the proposed NCP (53 FR 51443), that CERCLA response actions should be subject only to substantive, not administrative, requirements. EPA believes that this interpretation is most consistent with the terms of CERCLA and with the goals of the statute. Section 121(d)(2) provides that remedial actions should require "a level or standard of control" which attains ARARs; only substantive standards set levels or standards of control. Moreover, Congress made clear in sections 121 (d)(2) and (d)(4) that the "standards" or "requirements" of other laws that are ARARs should be applied to actions conducted on-site, and specifically provided in section 121(e)(1) that federal and state permits would not be required for such on-site response actions. These subsections reflect Congress' judgment that CERCLA actions should not be delayed by time-consuming and duplicative administrative requirements such as permitting, although the remedies should achieve the substantive standards of applicable or relevant and appropriate laws. Indeed, CERCLA has its own comparable procedures for remedy selection and state and community involvement. EPA's approach is wholly consistent with the overall goal of the Superfund program, to achieve expeditious cleanups, and reflects an understanding of the uniqueness of the CERCLA program, which directly impacts more than one medium (and thus overlaps with a number of other regulatory and statutory programs). Accordingly, it would be inappropriate to formally subject CERCLA response actions to the multitude of administrative requirements of other federal and state offices and agencies.

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[20] The CERCLA off-site policy requires that receiving facilities are in compliance with "applicable laws." Note that many treatability study wastes are exempt from the permitting requirement under RCRA (see 40 CFR 261.4(e) and (f)).

At the same time, EPA recognizes the benefits of consultation, reporting, etc. To some degree, these functions are accomplished through the state involvement and public participation requirements in the NCP. In addition, EPA has already strongly recommended that its regional offices (and states when they are the lead agency) establish procedures, protocols or memoranda of understanding that, while not recreating the administrative and procedural aspects of a permit, will ensure early and continuous consultation and coordination with other EPA programs and other agencies. CERCLA Compliance with Other Laws Manual, OSWER Directive No. 9234.1-01 (August 8, 1988). In working with states, EPA generally will coordinate and consult with the state Superfund office. That state superfund office should distribute to or obtain necessary information from other state offices interested in activities at Superfund sites.

The basis for this recommendation is a recognition that such coordination and consultation is often useful to determine how substantive requirements implemented under other EPA programs and by other agencies should be applied to a Superfund action. For example, although the Superfund office will make the final decisions on using ARARs, a water office may provide information helpful in determining ARARs when a surface water discharge is part of the Superfund remedy. Such information may include surface water classifications, existing use designations, technology-based requirements, and water quality standards. A water office may also be able to provide advice during the detailed analysis of alternatives on the effectiveness and implementability of treatment alternatives and the likely environmental fate and effects of surface or ground-water discharges. Other offices or agencies with different environmental responsibilities may similarly provide useful information, if it is given in a timely manner.

EPA also recognizes the importance of providing information to other programs and agencies that maintain environmental data bases. This is particularly true where the remedy includes releases of substances into the air or water and the extent of such releases is integral for air and water programs to maintain accurate information on ambient air and surface water quality in order to set statutorily-specified standards. Monitoring requirements themselves are considered substantive requirements and are necessary in order to document attainment of cleanup levels and compliance with emission limitations or discharge requirements identified as ARARs in the decision document. EPA strongly encourages its OSCs or RPMs, or the agency that is responsible for maintaining the operation and maintenance of an action (e.g., pump and treat system), to provide reports on monitoring activities to other offices in a form usable to those offices.

In summary, cleanup standards must be complied with, although administrative procedures such as consultation are not required, they should be observed when, for example, they are useful in determining the cleanup standards for a site. EPA believes that in order to ensure that Superfund actions proceed as rapidly as possible it must maintain a distinction between substantive and administrative requirements.

Final rule: EPA is promulgating the reference to "substantive" in the § 300.5 definitions of "applicable" and "relevant and appropriate" as proposed.

Name: Section 300.430(f)(1)(ii)(B). Consideration of newly promulgated or modified requirements.

Proposed rule: The preamble to the proposed rule discussed how new requirements or other information developed subsequent to the initiation of the remedial action should be addressed (53 FR 51440). It explained that new requirements or other information should be considered as part of the five-year review (as provided for in § 300.430(f)(3)(v)) (renumbered as final § 300.430(f)(5)(iii)(C)) to ensure that the remedial action is still protective of human health and the environment. That is, if a requirement that would be applicable or relevant and appropriate to the remedy is promulgated after the initiation of remedial action, the remedy will be evaluated in light of the new requirement to ensure that the remedy is still protective.

Response to comments: Several commenters objected to EPA's policy requiring consideration of new requirements on the grounds that the statute requires the five-year review only to determine that a remedy is still protective. These commenters were concerned that consideration of new requirements would require additional analysis and perhaps drastic changes in design; would impose an open-ended liability on PRPs; and would violate PRPs' right to due process. Two commenters suggested that making new requirements part of a negotiation process based on a reopener in the settlement agreement could alleviate the second and third concern.

Based on the comments and its experience in carrying out remedies, EPA is modifying its policy on considering newly promulgated or modified requirements to address those requirements that are promulgated or modified after the ROD is signed, rather than those requirements promulgated or modified after the initiation of remedial action, as discussed in the proposal. Once a ROD is signed and a remedy chosen, EPA will not reopen that decision unless the new or modified requirement calls into question the protectiveness of the selected remedy. EPA believes that it is necessary to "freeze ARARs" when the ROD is signed rather than at initiation of remedial action because continually changing remedies to accommodate new or modified requirements would, as several commenters noted, disrupt CERCLA cleanups, whether the remedy is in design, construction, or in remedial action. Each of these stages represents significant time and financial investments in a particular remedy. For instance, the design of the remedy (treatment plant, landfill, etc.) is based on ARARs identified at the signing of the ROD. If ARARs were not frozen at this point, promulgation of a new or modified requirement could result in a reconsideration of the remedy and a re-start of the lengthy design process, even if protectiveness is not compromised. This lack of certainty could adversely affect the operation of the CERCLA program, would be inconsistent with Congress' mandate to expeditiously cleanup sites and could adversely affect PRP negotiations, as noted by commenters. The policy of freezing ARARs will help avoid constant interruption, re-evaluation, and re-design during implementation of selected remedies.

EPA believes that this policy is consistent with CERCLA section 121(d)(2)(A), which provides that "the remedial action selected * * * shall require, at the completion of the remedial action," attainment of ARARs. EPA interprets this language as requiring attainment of ARARs identified at remedy selection (i.e., those identified in the ROD), not those that may come into existence by the completion of the remedy.[21] Neither the explicit statutory language nor the legislative history supports a conclusion that a ROD may be subject to indefinite revision as a result of shifting

[21] No commenters objected to the position in the preamble to the proposed rule that CERCLA remedial actions should attain ARARs identified at the initiation—versus completion—of the action.

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requirements. Rather, given the need to ensure finality of remedy selection in order to achieve expeditious cleanup of sites, and given the length of time often required to design, negotiate, and implement remedial actions, EPA believes that this is the most reasonable interpretation of the statute.

As EPA discusses elsewhere in this preamble, one variation to this policy occurs when a component of the remedy was not identified when the ROD is signed. In that situation, EPA will comply with ARARs in effect when that component is identified (e.g., during remedial design), which could include requirements promulgated both before and after the ROD was signed. EPA notes that newly promulgated or modified requirements may directly apply or be more relevant and appropriate to certain locations, actions or contaminants than existing standards and, thus, may be potential ARARs for future responses.

It is important to note that a policy of freezing ARARs at the time of the ROD signing will not sacrifice protection of human health and the environment, because the remedy will be reviewed for protectiveness every five years, considering new or modified requirements at that point, or more frequently, if there is reason to believe that the remedy is no longer protective of health and environment.

In response to the specific comments received, EPA notes that under this policy, EPA does not intend that a remedy must be modified solely to attain a newly promulgated or modified requirement. Rather, a remedy must be modified if necessary to protect human health and the environment; newly promulgated or modified requirements contribute to that evaluation of protectiveness. For example, a new requirement for a chemical at a site may indicate that the cleanup level selected for the chemical corresponds to a cancer risk of 10^{-3} rather than 10^{-5}, as originally thought. The original remedy would then have to be modified because it would result in exposures outside the acceptable risk range that generally defines what is protective.

This policy that newly promulgated or modified requirements should be considered during protectiveness reviews of the remedy, but should not require a reopening of the ROD during implementation every time a new state or federal standard is promulgated or modified, was discussed in the preamble to the proposed rule (53 FR at 51440) but not in the rule section itself. For the reasons outlined above, EPA believes that this concept is critical to the expeditious and cost-effective accomplishment of remedies duly selected under CERCLA and the NCP, and thus is appropriate for inclusion in § 300.430(f)(1)(ii)(B) of the final NCP. This will afford both the public and implementing agencies greater clarity as to when and how requirements must be considered during CERCLA responses, and thus will allow the CERCLA program to carry out selected remedies with greater certainty and efficiency. Of course, off-site CERCLA remedial actions are subject to the substantive and procedural requirements of applicable federal, state, and local laws at the time of off-site treatment, storage or disposal.

Final rule: EPA is adding the following language to the rule at § 300.430(f)(1)(ii)(B):

(B) On-site remedial actions selected in a ROD must attain those ARARs that are identified at the time of ROD signature or provide grounds for invoking a waiver under § 300.430(f)(1)(ii)(C)(*3*).

(*1*) Requirements that are promulgated or modified after ROD signature must be attained (or waived) only when determined to be applicable or relevant and appropriate and necessary to ensure that the remedy is protective of human health and the environment.

(*2*) Components of the remedy not described in the ROD must attain (or waive) requirements that are identified as applicable or relevant and appropriate at the time the amendment to the ROD or the explanation of significant differences describing the component is signed.

Name: Applicability of RCRA requirements.

Proposed rule: The preamble to the proposed rule discussed when RCRA subtitle C requirements will be applicable for site cleanups (53 FR 51443). It described the prerequisites for "applicability" at length, which are that: (1) The waste must be a listed or characteristic RCRA hazardous waste and (2) treatment, storage or disposal occurred after the effective date of the RCRA requirements under consideration (for example, because the activity at the CERCLA site constitutes treatment, storage, or disposal, as defined by RCRA).

The preamble explained how EPA will determine when a waste at a CERCLA site is a listed RCRA hazardous waste. It noted that it is often necessary to know the origin of the waste to determine whether it is a listed waste and that, if such documentation is lacking, the lead agency may assume it is not a listed waste.

The preamble discussed how EPA will determine that a waste is a characteristic hazardous waste under RCRA. It stated that EPA can test to determine whether a waste exhibits a characteristic or can use best professional judgment to determine whether testing is necessary, "applying knowledge of the hazard characteristic in light of the materials or process used."

The preamble also discussed when a CERCLA action constitutes "land disposal," defined as placement into a land disposal unit under section 3004(k) of RCRA, which triggers several significant requirements, including RCRA land disposal restrictions (LDRs) and closure requirements (when a unit is closed). It equated an area of contamination (AOC), consisting of continuous contamination of varying amounts and types at a CERCLA site, to a single RCRA land disposal unit, and stated that movement within the unit does not constitute placement. It also stated that placement occurs when waste is redeposited after treatment in a separate unit (e.g., incinerator or tank), or when waste is moved from one AOC to another. Placement does not occur when waste is consolidated within an AOC, when it is treated in situ, or when it is left in place.

Response to comments: EPA received many comments on its discussion of when RCRA requirements can be applicable to CERCLA response actions. On the issue of compliance with RCRA in general, most of these commenters argued that RCRA requirements are not intended for site cleanup actions, that such compliance will result in delays and that RCRA requirements are often unnecessary to protect human health and the environment at CERCLA sites. Other commenters argued, however, that EPA is trying to avoid compliance with RCRA requirements. Most of the comments, however, focused on when LDRs are applicable to CERCLA actions and on EPA's discussion of what actions associated with remediation trigger LDRs.

Some commenters opposed EPA's interpretation of "land disposal" or "placement" as too lenient, believing that EPA is trying to avoid compliance with RCRA laws, particularly LDRs. These commenters argued that LDRs should be applicable when hazardous wastes are managed, excavated, or moved in any way. One argued that ARARs waivers are available to address situations when the LDR levels cannot be achieved and should be used as necessary, rather than trying to narrowly define the universe of ARARs to avoid waivers. This commenter was also concerned with EPA's use of the term "unit," calling it an inappropriate concept for Superfund sites because it

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will allow the excavation and redeposition of waste within very large areas without ever meeting RCRA design and operating standards and LDR. One commenter asserted that EPA concerns on LDRs stem from an unjustifiable belief that LDR cleanup levels cannot be achieved.

Other commenters believed that the definition of "placement" should provide more flexibility. One asserted that replacement of treated residuals in the proximate area should not constitute placement. The commenter argued that Congress intended to address, preventively or prospectively, the original act of disposal, and that an innocent government or public entity should not be required to assume the entire environmental responsibility of the original disposers. The commenter also argued that establishing that replacement of treated waste triggers LDRs will be a serious disincentive to treating wastes. Some commenters argued that LDRs should not be relevant and appropriate where the CERCLA waste to be disposed on land is merely similar in composition to RCRA banned waste.

Other commenters argued that LDRs are inappropriate for CERCLA remedial actions. They noted an inherent conflict between LDRs, which require treatment to BDAT levels, and the CERCLA process, and claimed that LDRs will supplant CERCLA's "carefully articulated and balanced approach to remedy selection." Commenters asserted that compliance with LDRs will create technical problems because of differences between CERCLA wastes and those evaluated for LDRs. The solutions recommended by these commenters primarily focused on narrowing or eliminating RCRA applicability, but included suggestions for creating treatability groups for CERCLA-type waste and seeking legislative waivers from LDRs, e.g., a waiver from LDRs for Superfund actions at NPL sites.

One commenter believed that the concept of "unit" is not readily transferable to CERCLA sites due to the age and former uses of many of the sites undergoing remediation. Given the ramifications of LDRs, the commenter argued, it may be more reasonable to create a presumption of treating the entire site as one "unit," even if remediation includes a series of operable units.

Some comments were received on EPA's statements on consolidating waste. One stated that consolidation of small amounts of waste across units should not be considered placement, [illegible] environmentally sound and less cost-effective solutions, particularly if LDRs are triggered. Another recommended that EPA should allow consolidation of small volumes of waste anywhere on-site, for purposes of storage or treatment, without triggering otherwise applicable RCRA standards. Another commenter requested clarification that consolidation within a unit included normal earthmoving and grading operations.

1. *Actions constituting land disposal.* EPA disagrees with commenters who considered EPA's interpretation of the definition of "land disposal" under RCRA section 3004(k) to be too narrow. These commenters argued that any movement of waste should be considered "placement" of waste, and thus "land disposal" under RCRA section 3004(k).

The definition of "land disposal" is central to determining whether the RCRA LDRs are applicable to a hazardous waste which is being managed as part of a CERCLA response action, or RCRA closure or corrective action. The term "land disposal" is defined under RCRA section 3004(k) as including, but not limited to, "any placement of such hazardous waste in a landfill, surface impoundment, waste pile, injection well, land treatment facility, salt dome formation, salt bed formation, or underground mine or cave." The terms "landfill", "surface impoundment," and the others, refer to specific types of units defined under RCRA regulations. Thus, Congress generally defined the scope of the LDR program as the placement of hazardous waste in a land disposal unit, as those units are defined under RCRA regulations.

EPA has consistently interpreted the phrase "placement * * * in" one of these land disposal units to mean the placement of hazardous wastes into one of these units, not the movement of waste within a unit. See e.g., 51 FR 40577 (Nov. 7, 1986) and 54 FR 41566–67 (October 10, 1989)(supplemental proposal of possible alternative interpretations of "land disposal"). EPA believes that its interpretation that the "placement * * * in" language refers to a transfer of waste into a unit (rather than simply any movement of waste) is not only consistent with a straightforward reading of section 3004(k), but also with the Congressional purpose behind the LDRs. The central concern of Congress in establishing the LDR program was to reduce or eliminate the practice of disposing of untreated hazardous waste at RCRA hazardous waste facilities. The primary aim of [illegible] directed at already-disposed waste within a land disposal unit. See 51 FR 40577 (Nov. 7, 1986). Moreover, interpreting section 3004(k) to require application of the LDRs to any movement of waste could be difficult to implement and could interfere with necessary operations at an operating RCRA facility. For instance, when hazardous waste is disposed of in a land disposal unit at an operating RCRA facility, there may well be some "movement" of the waste already in the unit. Under the commenters' approach, such movement without pretreatment of the moved waste could be in violation of the LDRs. Thus, under the commenters' interpretation, virtually no operational activities could occur at any RCRA land disposal unit containing hazardous waste without pretreatment of any waste disturbed by the operation: clearly an infeasible approach.

EPA also believes that this interpretation of section 3004(k) is supported by the legislative history for this provision (see 129 Cong. Rec. H8139 (Oct. 6, 1983)(statement of Rep. Breaux)), and by the Congressional choice to define "land disposal" more narrowly for purposes of application of the LDRs than the already-existing term "disposal", which has a much broader meaning under RCRA. Under RCRA section 1004(3), the term "disposal" is very broadly defined and includes any "discharge, deposit, injection, dumping, spilling, leaking, or placing" of waste into or on any land or water. Thus, "disposal" (in a statutory, rather than the regulatory subtitle C meaning of the term) would include virtually any movement of waste, whether within a unit or across a unit boundary. In fact, the RCRA definition of "disposal" has been interpreted by numerous courts to include passive leaking, where no active management is involved (see, e.g., *U.S. v. Waste Industries, Inc.*, 734 F.2d 159 (4th Cir. 1984)). However, Congress did not use the term "disposal" as its trigger for the RCRA land disposal restrictions, but instead specifically defined the new, and more narrow, term "land disposal" in section 3004(k). The broader "disposal" language continues to be applicable to RCRA provisions other than those in subtitle C, such as section 7003. Thus, for the reasons outlined above, EPA believes that the existing interpretation, that movement of waste within a unit does not constitute "land disposal" for purposes of application of the RCRA LDRs, is reasonable.

With respect to the commenter who asked whether normal earthmoving and grading operations within a land [illegible]

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the unit", under EPA's interpretation of RCRA section 3004(k), such activity would not be "placement into the unit" and thus the RCRA LDRs and other subtitle C disposal requirements would not be applicable (nor would the requirement to obtain a permit under RCRA or minimum technology requirements in RCRA section 3004(o) apply).

Given this interpretation of section 3004(k), EPA does not believe that it is necessary to invoke ARAR waivers of LDRs for any movement of waste within a unit, which was the alternative suggested by the commenters. Nor does EPA believe that the widespread use of such waivers would be practical or desirable. 54 FR 41568-69 (October 10, 1989).

EPA also does not fully agree with the commenters who argued that the RCRA concept of "unit" does not apply to CERCLA sites. The commenters who criticized the application of the RCRA "unit" to the CERCLA area of contamination for purposes of section 3004(k) believed it to be either too broad, allowing large areas to escape the LDRs, or too narrow, not allowing entire CERCLA sites to be considered a single "unit". In contrast to hazardous waste management units at a RCRA facility, CERCLA sites often do not involve discrete waste management units, but rather involve land areas on or in which there can be widespread areas of generally dispersed contamination. Thus, determining the boundaries of the RCRA land disposal "unit," for which section 3004(k) would require application of the LDRs at these sites, is not always self-evident.

EPA generally equates the CERCLA area of contamination with a single RCRA land-based unit, usually a landfill. 54 FR 41444 (December 21, 1988). The reason for this is that the RCRA regulatory definition of "landfill" is generally defined to mean a land disposal unit which does not meet the definition of any other land disposal unit, and thus is a general "catchall" regulatory definition for land disposal units. As a result, a RCRA "landfill" could include a non-discrete land area on or in which there is generally dispersed contamination. Thus, EPA believes that it is appropriate generally to consider CERCLA areas of contamination as a single RCRA land-based unit, or "landfill". However, since the definition of "landfill" would not include discrete, widely separated areas of contamination, the RCRA "unit" would not always encompass an entire CERCLA site.

Waste consolidation from different units or AOCs at a CERCLA site are subject to any applicable RCRA requirements regardless of the volume of the waste or the purpose of the consolidation. Thus, EPA disagrees with those commenters that asserted that small volumes of hazardous waste at a CERCLA site can be consolidated anywhere on-site for storage or treatment purposes without consideration of any applicable RCRA requirements. Such requirements may, however, be subject to ARAR waivers in appropriate circumstances.

The remaining comments received with respect to EPA's interpretation of section 3004(k) discussed the achievability of LDR cleanup levels, questioned the appropriateness of applying the LDRs to remedial actions, and requested more flexibility regarding the LDRs. These comments were the basis for EPA's supplemental notice and proposed reinterpretation of section 3004(k), which is discussed below.

In light of the numerous comments received on the interpretation of "land disposal" in RCRA section 3004(k), as it relates to removal, treatment, and redeposition of hazardous wastes generated by CERCLA and RCRA remedial and other activities, and in view of the important policy decisions that RCRA LDRs pose for the CERCLA and RCRA programs, EPA decided to separately and more fully discuss the issue, the interpretation outlined in the proposed NCP, and possible alternative interpretations of "land disposal". In a supplemental notice to the proposed NCP (54 FR 41566 (Oct. 10, 1989)), EPA outlined several technical, policy, and legal issues concerning LDR applicability to removal, treatment, and redeposition of hazardous wastes, and requested comment on two alternative interpretations of "land disposal". The first alternative would allow the excavation and replacement of previously disposed hazardous wastes in the same unit or area of contamination; since the same wastes would remain in the same unit, this activity would not constitute "land disposal". Under the second alternative, hazardous wastes could be excavated and redeposited either within the original unit or area of contamination, or elsewhere at the site in a new or existing unit. These interpretations would allow greater flexibility in remedial decision-making, in the context of both CERCLA actions and RCRA corrective actions and closures.

On November 6 and 7, 1989, EPA held a forum on contaminated soil and groundwater ("Contaminated Media Forum") to provide an opportunity for interested groups to further address these issues. The Contaminated Media Forum was attended by representatives from EPA, states, environmental groups, Congress, and the regulated community. A summary of the concerns raised and suggested solutions appears in the public docket for this rulemaking.

2. *Selection of LDR treatment standards.* Upon further examination, EPA believes that many of the problems discussed in the supplemental notice, and raised by commenters, result from treatment standards developed pursuant to the RCRA LDR program that are generally inappropriate or infeasible when applied to contaminated soil and debris. As discussed in the October 1989 notice, EPA's experience under CERCLA has been that treatment of large quantities of soil and debris containing relatively low levels of contamination using LDR "best demonstrated available technology" (BDAT) is often inappropriate. 54 FR 41567, 41568 (October 10, 1989). EPA noted that:

> Experience with the CERCLA program has shown that many sites will have large quantities—in some cases, many thousands of cubic meters—of soils that are contaminated with relatively low concentrations of hazardous wastes. These soils often should be treated, but treatment with the types of technologies that would meet the standard of BDAT may yield little if any environmental benefit over other treatment based remedial options.

54 FR 41568 (October 10, 1989). Examples of these and other situations reflecting EPA's experience concerning the inappropriateness of incinerating contaminated soil and debris are included in the record for this rule. In addition, as discussed below, EPA has experienced problems in achieving the current noncombustion LDRs for contaminated soil and debris. Based on EPA's experience to date and the virtually unanimous comments supporting this conclusion, EPA has determined that, until specific standards for soils and debris are developed, current BDAT standards are generally inappropriate or unachievable for soil and debris from CERCLA response actions and RCRA corrective actions and closures. Instead, EPA presumes that, because contaminated soil and debris is significantly different from the wastes evaluated in establishing the BDAT standards, it cannot be treated in accordance with those standards and thus qualifies for a treatability variance from those standards under 40 CFR 268.44.

Accordingly, persons seeking a treatability variance from LDR treatment standards for contaminated soil and debris do not need to demonstrate on a case-by-case basis

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believes that it is unnecessary for petitioners (or the lead Agency in CERCLA response actions) to make site-specific demonstrations that BDAT standards are inappropriate for contaminated soil and debris. The numerous comments and Agency experience supporting a presumption that the BDAT standards are inappropriate or not achievable is clearly warranted at this time because the criteria in 40 CFR 268.44 for treatability variances are generally met for soil and debris. As a result, under EPA's established treatability variance procedures (40 CFR 268.44), variance applications for contaminated soil and debris do not need to demonstrate that the physical and chemical properties differ significantly from wastes analyzed in developing the treatment standard and that, therefore, the waste cannot be treated to specified levels or by specified methods. Petitions need only focus on justifying the proposed alternative levels of performance, using existing interim guidance containing suggested treatment levels for soil and debris (Superfund LDR Guidance #6A, "Obtaining a Soil and Debris Treatability Variance for Remedial Actions", EPA OSWER Directive 9347.3-06FS, July 1989) as a benchmark.

Although the presumption is that BDAT standards are not appropriate for soil and debris, there may be special circumstances where EPA determines that the existing BDAT standards are appropriate for contaminated soils and debris at a particular site, such as where high levels of combustible organics in soil are present. In these circumstances, the Agency would make a determination that treatment to the BDAT standards was appropriate and would require such treatment.

EPA regulations provide that treatability variances may be issued on a site-specific basis. 40 CFR 268.44(h).[22] Thus, they may be approved simultaneously with the issuance of a RCRA permit, the approval of a RCRA closure plan, or the selection of a remedy in a CERCLA response action in the ROD. In the case of an on-site CERCLA response action, the procedural requirements of the variance process do not apply. See CERCLA sections 121(e)(1) and 121(d)(2). The variance decision will be made as part of EPA's remedy selection process, during which data justifying alternative treatment levels will be included in the administrative record files, and public participation opportunities and Agency response to comment will be afforded as appropriate under this rule.

In EPA's view, the Agency's determination that the BDAT standards are generally inappropriate for contaminated soil and debris addresses many of the practical concerns raised by commenters in the supplemental notice on the Agency's interpretation of the term "land disposal". For this reason, and because EPA has had insufficient time to review and evaluate the many lengthy and complex issues raised by commenters on the supplemental notice, EPA is deferring any final decision to modify that interpretation. (EPA will respond to comments on the alternatives in the supplemental notice when the Agency makes a final decision on the proposed reinterpretation of land disposal.) Until a final decision is made, the interpretation announced in the preamble to the proposed NCP and discussed in section 1 above will remain in effect.

Final rule: There is no rule language on this issue.

Name: Determination of whether a waste is a hazardous waste.

Proposed rule: The preamble to the proposed rule discussed how to determine whether hazardous waste regulated under RCRA Subtitle C was present at a site (53 FR 51444).

Response to comments: Some commenters raised questions about EPA's discussion about determining whether a waste exhibits a hazardous characteristic. One argued that EPA cannot assume a waste is not a characteristic waste in the absence of testing and should therefore adopt a liberal and inclusive approach to determining whether RCRA applies to avoid expensive and time-consuming testing. Another commenter asked f[illegible] clarification on who was responsib[illegible] applying "process knowledge" to determine whether a waste was a hazardous waste in the absence of testing. The commenter asserted that under RCRA, EPA exercises prosecutorial discretion if a generator acting in good faith, decides incorrectly that his waste is not hazardous. EPA notes that when it determines that there is a violation there will normally be some kind of enforcement action taken the level and type of prosecutorial response will depend on a number of factors, for example, the size of the company, the significance of the violation, the intent, etc.

Under RCRA rules, a generator is not required to test, but may use knowledge of the waste and its constituents to judge whether the waste exhibits a characteristic. (See 40 CFR 262.11(c).) EPA believes this should also apply if the lead agency or PRP at a CERCLA site is the "generator." EPA wants to make clear, however, that a decision that a waste is not characteristic in the absence of testing may not be arbitrary, but must be based on site-specific information and data collected on the constituents and their concentrations during investigations of the site. B[illegible] on site data, it will be very clear i[illegible] cases that a waste cannot be characteristic; for example, if a waste does not contain a constituent regulated as EP toxic, a decision that the waste does not exhibit this characteristic can reliably be made without testing for EP toxicity. EPA does not expect to undertake testing when it can otherwise be determined with reasonable certainty whether or not the waste will exhibit a characteristic.

In response to the second concern, the determination whether a waste is a hazardous waste may be made by EPA, the state, or a PRP, depending on the nature of the action. EPA will take any necessary or appropriate action if decisions about the hazardous nature of the waste are in error or are made without proper basis.

Several commenters discussed the question of whether RCRA requirements can be applicable to RCRA hazardous waste disposed of before the RCRA requirements went into effect in 1980. One commenter argued that they could not be, unless the waste exhibited a characteristic at the time of the CERCLA action. However, as one commenter noted, EPA has consistently main[illegible] in enforcement actions that RCR[illegible] requirements apply to any waste

[22] In light of today's determination, the application of this rule requires clarification in two respects. First, although EPA is today establishing a general presumption that BDAT standards are inappropriate or not achievable for treating soil and debris, the Agency does not believe that this presumption triggers the rulemaking variance procedures in 40 CFR 268.44(a). Even with the presumption, treatment levels will be determined on a case-by-case basis, and commenters may submit information contending that the presumption is not applicable in a particular case. Thus, it is EPA's view that the site-specific, non-rulemaking procedures in 40 CFR 268.44(h) are entirely appropriate. See 53 FR 31199–31200 (August 17, 1988).

Second, EPA does not interpret its site specific variance procedures as invariably requiring applicants to demonstrate that they cannot meet applicable treatment levels or methods. The first sentence of 40 CFR 268.44(h) makes it clear that an applicant may make one of *two* demonstrations to qualify for a variance: he may show either that he cannot meet a treatment standard, *or* that a treatment method (or the method underlying the standard) is inappropriate for his waste. The final sentence of § 268.44(h), identifying the showing an applicant must include in his variance application, on its terms applies only to applications submitted under the first criterion. EPA's presumption, however, applies to soil and debris regardless of which of the two types of variances apply.

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APPENDIX B to EPA/540/G-91/009

OSWER DIRECTIVE 9347.3-05 FS
SUPERFUND LDR GUIDE #5

009226

United States Environmental Protection Agency
Office of Solid Waste and Emergency Response
Superfund Publication: 9347.3-05FS July 1989

EPA

Superfund LDR Guide #5

Determining When Land Disposal Restrictions (LDRs) Are Applicable to CERCLA Response Actions

CERCLA Section 121(d)(2) specifies that on-site Superfund remedial actions shall attain "other Federal standards, requirements, criteria, limitations, or more stringent State requirements that are determined to be legally applicable or relevant and appropriate (ARAR) to the specified circumstances at the site." In addition, the National Contingency Plan (NCP) requires that on-site removal actions attain ARARs to the extent practicable. Off-site removal and remedial actions must comply with legally applicable requirements. **This guide outlines the process used to determine whether the Resource Conservation and Recovery Act (RCRA) land disposal restrictions (LDRs) established under the Hazardous and Solid Waste Amendments (HSWA) are "applicable" to a CERCLA response action.** More detailed guidance on Superfund compliance with the LDRs is being prepared by the Office of Solid Waste and Emergency Response (OSWER).

For the LDRs to be applicable to a CERCLA response, the action must constitute placement of a restricted RCRA hazardous waste. Therefore, site managers (OSCs, RPMs) must answer three separate questions to determine if the LDRs are applicable:

(1) Does the response action constitute placement?

(2) Is the CERCLA substance being placed also a RCRA hazardous waste? and if so

(3) Is the RCRA waste restricted under the LDRs?

Site managers also must determine if the CERCLA substances are California list wastes, which are a distinct category of RCRA hazardous wastes restricted under the LDRs (see Superfund LDR Guide #2).

(1) DOES THE RESPONSE CONSTITUTE PLACEMENT?

The LDRs place specific restrictions (e.g., treatment of waste to concentration levels) on RCRA hazardous wastes prior to their placement in land disposal units. Therefore, a key determination is whether the response action will constitute placement of wastes into a land disposal unit. As defined by RCRA, land disposal units include landfills, surface impoundments, waste piles, injection wells, land treatment facilities, salt dome formations, underground mines or caves, and concrete bunkers or vaults. If a CERCLA response includes disposal of wastes in any of these types of off-site land disposal units, placement will occur. However, uncontrolled hazardous waste sites often have widespread and dispersed contamination, making the concept of a RCRA unit less useful for actions involving on-site disposal of wastes. Therefore, to assist in defining when "placement" does and does not occur for CERCLA actions involving on-site disposal of wastes, EPA uses the concept of "areas of contamination" (AOCs), which may be viewed as equivalent to RCRA units, for the purposes of LDR applicability determinations.

An AOC is delineated by the areal extent (or boundary) of contiguous contamination. Such contamination must be continuous, but may contain varying types and concentrations of hazardous substances. Depending on site characteristics, one or more AOCs may be delineated. Highlight 1 provides some examples of AOCs.

Highlight 1: EXAMPLES OF AREAS OF CONTAMINATION (AOCs)

- A waste source (e.g., waste pit, landfill, waste pile) and the surrounding contaminated soil.
- A waste source, and the sediments in a stream contaminated by the source, where the contamination is continuous from the source to the sediments.*
- Several lagoons separated only by dikes, where the dikes are contaminated and the lagoons share a common liner.

* The AOC does not include any contaminated surface or ground water that may be associated with the land-based waste source.

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For on-site disposal, placement occurs when wastes are moved from one AOC (or unit) into another AOC (or unit). Placement does not occur when wastes are left in place, or moved within a single AOC. Highlight 2 provides scenarios of when placement does and does not occur, as defined in the proposed NCP. The Agency is current reevaluating the definition of placement prior to the promulgation of the final NCP, and therefore, these scenarios are subject to change.

Highlight 2: PLACEMENT

Placement does occur when wastes are:

- Consolidated from different AOCs into a single AOC;
- Moved outside of an AOC (for treatment or storage, for example) and returned to the same or a different AOC; or
- Excavated from an AOC, placed in a separate unit, such as an incinerator or tank that is within the AOC, and redeposited into the same AOC.

Placement does not occur when wastes are:

- Treated in situ;
- Capped in place;
- Consolidated within the AOC; or
- Processed within the AOC (but not in a separate unit, such as a tank) to improve its structural stability (e.g., for capping or to support heavy machinery).

In summary, if placement on-site or off-site does not occur, the LDRs are not applicable to the Superfund action.

(2) IS THE CERCLA SUBSTANCE A RCRA HAZARDOUS WASTE?

Because a CERCLA response must constitute placement of a restricted RCRA hazardous waste for the LDRs to be applicable, site managers must evaluate whether the contaminants at the CERCLA site are RCRA hazardous wastes. Highlight 3 briefly describes the two types of RCRA hazardous wastes --listed and characteristic wastes.

Highlight 3: RCRA HAZARDOUS WASTES

A RCRA solid waste* is hazardous if it is listed or exhibits a hazardous characteristic.

Listed RCRA Hazardous Wastes

Any waste listed in Subpart D of 40 CFR 261, including:

- F waste codes (Part 261.31)
- K waste codes (Part 261.32)
- P waste codes (Part 261.33(e))
- U waste codes (Part 261.33(f))

Characteristic RCRA Hazardous Wastes

Any waste exhibiting one of the following characteristics, as defined in 40 CFR 261:

- Ignitability
- Corrosivity
- Reactivity
- Extraction Procedure (EP) Toxicity

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* A solid waste is any material that is discarded or disposed of (i.e., abandoned, recycled in certain ways, or considered inherently waste-like). The waste may be solid, semi-solid, liquid, or a contained gaseous material. Exclusions from the definition (e.g., domestic sewage sludge) appear in 40 CFR 261.4(a). Exemptions (e.g., household wastes) are found in 40 CFR 261.4(b).

Site managers are not required to presume that a CERCLA hazardous substance is a RCRA hazardous waste unless there is affirmative evidence to support such a finding. Site managers, therefore, should use "reasonable efforts" to determine whether a substance is a RCRA listed or characteristic waste. (Current data collection efforts during CERCLA removal and remedial site investigations should be sufficient for this purpose.) For listed hazardous wastes, if manifests or labels are not available, this evaluation likely will require fairly specific information about the waste (e.g., source, prior use, process type) that is "reasonably ascertainable" within the scope of a Superfund investigation. Such information may be obtained from facility business records or from an examination of the processes used at the facility. For characteristic wastes, site managers may rely on the results of the tests described in 40 CFR 261.21 - 261.24 for each characteristic or on knowledge of the properties of the substance. Site managers should work with Regional RCRA staff, Regional Counsel, State RCRA staff, and Superfund enforcement personnel, as appropriate, in making these determinations.

In addition to understanding the two categories of RCRA hazardous wastes, site managers will also need to understand the derived-from rule, the mixture rule, and the contained-in interpretation to identify correctly whether a CERCLA substance is a RCRA hazardous waste. These three principles, as well as an introduction to the RCRA delisting process, are described below.

Derived-from Rule (40 CFR 261.3(c)(2))

The derived-from rule states that any solid waste derived from the treatment, storage, or disposal of a listed RCRA hazardous waste is itself a listed hazardous waste (regardless of the concentration of hazardous constituents). For example, ash and scrubber water from the incineration of a listed waste are hazardous wastes on the basis of the derived-from rule. Solid wastes derived from a characteristic hazardous waste are hazardous wastes only if they exhibit a characteristic.

Mixture Rule (40 CFR 261.3(a)(2))

Under the mixture rule, when any solid waste and a listed hazardous waste are mixed, the entire mixture is a listed hazardous waste. For example, if a generator mixes a drum of listed F006 electroplating waste with a non-hazardous wastewater (wastewaters are solid wastes - see Highlight 3), the entire mixture of the F006 and wastewater is a listed hazardous waste.

Mixtures of solid wastes and characteristic hazardous wastes are hazardous only if the mixture exhibits a characteristic.

Contained-in Interpretation (OSW Memorandum dated November 13, 1986)

The contained-in interpretation states that any mixture of a non-solid waste and a RCRA listed hazardous waste must be managed as a hazardous waste as long as the material contains (i.e., is above health-based levels) the listed hazardous waste. For example, if soil or ground water (i.e., both non-solid wastes) contain an F001 spent solvent, that soil or ground water must be managed as a RCRA hazardous waste, as long as it "contains" the F001 spent solvent.

Delisting (40 CFR 260.20 and .22)

To be exempted from the RCRA hazardous waste "system," a listed hazardous waste, a mixture of a listed and solid waste, or a derived-from waste must be delisted (according to 40 CFR 260.20 and .22). Characteristic hazardous wastes never need to be delisted, but can be treated to no longer exhibit the characteristic. A contained-in waste also does not have to be delisted; it only has to "no longer contain" the hazardous waste.

If site managers determine that the hazardous substance(s) at the site is a RCRA hazardous waste(s), they should also determine whether that RCRA waste is a California list waste. California list wastes are a distinct category of RCRA wastes restricted under the LDRs (see Superfund LDR Guide #2).

(3) IS THE RCRA WASTE RESTRICTED UNDER THE LDRs?

If a site manager determines that a CERCLA waste is a RCRA hazardous waste, this waste also must be restricted for the LDRs to be an applicable requirement. A RCRA hazardous waste becomes a restricted waste on its HSWA statutory deadline or sooner if the Agency promulgates a standard before the deadline. Because the LDRs are being phased in over a period of time (see Highlight 4), site managers may need to determine what type of restriction is in

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APPENDIX C to EPA/540/G-91/009

OSWER DIRECTIVE 9330.2-04
DISCHARGE OF WASTEWATER FROM CERCLA SITES INTO POTWs

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Highlight 4: LDR STATUTORY DEADLINES

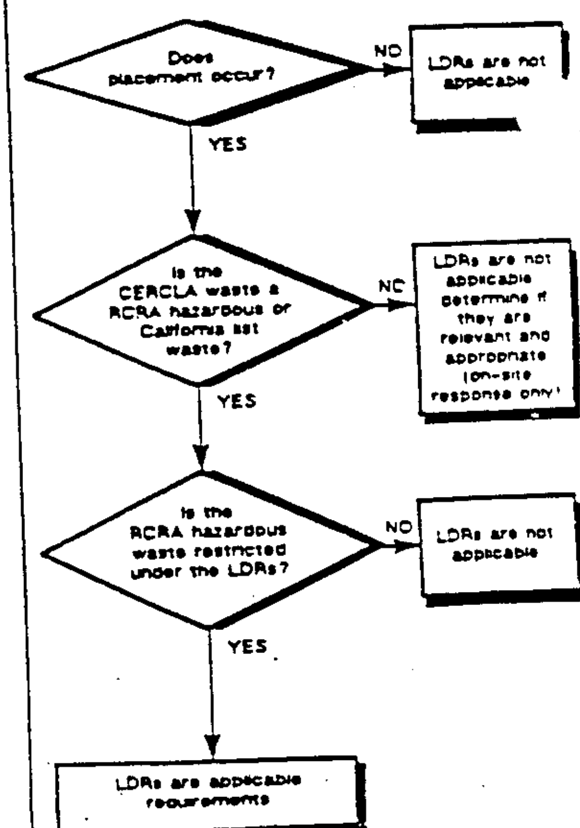
Waste	Statutory Deadline
Spent Solvent and Dioxin-Containing Wastes	November 8, 1986
California List Wastes	July 8, 1987
First Third Wastes	August 8, 1988
Spent Solvent, Dioxin-Containing, and California List Soil and Debris From CERCLA/RCRA Corrective Actions	November 8, 1988
Second Third Wastes	June 8, 1989
Third Third Wastes	May 8, 1990
Newly Identified Wastes	Within 6 months of identification as a hazardous waste

effect at the time placement is to occur. For example, if the RCRA hazardous wastes at a site are currently under a national capacity extension when the CERCLA decision document is signed, site managers should evaluate whether the response action will be completed before the extension expires. If these wastes are disposed of in surface impoundments or landfills prior to the expiration of the extension, the receiving unit would have to meet minimum technology requirements, but the wastes would not have to be treated to meet the LDR treatment standards.

APPLICABILITY DETERMINATIONS

If the site manager determines that the LDRs are applicable to the CERCLA response based on the previous three questions, the site manager must: (1) comply with the LDR restriction in effect, (2) comply with the LDRs by choosing one of the LDR compliance options (e.g., Treatability Variance, No Migration Petition), or (3) invoke an ARAR waiver (available only for on-site actions). If the LDRs are determined not to be applicable, then, for on-site actions only, the site manager should determine if the LDRs are relevant and appropriate. The process for determining whether the LDRs are applicable to a CERCLA action is summarized in Highlight 5.

Highlight 5 - DETERMINING WHEN LDRS ARE APPLICABLE REQUIREMENTS



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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

APR 15 1986

OSWER Directive 9330.2-4

MEMORANDUM

SUBJECT: Discharge of Wastewater from CERCLA Sites into POTWS

FROM: Henry L. Longest II, Director
Office of Emergency and Remedial Response

Rebecca Hanmer, Director
Office of Water Enforcement and Permits

Gene A. Lucero, Director
Office of Waste Programs Enforcement

TO: Waste Management Division Directors
Regions I - X

Water Management Division Directors
Regions I - X

A number of emergency removals and remedial cleanup actions under CERCLA will involve consideration of publicly owned treatment works (POTWs) for discharge of wastewater. The current off-site policy (issued on May 6, 1985) does not address the set of concerns and issues unique to POTWs that must be evaluated during the Remedial Investigation and Feasibility Study (RI/FS) for discharge of CERCLA wastewater to POTWs.

Recently, we have had meetings with representatives of the Association of Metropolitan Sewerage Authorities (AMSA) to discuss technical and policy concerns related to the POTW/CERCLA issue. This memorandum is to highlight some of the major points under consideration which were shared with AMSA at their recent Winter Technical Conference. The Agency intends to develop policy on the use and selection of POTWs for CERCLA wastewater. Your comments are sought on the proposed criteria set forth herein. These criteria may be useful in evaluation of POTWs for response actions (fund financed or responsible party financed) to be taken in the interim.

Our position is that no CERCLA discharges to a POTW should occur unless handled in a manner demonstrated to be protective of human health and the environment. Full compliance with all applicable requirements of the Clean Water Act (CWA), the Resource Conservation and Recovery Act (RCRA), and any other relevant or appropriate environmental statutes will be necessary

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The national pretreatment program, under the Clean Water Act, requires an analysis to determine whether the discharge of an industrial user of a POTW may pass through the POTW to cause receiving water quality problems or may interfere with POTW operations (including sludge disposal). If the analysis suggests that limits on the industrial user's discharge are needed to prevent pass through or interference, local limits or other safeguards, as necessary, must be established by the POTW and/or the NPDES permitting authority. The national pretreatment program requirements apply to the introduction of all non-domestic wastewater into any POTW, and include, among other things, the following elements:

- Prohibited discharge standards - prohibit the introduction of pollutants to the POTW which are ignitable, corrosive, excessively high in temperature, or which may cause interference or pass through at the POTW.
- Categorical discharge standards - include specific pretreatment standards which are established by EPA for the purpose of regulating industrial discharges in specific industrial categories.
- Local limits - where no categorical standards have been promulgated or where more stringent controls are necessary.

POTWs under consideration as potential receptors of CERCLA wastewaters may include those POTWs either with or without an approved pretreatment program. POTWs with an approved pretreatment program are required to have the mechanisms necessary to ensure compliance by industrial users with applicable pretreatment standards and requirements.* POTWs without an approved pretreatment program must be evaluated to determine whether sufficient mechanisms exist to allow the POTW to meet the requirements of the national pretreatment program in accepting CERCLA wastewaters. As noted above, pass through and interference are always prohibited, regardless of whether a POTW has an approved pretreatment program. POTWs without an approved pretreatment program must therefore have mechanisms which are adequate to apply the requirements of the national pretreatment program to specific situations.

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*POTWs with approved pretreatment programs must, among other things, establish procedures to notify industrial users (IUs) of applicable pretreatment standards and requirements, receive and analyze self-monitoring reports from IUs, sample and analyze industrial effluents, investigate noncompliance, and comply with public participation requirements.

Determination of a POTW's ability to accept CERCLA wastewater as an alternative to on-site treatment and direct discharge to receiving waters must be made during the Remedial Investigation/Feasibility Study (RI/FS) process. During the remedial alternatives analysis, the appropriateness of using a POTW must be carefully evaluated. Water Division officials and their state counterparts should participate in the evaluation of any remedial alternatives recommending the use of a POTW, and should concur on the selection of the POTW.

If an alternative considers the discharge of wastewater from a CERCLA site into a POTW, the following points should be evaluated in the RI/FS prior to the selection of the remedy for the site:

- o The quantity and quality of the CERCLA wastewater and its compatibility with the POTW (The constituents in the CERCLA wastewater must not cause pass through or interference, including unacceptable sludge contamination or a hazard to employees at the POTW; in some cases, control equipment at the CERCLA site may be appropriate in order to pretreat the CERCLA discharge prior to introduction to the POTW).

- o The ability (i.e., legal authority, enforceable mechanisms, etc.) of the POTW to ensure compliance with applicable pretreatment standards and requirements, including monitoring and reporting requirements.

- o The POTW's record of compliance with its NPDES permit and pretreatment program requirements to determine if the POTW is a suitable disposal site for the CERCLA wastewater.

- o The potential for volatilization of the wastewater at the CERCLA site and POTW and its impact upon air quality.

- o The potential for groundwater contamination from transport of CERCLA wastewater or impoundment at the POTW, and the need for groundwater monitoring.

- o The potential effect of the CERCLA wastewaters upon the POTW's discharge as evaluated by maintenance of water quality standards in the POTW's receiving waters, including the narrative standard of "no toxics in toxic amounts".

- The POTW's knowledge of and compliance with any applicable RCRA requirements or requirements of other environmental statutes (RCRA permit-by-rule requirements may be triggered if the POTW receives CERCLA wastewaters that are classified as "hazardous wastes" without prior mixing with domestic sewage, i.e., direct delivery to the POTW by truck, rail, or dedicated pipe; CERCLA wastewaters are not all necessarily considered hazardous wastes; case by case determinations have to be made).

- The various costs of managing CERCLA wastewater, including all risks, liabilities, permit fees, etc. (It may be appropriate to reflect these costs in the POTW's connection fees and user charge system).

Based upon consideration of the above elements, the discharge of CERCLA wastewater to a POTW should be deemed inappropriate if the evaluation indicates that:

- The constituents in the CERCLA discharge are not compatible with the POTW and will cause pass through, interference, toxic pollutants in toxic amounts in the POTW's receiving waters, unacceptable sludge contamination, or a hazard to employees of the POTW.

- The impact of the transport mechanism and/or discharging of CERCLA wastewater into a POTW would result in unacceptable impacts upon any environmental media.

- The POTW is determined to be an unacceptable receptor of CERCLA wastewaters based upon a review of the POTW's compliance history.

- The use of the POTW is not cost-effective.

If consideration of the various elements indicates that the discharge of CERCLA wastewater to a POTW is deemed appropriate:

- There should be early public involvement, including contact with POTW officials and users, in accordance with the CERCLA community relations plan and public participation requirements.

- The NPDES permit and fact sheet may need to be modified to reflect the conditions of acceptance of CERCLA wastewaters; permit modification may be necessitated by the need to incorporate specific pretreatment requirements, local limits, monitoring requirements and/or limitations on additional pollutants of concern in the POTW's discharge or other factors.

Policy to be developed in the future will apply to all removal, remedial, and enforcement actions taken pursuant to CERCLA and Section 7003 of RCRA. We would appreciate your feedback on this memorandum and any experience in the use of POTWs for CERCLA removal or remedial actions that you have to offer.

If you have any comments or questions on this issue, please submit written comments to the workgroup co-chairs: Shirley Ross (FTS-382-5755) from the Office of Emergency and Remedial Response, or Victoria Price (FTS-382-5681) from the Office of Water.

cc: Ed Johnson
Russ Wyer
Tim Fields
Steve Lingle

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APPENDIX D to EPA/540/G-91/009

TCLP CONSTITUENTS

TOXICITY CHARACTERISTIC CONSTITUENTS AND REGULATORY LEVELS

Constituent	Regulatory level (mg/L)
Arsenic	5.0
Barium	100.0
Benzene	0.5
Cadmium	1.0
Carbon tetrachloride	0.5
Chlorodane	0.03
Chlorobenzene	100.0
Chloroform	6.0
Chromium	5.0
o-Cresol	200.0
m-Cresol	200.0
p-Cresol	200.0
2,4-D	10.0
1,4-Dichlorobenzene	7.5
1,2-Dichloroethane	0.5
1,1-Dichloroethylene	0.7
2,4-Dinitrotoluene	0.13
Endrin	0.02
Heptachlor (and its hydroxide)	0.008
Hexachlorobenzene	0.13
Hexachloro-1,3-butadiene	0.5
Hexachlorethane	3.0
Lead	5.0
Lindane	0.4
Mercury	0.2
Methoxychlor	10.0
Methyl ethyl ketone	200.0
Nitrobenzene	2.0

TOXICITY CHARACTERISTIC CONSTITUENTS AND REGULATORY LEVELS

Constituent	Regulatory level (mg/L)
Pentachlorophenol	100.0
Pyridine	5.0
Selenium	1.0
Silver	5.0
Tetrachloroethylene	0.7
Toxaphene	0.5
Trichlorethylene	0.5
2,4,5-Trichlorophenol	400.0
2,4,6-Trichlorophenol	2.0
2,4,5-TP (Silvex)	1.0
Vinyl chloride	2.0

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APPENDIX E to EPA/540/G-91/009

GLOSSARY OF TERMS

GLOSSARY OF TERMS

AOC	-	Area of Contamination
ARARs	-	Applicable or Relevant and Appropriate Requirements
BDAT	-	Best Demonstrated Available Technology
BOA	-	Basic Ordering Agreement
CAA	-	Clean Air Act
CERCLA	-	Comprehensive Environmental Response, Compensation, and Liability Act
CLP	-	Contract Laboratory Program
CWA	-	Clean Water Act
DE	-	Disposable Equipment
FIT	-	Field Investigation Team
HSWA	-	Hazardous and Solid Waste Amendments
IDW	-	Investigation - Derived Wastes
LDRs	-	Land Disposal Restrictions
NCP	-	National Contingency Plan
PCB	-	Polychlorinated Biphenyls
PPE	-	Personal Protective Equipment
POTW	-	Publicly Owned Treatment Works
PRPs	-	Potentially Responsible Parties
RCRA	-	Resource Conservation and Recovery Act
RI/FS	-	Remedial Investigation/Feasibility Study
RPO	-	Regional Project Officer
SDWA	-	Safe Drinking Water Act
SI	-	Site Inspection
SM	-	Site Inspection Manager
SWDA	-	Solid Waste Disposal Act
TSD	-	Treatment, Storage, and Disposal
TCLP	-	Toxicity Characteristic Leaching Procedure
TSCA	-	Toxic Substances Control Act

*U.S. Government Printing Office: 1991 — 548-187/40606

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United States Environmental Protection Agency | Office of Solid Waste and Emergency Response | Publication: 9345.3-03FS April 1992

EPA

Guide to Management of Investigation-Derived Wastes

(2)

Office of Emergency and Remedial Response
Hazardous Site Control Division OS-220W

Quick Reference Fact Sheet

CERCLA field investigation activities (e.g., remedial investigation/feasibility studies and remedial designs) may result in the generation of waste materials that may pose a risk to human health and the environment. These investigation-derived wastes (IDW) may include drilling muds, cuttings, and purge water from test pit and well installation; purge water, soil, and other materials from collection of samples; residues (e.g., ash, spent carbon, well development purge water) from testing of treatment technologies and pump and treat systems; contaminated personal protective equipment (PPE); and solutions (aqueous or otherwise) used to decontaminate non-disposable protective clothing and equipment. The management of IDW must ensure protection of human health and the environment and comply with (or waive) regulatory requirements that are applicable or relevant and appropriate requirements (ARAR). **This fact sheet presents an overview of possible IDW management options, discusses the protectiveness requirements and ARARs associated with these options, and outlines general objectives established for IDW management under Superfund.**[1]

The general options for managing IDW (see **Highlight 1**) are ...llection and either (1) immediate disposal or (2) some type of ... management. Interim management may include storage or ... porary measures. As discussed below, the specific option ... will depend on the type of waste produced, its relative ...reat to human health and the environment, and other site-specific conditions.

IDW MANAGEMENT REQUIREMENTS

When managing IDW, site managers are required to choose an option that: (1) is protective of human health and the environment and (2) complies with (or waives) ARARs, as described below.

Protectiveness

In determining if a particular management/disposal option is protective, site managers should consider the following:

- The contaminants, their concentrations, and total volume of IDW;
- Media potentially affected (e.g., ground water, soil) under management options;
- Location of the nearest population(s) and the likelihood and/or degree of site access;
- Potential exposures to workers; and
- Potential for environmental impacts.

As a general rule, it will be necessary to use best professional judgment, in light of the site-specific conditions, to determine whether an option is protective of human health and the environment. For example, a site manager may determine that storing IDW temporarily until the final action or returning IDW to its source is protective, based on knowledge that the material poses low risk and/or that the final action will address any risks posed by the wastes and there will be no unacceptable risks in the interim.

Alternatively, if the site includes or is near residential areas, the site is unsecured, and/or contaminants appear to be present at unacceptable levels, it may not be protective to return excavated soil to the source. Storing IDW in containers in an on-site, secure location, or sending it off site immediately may be more appropriate.

Site managers also need to consider the potential effects of IDW management-related activities on environmental media. For example, pouring contaminated purge water on the ground around a well may not be prudent, because such an action could mobilize any hazardous constituents present in the soil or introduce contaminants into clean soil.

Compliance with ARARs

Remedial Investigation/Feasibility Study (RI/FS) and Remedial Design (RD) actions must comply with ARARs "to the extent practicable, considering the exigencies of the situation" (NCP, 55 FR 8756, emphasis added); therefore, it generally will not be necessary to obtain a waiver if an ARAR cannot be attained during these actions. If a site manager determines that, based on site-

[1] Management of treatability study and treatment pilot wastes is discussed in Guide for Conducting Treatability Studies Under C... A, Interim Final, December 1989, EPA/540/2-89/058. ...ion on management of IDW generated during ...minary Assessments and Site Investigations is provided in Management of Investigation-Derived Waste During Site Investigations, May 1990, EPA/540/G-91/009.

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Highlight 1: IDW MANAGEMENT OPTIONS

Type of IDW	Generation Processes*	Management Options
Soil	• Well/test pit installation • Borehole drilling • Soil sampling	• Return to boring, pit, or source immediately after generation • Spread around boring, pit, or source within the AOC⁺ • Consolidate in a pit (within the AOC) • Send to on-site TDU⁺ • Send to TDU off site immediately • Store for future treatment and/or disposal
Sludges/sediment	• Sludge pit/sediment sampling	• Return to boring, pit, or source immediately after generation • Send to on-site TDU • Send to TDU off site immediately • Store for future treatment and/or disposal
Aqueous liquids (ground water, surface water, drilling fluids, other wastewaters)	• Well installation/development • Well purging during sampling • Ground water discharge during pump tests • Surface water sampling	• Discharge to surface water • Pour onto ground close to well (non-hazardous waste) • Send to on-site TDU • Send to off-site commercial treatment unit • Send to POTW⁺ • Store for future treatment and/or disposal
Decontamination fluids	• Decontamination of PPE⁺ and equipment	• Send to on-site TDU • Evaporate (for small amounts of low contamination organic fluids) • Send to TDU off site immediately • Store for future treatment and/or disposal
Disposable PPE	• Sampling procedures or other on-site activities	• Send to on-site TDU • Place in on-site industrial dumpster • Send to TDU off site immediately • Store for future treatment and/or disposal

* The generation processes listed here are provided as examples. IDW may also be produced as a result of activities not listed here.

⁺ AOC: Area of Contamination (AOCs at a site may not yet have been identified at the time of the RI/FS); TDU: Treatment/disposal Unit; POTW: Publicly Owned Treatment Works; PPE: Personal Protective Equipment factors, compliance with an ARAR is practicable but an ...t waiver is warranted for an RI/FS or RD action, an interim action waiver may be available if the final remedy will attain the ARAR. An action memorandum should be prepared for the waiver, the state given an opportunity to comment, and the decision document placed in the administrative record.

Potential ARARs for IDW at CERCLA sites include regulations under the Resource Conservation and Recovery Act (RCRA) (including both Federal and State underground injection control (UIC) regulations), the Clean Water Act (CWA), the Clean Air Act (CAA), the Toxic Substances Control Act (TSCA), and other State environmental laws. How these various requirements may direct or influence IDW management decisions is described below.

Resource Conservation and Recovery Act (RCRA). Certain sections of the RCRA Subtitle C hazardous waste regulations (e.g., land disposal restrictions and storage restrictions) may be ARARs for IDW should RCRA hazardous waste be identified at a site. (Note that RCRA may be relevant and appropriate even if the IDW is not a RCRA hazardous waste.) A waste is hazardous under RCRA if it is listed as such in 40 CFR 261.31 - 261.33 or if it exhibits one of four characteristics: ignitability, corrosivity, reactivity, or toxicity.

Site managers should not assume that a waste considered to p... a potential risk at a CERCLA site is a listed or characteristic hazardous waste. **Until there is positive evidence (records, ...sults, other knowledge of waste properties) that the IDW is a RCRA hazardous waste, site managers should manage it in a protective manner (but not necessarily in accordance with Subtitle C requirements).** Business records or facility processes should be examined to determine whether RCRA listed wastes were generated and are present in the IDW. For characteristic wastes, site managers should rely on testing results or on knowledge of the material's properties. If best professional judgment and available information indicate that, for protectiveness reasons (or because RCRA requirements are relevant and appropriate), IDW is best managed as a "hazardous waste," management in accordance with Subtitle C requirements is prudent, regardless of whether it is known to be a RCRA waste.

If aqueous liquid IDW is considered a RCRA hazardous waste, the site manager should determine whether the Domestic Sewage Exclusion (DSE) applies to the discharge of that IDW to a POTW. The RCRA DSE exempts domestic sewage and any mixture of domestic sewage and other wastes that passes through a sewer system to a POTW for treatment from classification as a solid waste and, therefore, as a RCRA hazardous waste (40 CFR 261.4).

- Land Disposal Restrictions

If IDW is determined to be a RCRA hazardous waste and subject to the land disposal restrictions (LDRs), "land disposal" of th... IDW will be prohibited unless specified treatment standards are ...e Superfund LDR Guides #5 and #7, Determining When ... Are Applicable to CERCLA Response Actions and Determining When LDRs Are Relevant and Appropriate to CERCLA Response Actions, OSWER Directive 9347.3-05FS and 9347.3-08FS, June 1989 and December 1989 and the NCP, 55 FR 8759, March 8, 1990). "Land disposal" occurs when wastes from different AOCs are consolidated into one AOC; when wastes are moved outside an AOC (for treatment or storage) and returned to the same or a different AOC; or when wastes are excavated, placed in a separate hazardous waste management unit such as an incinerator or tank within the AOC, and then redeposited into the AOC.

Storing IDW in a container ("a portable device in which a material is stored, transported, treated, disposed of, or otherwise handled" (40 CFR 260.10)) within the AOC and then returning it to its source, however, is allowable without meeting the specified LDR treatment standards. Under the definition of "hazardous waste management unit" (40 CFR 260.10), EPA states that "a container alone does not constitute a unit; the unit includes the containers and the land or pad upon which they are placed." Therefore, returning IDW that has been stored in containers (not tanks or other RCRA-regulated units) within the AOC to its source does not constitute land disposal, as long as containers are not managed in such a manner as to constitute a RCRA storage unit as defined in 40 CFR 260.10. In addition, sampling and direct replacement of wastes within an AOC do not constitute land disposal.

- Storage

Subtitle C outlines the storage requirements for RCRA hazardous wastes. Under RCRA, "storage" is defined as "the holding of hazardous waste for a temporary period, at the end of which the hazardous waste is treated, disposed of, or stored elsewhere" (40 CFR 260.10).

On-site Superfund actions are only required to comply with the substantive standards of other laws (see 40 CFR 300.5, definitions of applicable or relevant and appropriate requirements). Superfund sites are also exempt from permit requirements under CERCLA §121(e). Therefore, site managers are not required to comply with administrative requirements triggered by RCRA storage deadlines (e.g., contingency planning, inspections, recordkeeping). Generally equivalent administrative activities are undertaken at Superfund sites, however, under existing Superfund management practices.

Site managers storing known RCRA hazardous waste must comply with the substantive, technical requirements of 40 CFR Parts 264 and 265 Subparts I (containers), J (tanks), and L (waste piles), to the extent practicable. (See **Highlight 2** for a summary of these technical requirements for each type of unit). In addition, the ground-water monitoring requirements of 40 CFR Parts 264 and 265 Subpart F are potential ARARs, and to the extent they are determined to be ARARs at a site, they should be attained to the extent practicable (or waived). (In many cases, ground-water monitoring conducted during the RI/FS will provide protection equivalent to the Subpart F requirements.)

[NOTE: Under the LDRs, restricted RCRA hazardous waste may not be stored at a site unless the storage is solely for the purpose of accumulating sufficient quantities of the waste to facilitate proper disposal, treatment, or recovery (see 40 CFR 268.50). **Generally, storing IDW until a final disposal option is**

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Highlight 2:
EXAMPLES OF RCRA TECHNICAL STORAGE REQUIREMENTS*

RCRA storage requirements, applicable to both less-than-90-days generators and permitted or interim status storage facilities, may include the following substantive requirements:

Containers **40 CFR 264 Subpart I and 265 Subpart I**

- Containers must be in good condition
- Wastes must be compatible with container
- Container must be closed during storage
- Container storage areas must have a containment system that can contain 10 percent of the volume of containers or of the largest container
- Spilled or leaked waste must be removed from the collection area as necessary to prevent overflow

Tanks **40 CFR 264 Subpart J and 265 Subpart J**

- Tanks must have a secondary containment system that includes a liner, a vault, a double-walled tank, or an equivalent device (applies only to certain tanks)

Waste Piles **40 CFR 264 Subpart L and 265 Subpart L**

- Waste piles must have a liner and a leachate collection and removal system
- Owners/operators must have a run-on control system to prevent flow onto the active portion of the pile during peak discharge from at least a 25-year storm
- Owners/operators must have a run-off management system to collect and control at least the water volume resulting from a 24-hour, 25-year storm

* This is a partial list of substantive requirements. For more detail, see 40 CFR Part 264 and 265.

selected in a Record of Decision (ROD) and implemented during the remedial action is allowable storage under the RCRA LDR storage prohibition.]

- Recordkeeping and Manifesting

If hazardous wastes are sent off site, the site manager must comply with both administrative and substantive elements of the RCRA generator requirements of 40 CFR Part 262 and LDR notification and certification requirements of Part 268. (For example, a site manager must prepare an LDR notification and certification when restricted wastes are sent off site to a land disposal facility.) These standards include requirements such as manifests for shipping waste that list all hazardous waste listings and characteristics applicable to the waste (see 40 CFR 262.11), packaging and transport requirements, and recordkeeping requirements.

If the LDRs are applicable, the following information should be collected and available before the removal of wastes to an off-site disposal facility: EPA hazardous waste number, LDR treatment standards, manifest number for the waste shipment, and waste analysis data.

- Underground Injection Control (UIC) Program

Under the UIC regulations, RCRA hazardous wastes may be injected into Class I permitted wells. In some cases, hazardous liquids, such as extracted ground water from pump and treat operations, may be injected into a Class IV UIC well. For example, ground water contaminated with RCRA hazardous wastes may be injected into Class IV permitted wells if it is part of a CERCLA response action or a RCRA corrective action and if it has been treated to "substantially reduce hazardous constituents prior to such injection..." (RCRA § 3020(b)). (See Applicability of Land Disposal Restrictions to RCRA and CERCLA Ground Water Treatment Reinjection, OSWER Directive #9234,1-06, December 1989.)

- Non-RCRA Hazardous Wastes

Some non-RCRA hazardous waste may be subject to management requirements under Subtitle D of RCRA as solid wastes. Subtitle D regulates disposal of solid waste in facilities such as municipal landfills. Therefore, non-RCRA hazardous IDW, such as decontaminated PPE or equipment, may need to be disposed of in a Subtitle D facility (depending on State requirements).

Clean Water Act (CWA). Discharges of aqueous IDW to surface water and publicly owned treatment works (POTWs) may be required to comply with CWA Federal, State, and local requirements. Requirements to be met may include water quality criteria, pre-treatment standards, State water quality standards, and NPDES permit conditions. Direct discharges to on-site waters are subject only to substantive requirements, while discharges to POTWs and other off-site discharges must comply with both substantive and administrative CWA requirements (including permitting requirements). (See Guide to Discharging CERCLA Aqueous Wastes to POTWs, June 1991 and CERCLA Compliance with the CWA and SDWA, #9234.2-06FS, January 1991.)

Toxic Substances Control Act (TSCA). If IDW contains PCBs, TSCA treatment and/or disposal requirements may apply during its management. TSCA requirements regulate the disposal of material contaminated with PCBs at concentrations of 50 ppm or greater as found on site (i.e., based on sample analysis and not the PCB concentration of the source material {e.g., transformer fluid}). (See PCB Guidance Manual, EPA/540/G-90/007, August 1990.) In addition, TSCA storage requirements may apply that limit the time that PCBs may be stored to one year. Furthermore, if PCB materials are mixed with a RCRA hazardous waste, they may be regulated by the LDR California list prohibitions. (See RCRA sections 3004(d)(2)(D) and (E).)

Department of Transportation (DOT) requirements. Where IDW will be disposed of off site or transported on public roads to a site, requirements for containerizing, labeling, and transporting ous materials and substances may apply.

State requirements. Promulgated State regulations that are legally enforceable, timely identified, and more stringent than Federal regulations may be potential ARARs for IDW managed on site. Substantive requirements of State law that may be ARARs for IDW management include State water quality standards, direct discharge limits, and RCRA requirements (including underground injection control regulations) promulgated in a State with an authorized RCRA hazardous waste management program (as well as programs authorized by State laws). Off-site, substantive and administrative requirements of State law may apply.

Off-Site Policy. In addition to complying with requirements of Federal and State laws, all off-site disposal of wastes must comply with CERCLA section 121(d)(3) and the CERCLA Off-Site Policy (OSWER Directive No. 9834.11 (November 13, 1987)). The Off-Site Policy establishes criteria for selecting an appropriate treatment, storage, or disposal facility (TSDF), including release criteria for all facilities that receive wastes from CERCLA-authorized or funded response actions. In addition, receiving facilities must be in compliance with all "applicable laws."

Before shipping wastes off site, approval should be obtained for the proposed disposal facility from EPA's Regional Off-Site Policy Coordinator. In addition, EPA has adopted a policy for Superfund wastes shipped out of State that written notification should be ‑ed to receiving States (OSWER Directive 9330.2-07, ‑ber 14, 1989).

GENERAL OBJECTIVES FOR IDW MANAGEMENT

In addition to the two requirements of protectiveness and compliance with ARARs to the extent practicable (on site) or compliance with applicable law (off site), EPA has identified two general objectives that Superfund site managers should consider when managing IDW: (1) minimization of IDW generation; and (2) management of IDW consistent with the final remedy for the site. The extent to which these objectives can be achieved is highly dependent on site-specific circumstances.

IDW Minimization

Site managers should strive to minimize the generation of IDW to reduce the need for special storage or disposal requirements that may result in substantial additional costs yet provide little or no reduction in site risks relative to the final remedial action. Generation of IDW can be minimized through proper planning of all remedial activities that may generate IDW, as well as through use of screening information from the site inspection. The potential problems of managing IDW should be a factor in choosing an investigative method. Site managers may wish to consider techniques such as replacing solvent-based cleaners with aqueous-based cleaners for decontamination of equipment, reuse of ‑ment (where it can be decontaminated), limitation of traffic ‑n clean and hot zones, and drilling methods and sampling ‑iques that generate little waste. Examples of such techniques include using gridding techniques to minimize the number of test pits or using soil borings instead of test pits. Alternative drilling and subsurface sampling methods may include the use of small diameter boreholes, as well as borehole testing methods such as a core penetrometer instead of coring. Site managers should also be careful to keep hazardous wastes separate from nonhazardous wastes.

Management Consistent with Final Remedy

Most IDW (with the exception of non-indigenous IDW) generated during the course of an investigation are intrinsic elements of the site. If possible, IDW should be considered part of the site and should be managed with other wastes from the site, consistent with the final remedy. This will avoid the need for separate treatment and/or disposal arrangements.

Because early planning for IDW management can prevent unnecessary costs and the use of treatment or disposal capacity, IDW management should be considered as early as possible during the remedial process. A key decision to be made is whether the waste will best be treated/disposed of immediately or addressed with the final remedy. If addressed with the final remedy, IDW volumes should be considered in the FS. In addition, when IDW is stored on site, it should be managed as part of the first remedial action/operable unit that addresses the affected media.

SELECTION OF IDW DISPOSAL OPTIONS

The following sections present the Agency's presumptions for IDW management that have been established based on the above considerations. The actual option selected should be based upon best professional judgment and should take into account the following factors:

- The type and quantity of IDW generated (sludge/soil, aqueous liquid, non-indigenous IDW);
- Risk posed by managing the IDW on site (e.g., based on site access controls, contaminant concentrations);
- Compliance with ARARs, to the extent practicable (on site);
- IDW minimization; and
- Whether the final remedy is anticipated to be an off-site or on-site remedy (or this information is unknown) and whether IDW can be managed consistent with the final remedy.

Off-site Final Remedies

If a site manager believes that the final remedy will involve off-site disposal of wastes, EPA's presumption is to manage the IDW as part of the remedial action addressing the waste/medium. Thus, until the final action, the IDW may be stored (e.g., drummed, covered waste pile) or returned to its source. However, the management option selected should also take into account any protectiveness concerns, ARARs, and other relevant site-specific factors (e.g., weather, storage space, and public concern/perceptions).

There are several potential reasons why it may be advisable to store IDW until the final action. First, because wastes at the site ... shipped off site eventually, returning IDW (especially sludges ...il) to its source would require that it be excavated again. ... site managers may consider it practical to containerize IDW as soon as it is generated. Second, storing IDW in containers may be more protective than returning it to its source. Third, because off-site actions may trigger such requirements as the LDRs, temporary storage will eliminate the need to meet these additional requirements until the final remedy.

In some cases, circumstances may lead site managers to choose to return the IDW to its source. This may be appropriate if it is determined that returning IDW to the source is protective and that storage at the site is not possible or practicable (i.e., given State or community concerns). In other cases, long-term storage may not be protective, and immediate off-site disposal may be a better option.

Off-site Remedy

Example: A site involves volatile organic RCRA hazardous wastes that will likely be sent off site for final treatment and disposal. Site conditions are such that temporary storage of IDW is considered protective until the remedial action begins. Because off-site disposal will trigger RCRA disposal requirements such as the LDRs and immediate containerization would be more protective than redepositing into the source area at the time of sampling, the site ...nager decides to containerize the IDW (and comply with ...RA substantive technical tank and container standards) ...il the final action is initiated.

On-site Final Remedies (or Final Management in an Unknown Location)

When final management of wastes is likely to occur on site, the management presumptions vary depending on the type of IDW produced.

Sludge/soil

Generally, the Agency expects sludge or soil IDW will be returned to its source if short-term protectiveness is not an issue. The reason behind this presumption is that IDW that may pose a risk to human health and the environment in the long term will be addressed by the final action. **Storage of RCRA hazardous IDW in containers within the AOC prior to returning it to the source will not trigger the LDRs, as long as the containers are not managed in such a way as to constitute a RCRA storage unit as defined in 40 CFR 260.10.** Therefore, it may be possible to store IDW temporarily before redisposing of it. However, EPA believes that, in many cases, returning sludges and soils to their source immediately will be protective and will avoid potentially increased costs and requirements associated with storage. Site-specific ...ions on how to manage sludge and soil IDW may ultimately vary from the presumption based on protectiveness, ARARs, and/or community concerns.

Sludge/Soil

Example 1: The soil at a site contains wastes that are expected to be stabilized on site during the final remedial action. The site manager determines that sending soil IDW off site is not cost-effective, because off-site disposal would involve testing and transport costs for a relatively small amount of waste. Instead, knowing that the site is secure and that redisposing the waste at the source will not increase site risk or violate ARARs, the site manager decides to return soil IDW to the source area from which it originated.

Example 2: A site manager determines that returning highly contaminated PCB wastes to the ground at a site is not protective because of the potential risks associated with the material; instead, the site manager chooses to drum the waste and send it off site (in compliance with TSCA). (Off-site disposal may occur immediately or at a later date.)

Example 3: Soil IDW contaminated with a RCRA hazardous waste is generated from a soil boring. The site manager decides to put the IDW back into the borehole immediately after generation, but ensures that site risks will not be increased (e.g., the contaminated soil will not be replaced at a greater depth than where it was originally so that it will not contaminate "clean" areas) and that the contamination will be addressed in the final remedy.

Aqueous liquids

EPA has not established a presumption for the management of aqueous liquid IDW (e.g., ground water). Site managers should determine the most appropriate disposal option for aqueous liquids on a site-specific basis. Parameters to consider, especially in making the protectiveness decision, include the volume of IDW, the contaminants present in the ground water, the presence of contaminants in the soil at the site, whether the ground or surface water is a drinking water supply, and whether the ground-water plume is contained or moving. Special disposal/handling may be needed for drilling fluids because they may contain significant solid components. Examples of aqueous liquid management decisions considering these factors are presented in the box on the next page.

Non-indigenous IDW

Non-indigenous IDW (e.g., sampling materials, disposable PPE, decontamination fluids) should be stored until the final remedy or disposed of immediately. If contaminated, such waste may not be disposed of onto the ground because such an action would add contamination that was not present when activities began at the site (e.g., solvents used for decontamination). If non-indigenous IDW is contaminated with RCRA hazardous waste, it must be managed in accordance with RCRA Subtitle C requirements. Otherwise, site

Aqueous Liquids

Example 1: A site manager has large volumes of ground water IDW and does not know if it is contaminated. Pouring this IDW on the ground would not be protective, because it may contaminate previously uncontaminated soil or may mobilize contaminants that are present in the soil. Therefore, the site manager stores the water in a mobile tank until a determination is made as to whether the water and soil are contaminated or until the final action.

Example 2: IDW is generated from the sampling of background, upgradient wells. Because there are no community concerns or evidence of any soil contamination from other sources, the site manager decides to pour this presumably uncontaminated IDW on the ground around the well.

Example 3: Purge water from a deep aquifer is known to be contaminated with a RCRA hazardous waste. At this site, if this water were poured on the ground, it could contaminate a previously uncontaminated shallow aquifer that is a potential drinking water source and would have to comply with the LDRs. The site manager decides to containerize the water within the AOC and store it until the final remedy.

...ers may generally dispose of it in an on-site dumpster (for PPE).

Non-indigenous IDW

Example 1: Disposable PPE (e.g., gloves, shoe covers) becomes contaminated with RCRA hazardous waste during the field investigation. The site manager containerizes and disposes of this IDW in compliance with RCRA Subtitle C requirements.

Example 2: Disposable equipment becomes contaminated during a field investigation. The site manager decontaminates them and sends them to a Subtitle D facility.

COMMUNITY CONCERNS

Residents of communities near a CERCLA site, local governments, or States may have concerns about certain disposal methods or long-term storage of IDW at the site. As with all CERCLA activities, site managers should evaluate community concerns regarding disposal of IDW in deciding what action to take. For example, if a community is concerned about the direct discharge of IDW water to surface water on site, site managers may want to consider sending the water to a POTW, if one is located nearby. In some instances, it may be appropriate to prepare fact sheets, include options in other community relations documents, or explain IDW management decisions at public meetings prior to actions.

There are several potential reasons why it may be advisable to store IDW until the final action. First, because wastes at the site will be shipped off site eventually, returning IDW (especially sludges and soil) to its source would require that it be excavated again. Thus, site managers may consider it practical to containerize IDW as soon as it is generated. Second, storing IDW in containers may be more protective than returning it to its source. Third, because off-site actions may trigger such requirements as the LDRs, temporary storage will eliminate the need to meet these additional requirements until the final remedy.

In some cases, circumstances may lead site managers to choose to return the IDW to its source. This may be appropriate if it is determined that returning IDW to the source is protective and that storage at the site is not possible or practicable (i.e., given State or community concerns). In other cases, long-term storage may not be protective, and immediate off-site disposal may be a better option.

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On-site Final Remedies (or Final Management in an Unknown Location)

When final management of wastes is likely to occur on site, the management presumptions vary depending on the type of IDW produced.

Sludge/soil

Generally, the Agency expects sludge or soil IDW will be returned to its source if short-term protectiveness is not an issue. The reason behind this presumption is that IDW that may pose a risk to human health and the environment in the long term will be addressed by the final action. **Storage of RCRA hazardous IDW in containers within the AOC prior to returning it to the source will not trigger the LDRs, as long as the containers are not managed in such a way as to constitute a RCRA storage unit as defined in 40 CFR 260.10.** Therefore, it may be possible to store IDW temporarily before redisposing of it. However, EPA believes that, in many cases, returning sludges and soils to their source immediately will be protective and will avoid potentially increased costs and requirements associated with storage. Site-specific decisions on how to manage sludge and soil IDW may ultimately vary from the presumption based on protectiveness, ARAR[illegible]/or community concerns.

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009251

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

LANDFILL CAPS
REMEDIAL DESIGN INVESTIGATIONS

FINAL
WORK PLAN

LHAAP-12 AND LHAAP-16
ACTIVE LANDFILL AND OLD LANDFILL

AUGUST 1994

PREPARED BY

U.S ARMY CORPS OF ENGINEERS
TULSA DISTRICT

009252

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1.0 INTRODUCTION.

Under a Federal Facilities Agreement (FFA) between the U.S. Environmental Protection Agency (EPA), the Texas Natural Resources Conservation Commission (TNRCC) (formerly Texas Water Commission) and the Department of the Army, remedial activities are planned or underway at Longhorn Army Ammunition Plant (LHAAP) in Marshall, Texas. As part of the remedial activities, a landfill cap will be constructed at sites LHAAP-12 (Active Landfill) and LHAAP-16 (Old Landfill).

The final Longhorn Army Ammunition Plant RI/FS Work Plan, Volume I - General, dated June 1992, contains detailed information about the plant background and history. The final Field Investigations Summary Report contains a description of the Phase I field investigation results. The purpose of this work plan is to describe the task required to complete remedial design of the landfill caps for LHAAP-12 and LHAAP-16. A site map of LHAAP-12 and LHAAP-16 are shown in Figure 1 and 2, respectively.

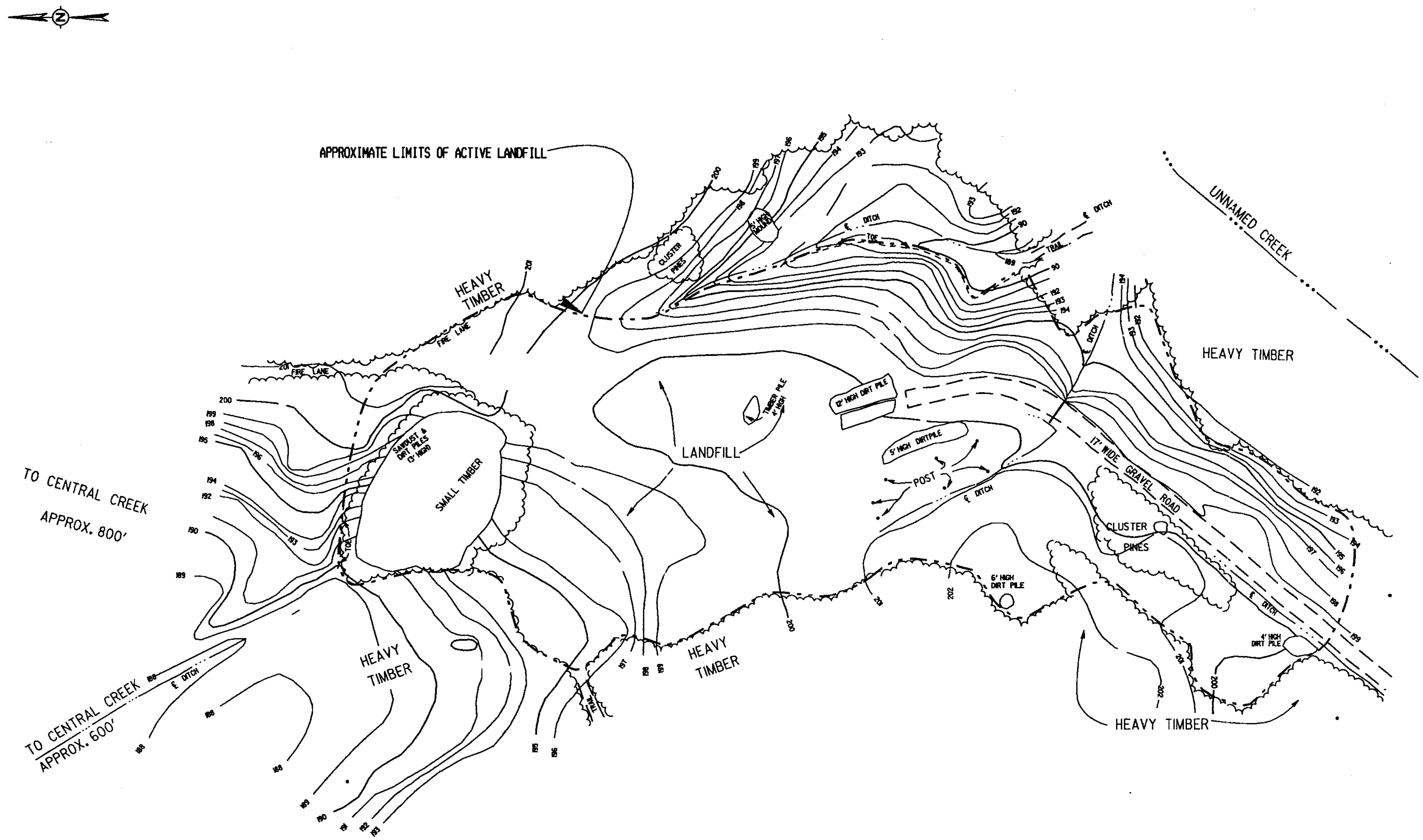
2.0 REMEDIAL DESIGN INVESTIGATIONS.

The Remedial Design Investigations will include a review of historical aerial photographs, site reconnaissance, soil gas survey, excavations to locate the landfill boundary and determine the depth and type of waste, and a detailed site topographic survey.

2.1 Historical Aerial Photographs and Site Reconnaissance. A review of historical aerial photographs and site reconnaissance will be conducted to preliminarily estimate the landfill boundaries. The site reconnaissance will consist of site visits to observe site features.

2.2 Soil Gas Survey. An Active Soil Gas Survey will be performed at both landfill sites to estimate the landfill boundaries, determine the presence of volatile compounds in the landfill, and estimate the generation of decomposition gases (i.e. methane and carbon dioxide). The survey will consist of 90 to 100 sample locations at LHAAP-12 and 65 to 75 locations at LHAAP-16. The soil gas sample locations will be located on 50 to 100 foot spacing at a depth of approximately 4 feet. Approximate soil gas sample locations for LHAAP-12 and LHAAP-16 are shown in Figures 3 and 4, respectively. Closer spacing will be used near the landfill boundary estimated from the historical aerial photographs and site reconnaissance.

009254



50 0 50 100
SCALE IN FEET

SYMBOL	DESCRIPTION	DATE

Tulsa District
Tulsa, Oklahoma

US Army Corps
of Engineers

DESIGNED BY: WADE ANDERSON
DRAWN BY: LORI KRUSE
REVIEWED BY: WADE ANDERSON
SUBMITTED BY:
CHIEF, GEOTECH BRANCH

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

ACTIVE LANDFILL
SITE MAP
FIGURE 1

PLOT SCALE: AS SHOWN
DWG. CODE:
CONTRACT DATE:
DESIGN FILE: LHAAP12.DGN
INVITATION NO. DACA56- -B-
PLOT DATE: AUGUST 1994
SHEET OF
CONTRACT NO. DACA56- -C-
SHEET REFERENCE NUMBER

D
C
B
A

009255

SYMBOL	DESCRIPTION	DATE

Tulsa District
Tulsa, Oklahoma

US Army Corps of Engineers

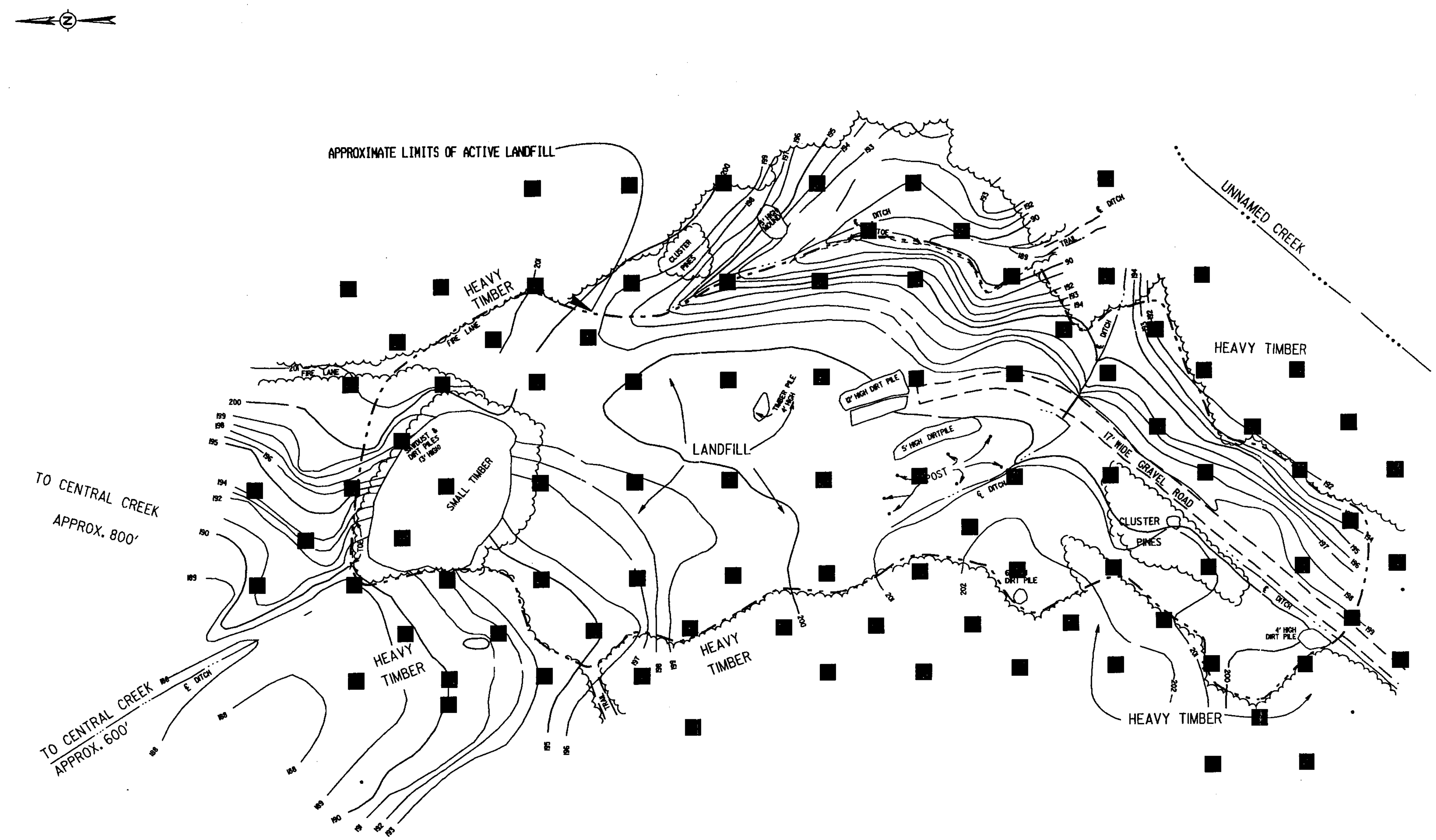
DESIGNED BY: WADE ANDERSON
DRAWN BY: LORI KRUSE
REVIEWED BY: WADE ANDERSON
SUBMITTED BY:
CHIEF, GEOTECH BRANCH

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

OLD LANDFILL
SITE MAP
FIGURE 2

PLOT SCALE: AS SHOWN	DWG. CODE:	CONTRACT DATE:	SHEET REFER NUMBE
DESIGN FILE: LHAAP16.DGN		INVITATION NO. DACA56- -B-	
PLOT DATE: AUGUST 1994	SHEET OF	CONTRACT NO. DACA56- -C-	

009256



LEGEND

■ - PROPOSED SOIL GAS SAMPLE LOCATION

50 0 50 100
SCALE IN FEET

SYMBOL	DESCRIPTION	DATE	APPR

Tulsa District, Tulsa, Oklahoma — US Army Corps of Engineers

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DRAWN BY: LORI KRUSE
REVIEWED BY: WADE ANDERSON
SUBMITTED BY:
CHIEF, GEOTECH BRANCH

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

SOIL GAS SAMPLE LOCATIONS
ACTIVE LANDFILL
FIGURE 3

PLOT SCALE: AS SHOWN	DWG. CODE:	CONTRACT DATE:	SHEET REFERENCE NUMBER
DESIGN FILE: LHAAP12.DGN		INVITATION NO. DACA56- -B-	
PLOT DATE: AUGUST 1994	SHEET OF	CONTRACT NO. DACA56- -C-	

009257

SYMBOL	DESCRIPTION	DATE	AP

Tulsa District, Tulsa, Oklahoma — US Army Corps of Engineers

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REVIEWED BY: WADE ANDERSON
SUBMITTED BY:
CHIEF, GEOTECH BRANCH

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

SOIL GAS SAMPLE LOCATIONS
OLD LANDFILL
FIGURE 4

PLOT SCALE: AS SHOWN | DWG. CODE: | CONTRACT DATE: | SHEET REFERENCE NUMBER:
DESIGN FILE: LHAAP16.DGN | INVITATION NO. DACA56- -B-
PLOT DATE: AUGUST 1994 | SHEET OF | CONTRACT NO. DACA56- -C-

1

At each soil gas sample location, a 1/2" diameter hole will be made to the sampling depth by using a slide hammer. The 1/2" diameter stainless steel probe will be inserted to the full depth of the hole and sealed off from the atmosphere by packing soil around it or by using a biodegradable inert sealant. Each gas sample will be collected from the prescribed depth through the probe. A vacuum system that allows acquisition of a sample from near the probe tip will be used. The soil gas sample will not pass through the pump. The soil gas sample will be drawn into a stainless steel syringe, and injected directly into a pre-evacuated EPA-clean glass vial and sealed with teflon coated septa. The sample collection system shall be thoroughly purged between each soil gas sample.

The soil gas samples will be shipped overnight to the laboratory and analyzed within 48 hours. Soil gas samples will be analyzed by a gas chromatograph equipped with an electron capture detector (ECD) for chlorinated compounds typically contained in industrial solvents following modified EPA 8010 procedures, a flame-ionization detector (FID) for volatile compounds associated with petroleum products following modified EPA 8020 procedures. An additional analysis on a GC equipped with a thermal conductivity detector (TCD) will be conducted. The list of parameters for each analysis in shown in Table 1.

TABLE 1 Soil Gas Parameters

<u>ECD Analytes</u>	
cis-1,2-dichloroethene	trans-1,2-dichloroethene
trichloroethene	tetrachloroethene
1,1,1-trichloroethane	1,1,2-trichloroethane
1,1-dichloroethane	methylene chloride
1,1-dichloroethene	carbon tetrachloride
chloroform	
<u>FID Anlalytes</u>	
benzene	toluene
ethylbenzene	total xylenes
<u>TCD Analytes</u>	
carbon dioxide	methane
oxygen	nitrogen

<u>2.3 Excavations</u>. Trenching with a backhoe will be conducted around the perimeter of the landfill to confirm the landfill limits. The excavation will begin approximately 10 to 20 feet from the estimated landfill boundary as determined from the soil gas survey results and site reconnaissance. The excavation will continue towards the landfill until landfill materials or the estimated boundary are encountered. Minimal trenching within the landfill boundaries will be conducted to

determine the depth and type of waste. All excavated material will be used to backfill the trench. Removal of any waste materials from the trench will be minimized. A Site Safety and Health Plan for excavation is included in Appendix A.

2.4 Site Topographic Mapping. A 1-foot contour map was created for the RI/FS Work Plan. Any additional topographic mapping required for the site and the surrounding area will be created with a 1 foot contour interval. The topographic map is required to complete design of site grading and to estimate material quantities.

3.0 BORROW INVESTIGATIONS. A source of borrow materials for construction of the cap will be investigated within the installation boundaries. Borrow material is reqired for general fill, clay barrier layer, and coversoil. Potential sources will be investigated by hand auger or test pits and laboratory testing. Test pits in the selected borrow source will be spaced at approximately 500 feet with closer spacing if required by subsurface conditions. The material requirements for the borrow soil are:

General Fill

Satisfactory material (SW, SP, SM, SC, SM-SC, CL, and CH) and free of trash, debris, roots, or other organic matter, or stones larger than 3 inches in any dimension.

Clay Barrier Layer

The clay barrier layer shall consist of materials with the following characteristics:

Fines Content	≥ 30%
Plasticity Index	= 10% to 40%
Gravel Content	≤ 30%
Maximum Particle Size	≤ 2 inches

Cover Soil/Top Soil

Soil types SC, SM, CL, SC-SM, CL-ML and free of trash, debris, roots, or other organic matter, or stones larger than 3/4 inch in any dimension.

The soil testing program will consist of visual classification of all samples; gradation, water content, Atterberg limits on 50 to 75% of the samples; standard and modified moisture density relationships and flexible wall permeability for the clay layer. All testing will be conducted in accordance with American Society of Testing Materials methods. Construction specification for the clay layer will be designed for a hydraulic conductivity of $\leq 10^{-7}$ cm/sec.

4.0 BUDGET AND SCHEDULE.

4.1 Budget. All remedial activities at LHAAP will be funded by the Defense Environmental Restoration Account (DERA). Funding to the DERA is appropriated by Congress annually. Funding requirements for this effort shall be identified in a timely manner through the chain of command.

Funding for the Installation Restoration Program projects at Army installations is done on a priority basis. Because of the number of Army installations requiring environmental restoration work and the limited amount of funding, not all work is funded immediately. Funding to start remedial design of the landfill caps has been received in fiscal year 1994.

4.2 Schedule. A schedule of approximately 11 months has been proposed for the remedial design of the landfill caps including investigations, Proposed Plan, Responsiveness Summary/Record of Decison, and 60 percent and final plans and specifications. Remedial Design and Borrow Investigations are currently scheduled for August thru October 1994.

APPENDIX A

SITE SAFETY AND HEALTH PLAN
EXCAVATIONS

009262

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

LHAAP-12 AND LHAAP-16
OLD LANDFILL AND ACTIVE LANDFILL
INVESTIGATIONS

APRIL 1994

SITE SAFETY AND HEALTH PLAN

U.S. ARMY CORPS OF ENGINEERS
TULSA DISTRICT

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1.0 PLAN APPROVAL

This Site Safety and Health Plan for investigative activities at Longhorn Army Ammunition Plant has been prepared and approved by the following:

M G Snider

GREG SNIDER
Industrial Hygienist

Date: 4/7/94

Joe M. Glenn

JOE M. GLENN
Chief, Chemistry and
Industrial Hygiene Section

Date: 4/8/94

Bob W. Vandegriff

BOB W. VANDEGRIFF
Chief, Safety and Occupational
Health Office

Date: 8 Apr 94

2.0 PURPOSE AND SCOPE

This Site Safety and Health Plan (SSHP) establishes procedures and work practices to protect Tulsa District Corps of Engineers (COE) employees and authorized on-site visitors from potential safety and health hazards during investigative activities.

This SSHP has been prepared in accordance with Occupational Safety and Health Administration guidelines outlined in 29 CFR 1910.120 along with US Army Corps of Engineers Safety and Health Requirements Manual EM 385-1-1 (October 1992).

3.0 APPLICABILITY

The requirements and procedures set forth in this SSHP apply to all COE personnel and authorized on-site visitors working in the identified areas. Supervisors are to ensure that employees understand and follow the guidelines contained within this plan.

4.0 RESPONSIBILITIES

The following personnel are responsible for site safety and health and ensuring compliance with the requirements and procedures contained within this SSHP along with EM 385-1-1:

(a) Bob Vandegriff, Tulsa District Safety Officer
(b) Greg Snider, Project Industrial Hygienist, SSHO

4.1 Safety Officer

* Overall responsibility for safety and health on Corps of Engineers projects.
* Oversight and approval of safety and health plan requirements.
* Direction of industrial hygiene sampling and air monitoring strategies.
* Medical surveillance program implementation.
* Hazardous waste worker training program implementation.
* Ensure that the project is performed in accordance with SSHP and EM 385-1-1 requirements.

4.2 Project Industrial Hygienist

* Development and preparation of safety and health plan.
* Direct site safety and health officer on health and safety matters and field implementation of the safety and health plan.
* Upgrade or downgrade levels of protection as outlined in the SSHP.
* Perform and direct industrial hygiene air sampling activities.
* Direct site specific training activities as outlined in

the SSHP.
* Coordinate with the Safety Officer on health and safety matters.
* Ensure that the project is performed in accordance with the SSHP and EM 385-1-1 requirements.

4.3 Site Safety and Health Officer

* Direct safety and health activities on-site.
* Implement the SSHP and ensure the project is performed in accordance with SSHP and EM 385-1-1 requirements.
* Perform health and safety activities on-site as specified in the SSHP, and report all results to the project industrial hygienist.
* Upgrade or downgrade levels of protection as directed by the project industrial hygienist.
* Suspend field activities if action levels are exceeded or conditions at the site change.
* Perform air monitoring as specified in the SSHP and maintain documentation of air monitoring results.
* Establish and enforce site zonation requirements as outlined in the SSHP.
* Report all infractions of the SSHP to the project industrial hygienist.

5.0 SITE LOCATION

Longhorn Army Ammunition Plant (LHAAP) is located in east central Texas in the northeast corner of Harrison County, approximately 14 miles northeast of Marshall, Texas, and approximately 40 miles west of Shreveport, Louisiana. The installation occupies 8,493 acres between State Highway 43 and the western shore of Caddo Lake. State highways 43 and 134 access the installation. A location map is provided as Figure 5.0-1.

6.0 SITE HISTORY

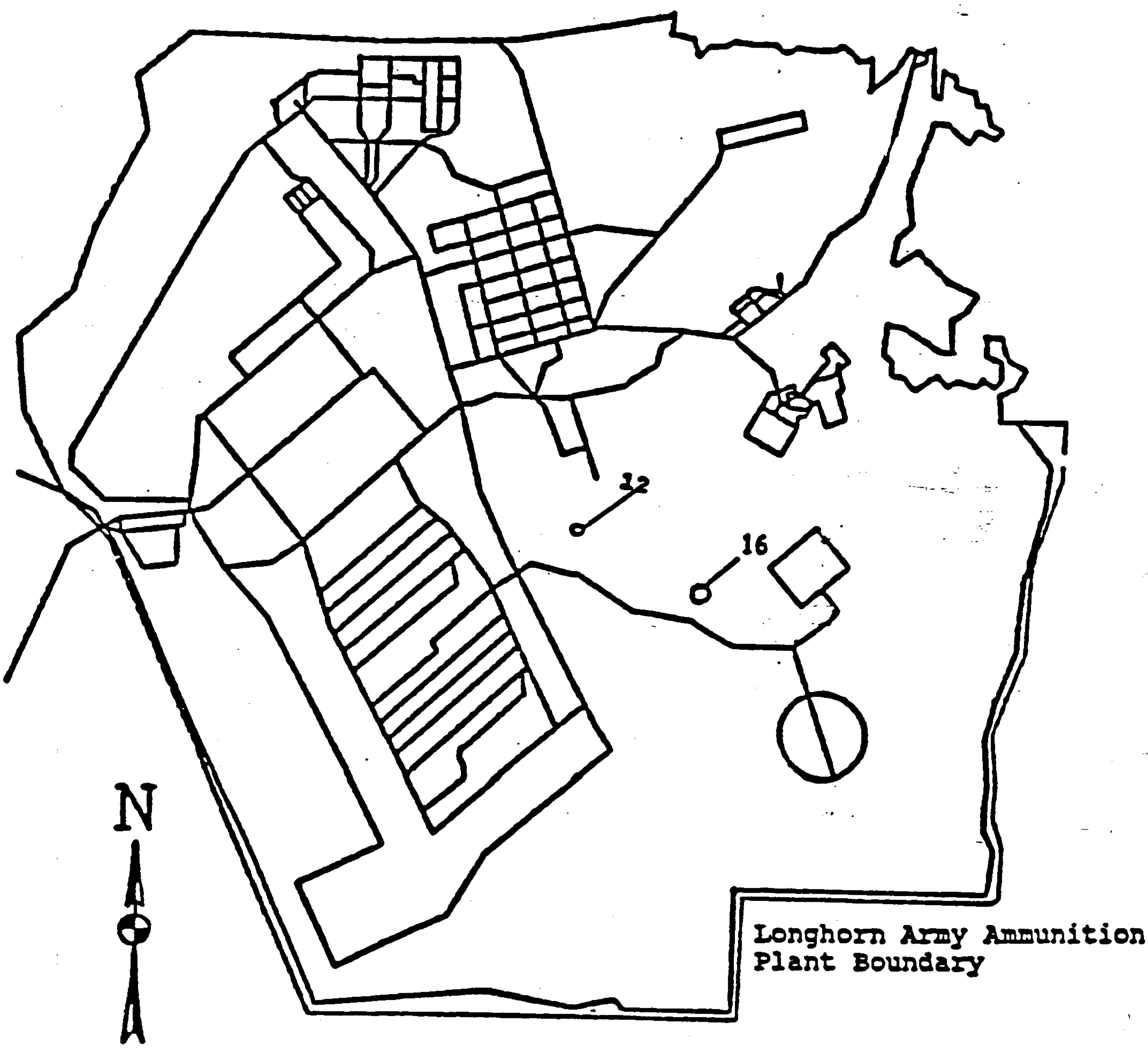
Longhorn Army Ammunition Plant is a government-owned, contractor-operated industrial facility under the jurisdiction of the U.S. Army Armament, Munitions, and Chemical Command (AMCCOM). Its primary mission is to load, assemble, and pack pyrotechnic and illuminating/signal ammunition and solid propellant rocket motors. The Longhorn Division of Thiokol Corporation is the current operating contractor.

LAAP was established in October 1942 with the primary mission of producing 2,4,6-trinitrotoluene (TNT) flake in the Plant 1 area. Monsanto Chemical Company was the first contractor at the plant. Production of TNT continued through World War II until August 1945 when Monsanto's role ceased and the plant went on standby status until February 1952. From 1952 until 1956, Universal Match Corporation was the operating contractor, producing such pyrotechnic ammunition as photoflash bombs, simulators, hand signals, and 40mm tracers.

In November 1955, Thiokol Corporation began operation of the Plant 3 area rocket motor facility. Thiokol assumed responsibility for total operation of the plant with the departure of Universal Match Corporation in 1956. Production of rocket motors continued to be the primary mission of LAAP until 1965, when the production of pyrotechnic and illuminating ammunition was reestablished.

Industrial operations at LHAAP resulted in the disposal of various hazardous wastes into ditches, streams, and earthen impoundments where contamination has been previously identified.

FIGURE 5.0-1
GENERAL SITE LOCATION MAP



6.1 LHAAP 12 - Active Landfill

The Active Landfill (LHAAP 12) is located in the central portion of LHAAP. The center of the site is about 1,700 feet east-northeast of the intersection of Avenue P and Q. The entrance to the sites' graveled access road is on Avenue Q about 0.2 miles east of Avenue P.

Aerial photography taken in 1954 reveals the construction of a diversion ditch between Central Creek and one of its principal tributaries which collects surface runoff from the southern part of the Magazine Area. The apparent purpose of the ditch was to divert flow in the area where a railroad crossed the tributary system, eliminating the need for a bridge. The diversion ditch remained functional until 1963 when aerial photography shows waste material disposed in the ditch system. 1970 photographs show that enough waste material had been disposed to block the flow of the system, but the site appeared to be inactive. Sometime between 1970 and 1978, the site was reactived for waste disposal. By 1978 the entire ditch system had been filled with waste material and an adjacent undisturbed hillside had also been used for disposal. Since 1978, the site has been in continuous use for disposal of industrial solid wastes generated at LHAAP. An area southeast of the original ditch system has been cleared and is now used for the disposal of non-hazardous combustible and non-combustible wastes. The types of waste disposed of at this site since 1963 are largely unknown. It is possible that the Active Landfill site has been used for the disposal of similar wastes which were disposed of at the Old Landfill which include substandard TNT, barrels of chemicals, oils, paints scrap iron, and wood.

Major contaminants detected in previous investigations are presented in Table 6.1-1.

TABLE 6.1-1
ACTIVE LANDFILL (LHAAP 12)
Maximum Concentrations of Major Contaminants
Detected in Previous Investigations

Parameter	Maximum Concentration In: Groundwater (ug/L)	Surface Water (ug/L)	Sediment (ug/L)
Aluminum	361.00	3150	1100
Arsenic	-	-	.4
Barium	75.10	-	25
Cadmium	11.52	10	1.3
Chromium	27.70	50	4.6
Copper	-	60	5000
Iron	-	2250000	22800
Lead	54.40	12	4.9
Manganese	1990.00	25000	2010
Nickel	71.+	-	2010
Silver	-	-	0.2
Zinc	-	580	90
Dichloromethane	48.	-	-
1,1'-Bicyclohexl	11	-	-
Methylene Chloride	45	-	-
Thallium	110	-	-

Reference: Longhorn Army Ammunition Plant Field Investigation Summary, Volume 1, February 1994.

6.2 LHAAP 16 - Old Landfill

The Old Landfill (LHAAP 16) site is described as an open area bounded along the western and northern edges by a gravel road and along the eastern and southern edges by a wooded area. A large rectangular paved area that is designated as the Retail Sales Area for LHAAP is located on the western edge of the site. In the past, equipment auctions were held at this location. A tributary of Harrison Bayou runs closely along the eastern edge of the site.

The Old Landfill area was used for the disposal of inert materials and mission related hazardous wastes. The area was used to dispose of TNT redwater ash material from 1942 to 1944. In the mid to late 1950's, three rocket motor casings were burned and possibly buried on the eastern side of this landfill. A large bermed depression, once located near the center of the Old Landfill, served as an all purpose junkyard for the disposal of such materials as substandard TNT, barrels of chemicals, oil, paint, scrap iron and wood. This area was filled in and the pond no longer exists. The landfill operation started at the original ground level at the north-south mid-line of the site and ended 15 feet above original grade at the eastern edge of the site.

Soil contamination due to explosives has been verified at the site to depths of at least 15 feet. Sediments in the adjacent tributary to Harrison Bayou also are contaminated with explosive compounds.

Major contaminants detected in previous investigations are presented in Table 6.2-1.

TABLE 6.2-1
OLD LANDFILL (LHAAP 16)
Maximum Concentrations of Major Contaminants
Detected in Previous Investigations

	Maximum Concentration In:	
Parameter	Groundwater (ug/l)	Soil (ug/g)
1,3-DNB	<1.0	<10.0 ug/kg
2,4,6-TNT	<1.0	<10.0 ug/kg
1,3,5-TNB	<1.0	0.153
2,4-DNT	<1.0	0.073
2,6-DNT	8.60	0.073
aluminum	24100.0	16900.0
antimony	1.0	0.2
arsenic	<3.0	4.5
barium	850.0	700.0
beryllium	20.0	1.5
cadmium	20.0	3.4
chromium	41.0	104.0
copper	30.0	244.0
lead	66.0	2000.0
manganese	190.0	2020.0
mercury	<1.0	0.1
silver	10.0	3.9
strontium	1790.0	35.8
thallium	<1	<3
zinc	1300.0	796.0
sulfate	58	740.0
chloride	1180.0	190.0
fluoride	4.3	93.0
vinyl chloride	10.5	2.1

Reference: Longhorn Army Ammunition Field Investigation Summary, Volume 1, February 1994.

7.0 PROJECT SCOPE

Investigative activities planned in support of this investigation consist of trenching with a backhoe or auguring with a portable drilling rig to determine the boundaries of the landfills. Locations which are suspected to be outside of the existing landfill boundary will be selected on all sides. A trench will be dug or hole augured towards the landfill interior to determine the outermost boundaries of the landfill. When landfill debry and fill material are encountered, trenching or auguring at that particular location will cease.

8.0 TRAINING

All personnel entering the site during field investigative activities must meet training requirements outlined in 29 CFR 1910.120. Additional site specific training will be conducted by the Site Safety and Health Officer before field activities commence in the following areas:

- History of the site.
- Field activities planned.
- Safety, health and other hazards present at the site.
- Use of personal protective equipment.
- Work practices which will minimize potential hazards.
- Safe use of equipment at the site.
- Air monitoring activities.
- Industrial hygiene sampling activities.
- Recognition of signs and symptoms indicating possible overexposure to chemical hazards.
- Decontamination procedures.
- Emergency response and evacuation procedures.

29 CFR 1910.120 training documentation records for Corps of Engineers employees are maintained in the Tulsa District Safety and Occupational Health Office. Site specific training will be documented on forms included in Appendix C.

9.0 SITE WORK ZONES

Due to the presence of chemical, physical and equipment hazards at the site an exclusion zone will be established at all investigation sites. If necessary, based upon site conditions and the site surroundings, a contamination reduction zone and support zone will also be established. An illustration of site work zones is provided as Figure 9.0-1.

9.1 Exclusion Zone

The exclusion zone shall consist of a approximately 30-foot radius around the backhoe or drilling rig established with printed hazard tape. The exclusion zone is considered a contaminated area, therefore, only authorized personnel with proper personal protective equipment are allowed entry.

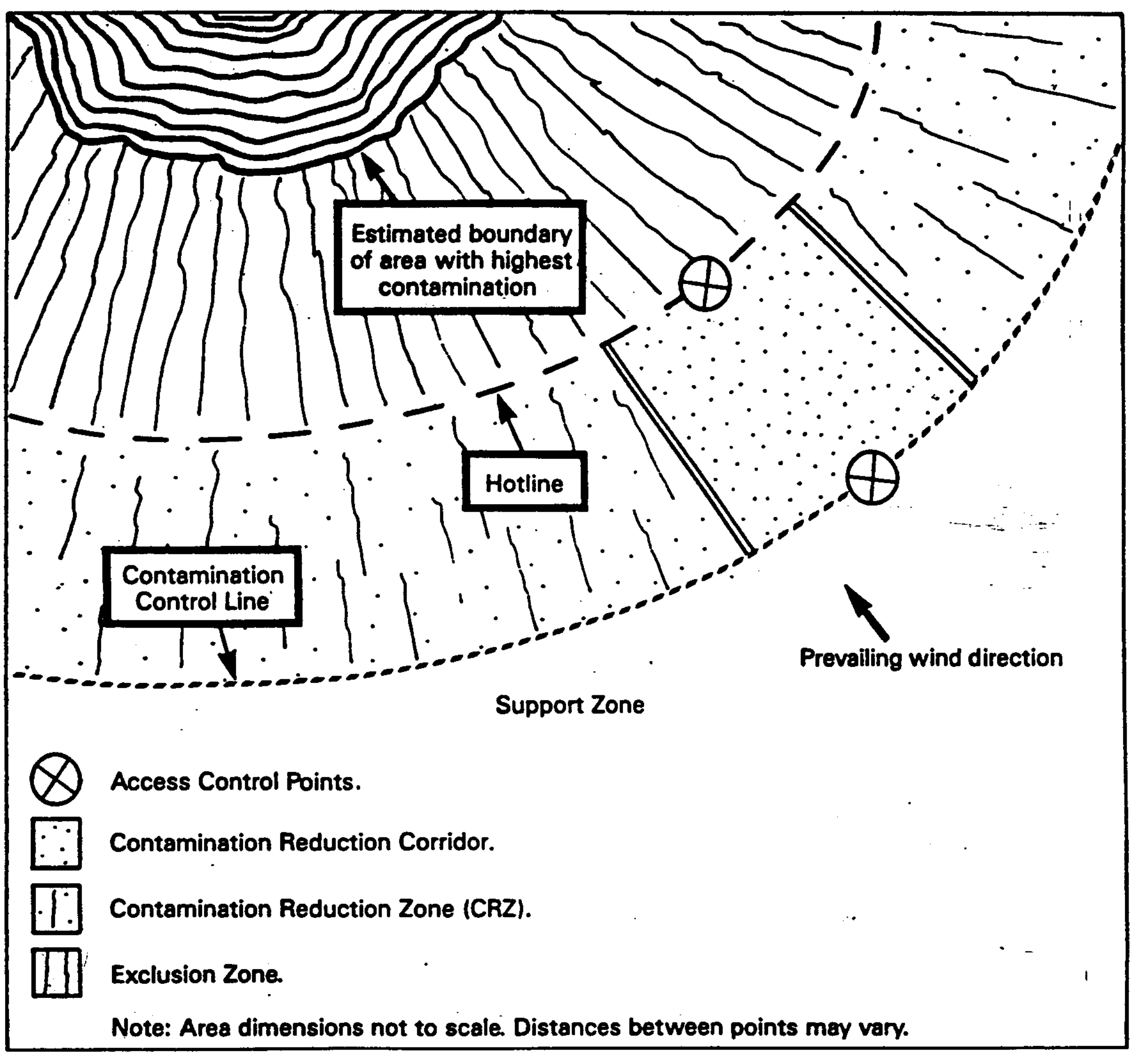
9.2 Contamination Reduction Zone

The contamination reduction zone will consist of a site specific area just outside the exclusion zone. The contamination reduction zone will serve as a buffer between contaminated and non contaminated work areas.

9.3 Support Zone

The support zone is a staging area for equipment and personnel. A log will be kept in the support zone by the SSHO of all personnel entering and leaving the site.

FIGURE 9.0-1
SITE WORK ZONES



10.0 HAZARD ASSESSMENT

10.1 Chemical Hazards

The compounds detected in previous investigations at the site include metals, solvents, explosives, and vinyl chloride. A summary of major contaminants found or expected at the sites included in this project and their exposure standards is presented in Table 10.0-1. No potential military chemical agent hazards have been identified at LHAAP.

Metals were found at LHAAP in high concentrations in both soil and groundwater. Many metals are carcinogenic, and most are toxic by ingestion, inhalation, and/or skin absorption. Exposure to metals can occur through inhalation and ingestion. The possibility of ingestion will be minimized by wearing personal protective clothing and good work practices. Exposure via inhalation will be controlled by minimizing dust generation during drilling and trenching operations.

Solvents identified at the site in very high concentrations were trichlorethene and methylene chloride. The major route of exposure to solvents is through the respiratory system. Another route of exposure is through skin absorption. Solvents can be Central Nervous System depressants, narcotics, hepatotoxin or hematopoietic toxins. Most are both skin and eye irritants. In addition, 1,2-dichloroethane, methylene chloride and trichloroethene have been classified as potential human carcinogens. However, due to the rapid volatility of most of these compounds and the unconfined spaces to be sampled at this site, the possibility of exposure via inhalation is low. Air monitoring and proper PPE will minimize and control the exposure potential. The possibility of skin contact is greater; therefore, protective clothing shall be worn.

Contamination by various explosives has been found over most of the sites at LHAAP. The primary routes of exposure to these compounds are through skin contact/absorption and inhalation of dust. Nitrobenzene, a potential contaminant, is a poisonous yellow oily liquid which is rapidly absorbed through the skin. TNT may also be absorbed through the skin; both of these compounds can cause headache, weakness, drowsiness, and/or vomiting. The primary acute effect from exposure to tetryl is dermatitis. Conjunctivitis may be caused by rubbing the eyes with contaminated hands or by exposure to air-borne dust. Anemia can also result from exposure to either TNT or tetryl. Skin contact/absorption is possible during drilling and sampling activities; therefore, protective clothing and especially eye protection will be important to prevent exposure.

Vinyl chloride, found at the Old Landfill, is a human carcinogen and is dangerous to skin, eyes and mucous membranes. Exposure may occur via inhalation or absorption. Air monitoring and proper PPE will minimize and control the possibility of exposure.

10.2 Physical Hazards

Temperature related stresses can be a significant hazard to employees working at this site. Appendix B, SOP 3 addresses actions to monitor and treat temperature related stresses.

10.3 Biological Hazards

Biological hazards potentially present at the site include but are not limited to insects and poisonous snakes. Employee awareness to these hazards will reduce associated risk. Appendix B, SOP 2 addresses recommended actions in the event of a snakebite.

10.4 Equipment Operation Hazards

Rotary drilling rig and heavy equipment operation present inherent safety hazards. Employee experience in the use of such equipment and awareness to potential hazards will reduce risk. Equipment operation must be in accordance with guidelines set forth in applicable OSHA regulations and U.S. Army Corps of Engineers Safety and Health Requirements Manual EM 385-1-1.

TABLE 10.1-1
CHEMICAL HAZARD ANALYSIS AND CONTAMINANT EXPOSURE LEVELS

Contaminants	ACGIH TLV	OSHA PEL	Route of Exposure
Beryllium	0.002 mg/m3 A2	0.002 mg/m3	Ih
Mercury	0.05 mg/m3 skin	0.05 mg/m3 skin	Ih,Ab,Cn
Cadmium	0.01 mg/m3 A2	0.2 mg/m3	Ih,Ig
Silver	0.1 mg/m3	0.01 mg/m3	Ih,Ig,Cn
Thallium	0.1 mg/m3 skin	0.1 mg/m3 skin	Ih,Ig,Cn,Ab
Lead	0.15 mg/m3	0.05 mg/m3	Ih,Ig,Cn
1,3-DNB	0.15 mg/m3	1 mg/m3 skin	Ih,Ig,Cn,Ab
Arsenic	0.01 mg/m3 A1	0.5 mg/m3	Ih,Ig,Cn,Ab
Vinyl chloride	5 ppm A1	1 ppm	Ih
Antimony	0.5 mg/m3	0.5 mg/m3	Ih,Cn
Barium	0.5 mg/m3	0.5 mg/m3	Ih,Ig,Cn
Chromium	0.05 mg/m3	0.05 mg/m3	Ih,Ig
2,4,6-TNT	0.5 mg/m3 skin	0.5 mg/m3 skin	Ih,Ig,Cn,Ab
DNT	0.15 mg/m3 A2 skin	1.5 mg/m3 skin	Ih,Ig,Cn,Ab
Cyclonite (RDX)	1.5 mg/m3 skin	1.5 mg/m3 skin	Ih,Ig,Cn,Ab
Copper	1 mg/m3	1 mg/m3	Ih,Ig,Cn
Manganese	0.2 mg/m3	5 mg/m3	Ih,Ig
Aluminum	10 mg/m3	15 mg/m3	Ih,Ig
Ethylene Dichloride	10 ppm	1 ppm	Ih,Ig,Cn,Ab
Methylene Chloride	50 ppm A2	500 ppm	Ih,Ig,Cn
Perchlorothylene	25 ppm	25 ppm	Ih,Ig,Cn
Trichloroethene	50 ppm	50 ppm	Ih,Ig,Cn
Dichlorobenzene	75 ppm	75 ppm	Ih,Ig,Cn
Acetone	750 ppm	750 ppm	Ih,Ig,Cn

ACGIH TLV - American Conference of Governmental Industrial Hygienist Threshold Limit Values
OSHA PEL - Occupational Safety and Health Administration Permissible Exposure Limit
A1 - Confirmed Human Carcinogen
A2 - Suspected Human Carcinogen
Ih - Inhalation
Ig - Ingestion
Cn - Skin and/or eye contact
Ab - Absorption

10.5 Unexploded Ordnance and Explosive Waste Hazards

Explosive ordnance, explosives and pyrotechnic fillers were manufactured at LHAAP. It is reasonable to assume the same were destroyed and/or buried at LHAAP. To ensure maximum safety for on-site personnel, all intrusive activities will be preceded by a magnetometer survey of the intrusion site by qualified OEW experts. All magnetometer anomalies should be avoided, and only nonmagnetic areas will be selected for intrusive activities.

All personnel will receive site-specific training on the recognition of manufactured explosive ordnance items and bulk TNT.

TABLE 10.1-2
CHEMICAL AND PHYSICAL PROPERTIES

COMPOUND	MOLECULAR WEIGHT	BOILING POINT (F)	FLASH POINT (F)	IP (eV)	UEL (%)	LEL (%)
Beryllium	9.0	4532	NA	NA	NA	NA
Mercury	200.6	674	NA	NA	NA	NA
Cadmium	112.4	1409	NA	NA	NA	NA
Silver	107.9	3632	NA	NA	NA	NA
Lead	207.2	3164	NA	NA	NA	NA
1,3-DNB	168.1	570	182	10.43	NA	NA
Arsenic	74.9	subl	NA	NA	NA	NA
Vinyl Chloride	62.5	7	NA	9.99	33.0	3.6
Antimony	121.8	2975	NA	NA	NA	NA
Barium	208.4	2840	NA	NA	NA	NA
Chromium	52.0	4788	NA	NA	NA	NA
2,4,6-TNT	227.1	464	explodes	10.59	NA	NA
DNT	182.2	572	404	NA	NA	NA
Copper	63.5	4703	NA	NA	NA	NA
Manganese	54.9	3564	NA	NA	NA	NA
Ethylene Dichloride	99.0	182	56	11.05	16	6.2
Methylene Chloride	84.9	104	NA	11.32	22	14
Perchloroethylene	165.8	250	NA	9.32	NA	NA
Trichloroethene	131.4	189	90	9.45	10.5	8
Dichlorobenzene	147.0	357	151	9.06	9.2	2.2
Acetone	58.1	133	0	9.69	13	2.5

Source: Pocket Guide to Chemical Hazards, US Department of Health and Human Services, NIOSH, June 1990.

10.6 Noise Hazards

Suitable ear protection (ear plugs) will be required during work operations where noise levels exceed 85 dB. Periodic noise monitoring will be performed using a portable sound level indicator.

10.7 Excavation and Confined Space Hazards

Confined space entry and entry into the excavation will not be performed in support of this project. Proper precautions will be taken while the excavation is open to prevent personnel from accidentally falling into the excavation. The excavation will be properly secured at the end of each work day.

11.0 PERSONAL PROTECTIVE EQUIPMENT

In order to minimize bodily contact with potentially contaminated materials, the following personal protective equipment shall be worn by all site personnel engaged in site activities. If site conditions change during the course of investigative activities, the project industrial hygienist or the safety officer will need to be contacted to further evaluate the site and recommend PPE upgrades.

Level D (modified)

- Cotton or Tyvek full body coveralls
- Chemical resistant gloves
- Steel toe safety work boots
- Hard hat (if overhead hazards are present)
- Safety glasses
- Hearing protection (as necessary)

11.1 Respiratory Protection

All personnel involved in HTRW investigative activities will have access to a NIOSH approved air purifying respirator (half face minimum). Appropriate cartridges will be made available to field personnel as necessary by the project industrial hygienist. Respirators will be added to personal protective equipment requirements as determined by site conditions and the project industrial hygienist. Respiratory use will be in accordance with requirements outlined in the Tulsa District Respiratory Protection Program. All personnel required to wear a respirator must first receive an indepth respiratory physical, a physicians interpretation of the employees ability to wear a respirator, and receive a qualitative fit test with the selected respirator.

12.0 AIR MONITORING

The designated Site Safety and Health Officer (SSHO) will be responsible for the on-site implementation of the air monitoring procedures contained within this plan including recordkeeping. In the event of changing site conditions or if action levels are exceeded, the SSHO will be responsible for contacting the project industrial hygienist or safety officer for recommended actions including necessary engineering controls and PPE upgrades.

12.1 Photoionization Detector (PID)

A PID with a 10.2 eV probe will be used to monitor employee exposure to ionizable compounds at selected intervals during drilling and trenching activities. Monitoring will be performed in the employee breathing zone. Screenings will also be taken at the borehole and over excavated soil cuttings.

12.2 Combustible Gas/Oxygen Indicator (CGI)

A CGI will be used at selected intervals during drilling and trenching activities to measure the oxygen content and lower explosive limit.

12.3 Draegar Pump

As determined by site conditions a draegar pump will be used for initial screening and randomly throughout investigative activities to screen for the presence of site specific contaminants with low PELs such as vinyl chloride and ethylene dichloride. If compounds are detected, integrated air sampling using a low flow pump may be implemented.

13.0 ACTION LEVELS

13.1 Photoionization Detector

A value of 10 PID units above background in the workers breathing zone will require the site to be evacuated. After 15-30 minutes the SSHO will take additional readings. If a value of 5-10 PID units above background is still present the project industrial hygienist or safety officer shall be notified for recommended PPE upgrades and engineering controls.

13.2 Combustible Gas/Oxygen Indicator

Alarms will be set at 10% of the lower explosive limit (LEL) and <19.5% and > 23% oxygen. Should the alarms activate, work operations will immediately be terminated and the site evacuated. The project industrial hygienist or safety officer shall be notified for recommended actions.

13.3 Draegar Pump/ Air Sampling

Action levels for vinyl chloride and ethylene dichloride and other site specific chemicals will be 1/2 the OSHA PEL or ACGIH TLV, whichever is lower.

TABLE 13.0-1
ACTION LEVELS BASED ON BREATHING ZONE MEASUREMENTS

CONTAMINANT	INSTRUMENT	ACTION LEVEL	ACTION
Organic Vapors	HNU PI-101	0-5 PID	Continue work.
		5-10 PID	Monitor worker breathing zone with detector tubes.
		>10 PID	Evacuate exclusion zone, terminate work operations, notify Project Industrial Hygienist.
Combustible Gases	Industrial Scientific HMX-271	<10% LEL	Continue work.
		10% LEL (alarm)	Shut down electrical and fuel powered motors. Evacuate exclusion zone, notify Project Industrial Hygienist.
Oxygen Content	Industrial Scientific HMX-271	<19.5% (alarm)	Stop work. Evacuate exclusion zone. Oxygen deficiency exists, notify Project Industrial Hygienist.
		19.5-23%	Continue work.
		>23% (alarm)	Stop work. Evacuate exclusion zone. Oxygen enriched atmosphere, notify Project Industrial Hygienist.

14.0 DECONTAMINATION

14.1 Personnel Decontamination

Decontamination activities for personnel will consist of the disposal of Tyvek coveralls and gloves in trash bags, placing cotton coveralls in laundry bags, and washing of all exposed body surfaces. Disposal of all materials will be in accordance with workplan requirements.

14.2 Equipment Decontamination

All equipment contacting potentially contaminated soils will be thoroughly decontaminated before exiting the site. Decontamination activities and disposal of decontamination materials will be in accordance with workplan requirements.

15.0 MEDICAL SURVEILLANCE

All Corps of Engineers employees working on hazardous waste sites are required to participate in the Tulsa District Medical Surveillance Program. Employees receive an annual physical examination including blood chemistry with complete blood count and differential; urinalysis; medical history; required chest x-rays; audiogram; pulmonary function testing; and a physicians interpretation as to the employees ability to wear a respirator. As required the examination may include testing for heavy metals. Employee medical surveillance records are managed by the Tulsa District Safety and Occupational Health Office.

16.0 EMERGENCY RESPONSE NUMBERS

- Ambulance Service.................. (903) 938-6711
- Marshall Police.................... (903) 935-7831
- Marshall Fire Department........... (903) 938-6711
- Marshall Hospital.................. (903) 935-9311
- Poison Control Center..............1-800-822-9761

COE SAFETY AND OCCUPATIONAL HEALTH OFFICE

Bob Vandegriff (918) 669-7360

COE CHEMISTRY AND INDUSTRIAL HYGIENE SECTION

Greg Snider (918) 669-7073
Tracey Jordan

COE INVESTIGATIONS SECTION

Buddy Collins (918) 581-7382

COE EXPLOSIVES CENTER, HUNTSVILLE DIVISION

Dave Doughat (205) 955-5785

17.0 REFERENCES

(a) EM 385-1-1, Engineers Safety and Health Requirements Manual, October 1992.

(b) 29 CFR 1926, Occupational Safety and Health Administration (OSHA), Construction Industry Standards.

(c) 29 CFR 1910, Occupational Safety and Health Administration (OSHA), General Industry Standards.

(d) COE, Tulsa District Respiratory Protection Program, October 1992.

(e) NIOSH/OSHA/USCG/EPA, Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, October 1985.

(f) American Conference of Governmental Industrial Hygienists, Threshold Limit Values and Biological Exposure Indices, 1993-94.

(g) NIOSH, Pocket Guide to Chemical Hazards, June 1990.

APPENDIX A

EMERGENCY PLAN

EMERGENCY PLAN

1.0 General. Careful consideration has been given to the relative possibility to fire, explosion, or release of vapors, dusts, or gases which may impinge on nearby facilities. The most likely off-site impact from this investigation involves the potential for increased airborne contaminants as a result of intrusive activities. Control measures will be employed as necessary to preclude any possibility of off-site migration of contaminants. As a result of the hazards on site and the conditions under which investigations will be conducted, the possibility of an emergency situation exists. An emergency plan is required by 29 CFR 1910.120 to be available for use and is included below.

1.1 Site Safety and Health Officer. The Site Safety and Health Officer (SSHO) shall implement this emergency plan whenever conditions at the site warrant such action. The SSHO will be responsible for assuring the evacuation, emergency treatment, emergency transport of site personnel as necessary, and notification of emergency response units and the appropriate management staff.

1.2 Evacuation. In the event of an emergency situation, such as fire, explosion, significant release of contaminants, etc., the SSHO will notify all site personnel indicating the initiation of evacuation procedures. All personnel in both the restricted and nonrestricted areas will evacuate and assemble in the support zone or other safe area as identified by the SSHO. The SSHO will have authority to initiate proper action if outside services are required. Under no circumstances will incoming personnel or visitors be allowed to proceed into the area once the emergency has been identified. The SSHO shall see that access for emergency equipment is provided and that all equipment has been shut down once the emergency has been identified. Once the safety of all personnel is established, the emergency response groups will be notified of the emergency. Other personnel listed in paragraph 2.1 shall then be notified.

1.3 Personnel Exposure. In the event of personnel exposure, skin contact, inhalation, or ingestion the following procedures shall be followed:

1.3.1 Skin Contact. Wash/rinse affected area thoroughly with copious amounts of soap and water, then provide appropriate medical attention if required. Eyes should be rinsed for at least 15 minutes following chemical contamination.

1.3.2 Inhalation. Move to fresh air and if necessary decontaminate and transport to nearest hospital.

1.3.3 Ingestion. Decontaminate and transport to nearest hospital.

1.3.4 Puncture Wound or Laceration. Decontaminate and transport to nearest hospital for professional medical attention. The SEC will provide medical data sheets to appropriate medical personnel as required.

2.0 Fire or Explosion. Immediately evacuate the site and notify the local fire and police departments, and other appropriate emergency response groups.

2.1 Environmental Incident. Secure spread of contamination if possible. Notify fire, sheriff, and police departments to inform them of the possible need for assistance to evacuate nearby areas. If a significant release has occurred, the National Response Center should be contacted. Emergency phone numbers are located in Appendix B. Those groups will alert the National or Regional Response Teams as necessary. Following these emergency calls, the following personnel listed below shall be notified:

Bob Vandegriff	COE Safety Office	(918) 669-7360
Greg Snider Tracey Jordan	COE Industrial Hygienist	(918) 669-7073

2.2 Adverse Weather. In the event of adverse weather, the Site Safety and Health Officer will determine if work can continue without sacrificing the health and safety of site personnel. Some of the items to be considered prior to determining if work should continue are:

- Heavy Rainfall
- Potential for heat stress
- Tornadoes
- Limited visibility
- Electrical storms
- Potential for accidents
- Malfunctioning of monitoring equipment

2.3 Incident Investigation. Upon receiving a report of an incident on the site, the Site Safety and Health Officer will investigate the circumstances surrounding the incident. The COE Occupational Safety and Health Office may be requested to participate in the investigation of serious incidents.

2.4 Incident Reporting. All serious incidents resulting in a fatality, emergency response, lost work time, or medical treatment will be reported immediately by the Site Safety and Health Officer. A written report will be forwarded to the COE Occupational Safety and Health Office, at the address listed below, within 48 hours of the incident. An incident follow-up report will be distributed within one week of the incident.

U.S. Army Corps of Engineers
Safety and Occupational Health Office
P.O. Box 61
Tulsa, Oklahoma 74121

009285

APPENDIX B

STANDARD OPERATING PROCEDURES

(1) Contains or has known potential to contain a hazardous atmosphere;

(2) Contains materials/chemicals with the potential for suffocation or engulfment of the entrant;

(3) Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls, or a floor which slopes downward and tapers to a smaller cross-section;

(4) Or contains any other recognized serious safety hazard.

(e) Double Block and Bleed - The closure of a line, duct or pipe by locking and tagging a drain or vent which is open to the atmosphere in the line between two locked-closed valves.

(f) Emergency - Any occurrence (including any failure of hazard control or monitoring equipment) or event(s) internal or external to the confined space which could endanger entrants.

(g) Engulfment - The surrounding and effective capture of a person by a liquid or finely divided solid substance.

(h) Entry - The act by which a person intentionally passes through an opening into a confined space, and includes ensuing work activities in that space. The entrant is considered to have entered as soon as any part of the entrant's face breaks the plane of an opening into the space.

(i) Entry Permit - The written or printed document established by the employer, the content of which is based on the employer's hazard identification and evaluation for that confined space and is the instrument by which the employer authorizes his or her employees to enter that confined space. The permit defines the conditions under which the space may be entered; states the reason(s) for entering the space; the anticipated hazards of the entry; lists eligible attendants, entrants, and the individuals who may be in charge of the entry; and establishes the length of time for which the permit may remain valid.

(j) Hazardous Atmosphere - An atmosphere which exposes employees to a risk of death, incapacitation, injury or acute illness from one of the following causes:

(1) An explosive gas, vapor, or mist in excess of 10 percent of its lower explosive limit (LEL);

(2) An airborne combustible dust at a concentration that obscures vision at a distance of five feet or less;

(3) An atmospheric oxygen concentration below 19.5 percent or above 22 percent;

(4) An atmospheric concentration of any substance in excess of its established permissible exposure limit (PEL).

(5) Any atmospheric condition recognized as immediately dangerous to life or health.

(k) Hot Work Permit - An employer's written authorization to perform operations, within the confined space, which could provide a source of ignition, such as riveting, welding, cutting, burning or heating.

(l) Immediately Dangerous to Life or Health (IDLH) - Any condition which poses an immediate threat of loss of life; may result in irreversible or immediate severe health effects; may result in eye damage; irritation or other conditions which could impair escape from the space.

(m) Inerting - Rendering the atmosphere of a confined space nonflammable, non-explosive or otherwise chemically non-reactive by such means as displacing or diluting the original atmosphere with steam or gas which is non-reactive with respect to that space.

(n) Isolation - The separation of a confined space from unwanted forms of energy which could be a serious hazard to authorized entrants.

(o) **Low Hazard Permit Required Confined Space** - A permit required confined space where there is an extremely low likelihood that an IDLH or engulfment hazard could be present, and where all other serious hazards have been controlled.

(p) Oxygen Deficient Atmosphere - An atmosphere containing less than 19.5 percent oxygen by volume.

(q) Oxygen Enriched Atmosphere - An atmosphere containing more than 22 percent oxygen by volume.

(r) Confined Spaces - Examples of typical confined spaces include tanks, pits, diked areas, vats, tunnels, boilers, silos, ducts, digestors, manholes, sewers, stacks, storage bins, pipelines, barges, tank cars, shafts, septic tanks, pumping or lift stations, hoppers, steam condensers, trenches, bunkers, vaults, grease pits, equipment housing and cisterns. Site specific conditions must be evaluated to determine whether the examples listed above are considered to be permit required confined spaces or low hazard permit required confined spaces.

(s) General Confined Space Entry Hazards - Examples of typical confined space entry hazards include atmospheric, engulfment, mechanical, electrical, chemical and physical hazards.

5.0 **General Requirements For <u>All</u> Permit Required Confined Spaces and Low Hazard Permit Required Confined Spaces.**

(a) Training. No person shall be required or permitted to enter a confined space until they have been trained in the hazards associated with confined space entry. Training will be conducted by a competent person under the direction of the Safety and Occupational Health Office. The following items shall be addressed in the confined space entry training program.

- Hazard recognition
- Signs and symptoms of exposure
- Entry/exit procedures
- Personal protective equipment
- Rescue/emergency procedures
- First aid/CPR overview
- Lockout/tagout and energy control
- Communication
- Monitoring
- Heat stress recognition and prevention
- Respiratory protection
- Safety and health hazard recognition

(b) Confined Space Placarding. Signs shall be posted on the outside of all identified confined spaces, within Tulsa District facilities and on construction sites managed by the Tulsa District, which require routine or periodic entry. The signs shall notify employees of the hazards which are present within the space and that entry is not authorized without meeting entry permit requirements and without prior supervisor approval. A sample confined space placard is included in attachment 2.

(c) Prevention of Unauthorized Entry. If possible, all confined spaces identified on Tulsa District property and on construction sites managed by the Tulsa District, shall be locked or secured to prevent unauthorized entry.

6.0 **SPECIFIC PERMIT REQUIRED CONFINED SPACE ENTRY PROCEDURES.**

(a) General. A permit required confined space is one that is difficult to enter and exit; is not intended for occupancy except for repair or maintenance; presents potential serious hazards such as toxic, oxygen deficient or flammable atmosphere; and involves engulfment or mechanical hazards. Such a confined space would require an attendant/competent person on duty while employees are within the space.

(b) Entry Permit. Before employees are required to enter a permit required confined space, an entry permit (attachment 1) authorizing entry into the space must be completed by the crew supervisor or individual responsible for the entry. A new permit shall be completed at the start of each work shift, after extended breaks and at any time a new material (such as a cleaning compound or paint) or work process (such as welding or grinding) is introduced into the space. The permit shall be clearly posted at the point of entry into the confined space.

(c) Atmospheric Testing and Monitoring. Atmospheric testing and monitoring of the confined space shall be conducted prior to entry and continuously while the space is occupied. Monitoring and testing of the space will be conducted for oxygen content of the space, combustible gasses, vapors and mists, and other toxic compounds which could potentially be present within the space. Individuals required to monitor confined spaces will be trained in the operation of monitoring equipment and interpretation of confined space conditions. Atmospheric testing and monitoring of confined spaces must be performed by a competent person under the direction of the Safety and Occupational Health Office.

(d) Atmospheric Testing and Monitoring Equipment. Equipment used for initial and continuous monitoring of confined spaces consists of the following minimums:

(1) Combination oxygen/combustible gas meter. Optional capabilities for toxic substances detection such as carbon monoxide, hydrogen sulfide, etc.

(2) Detector tubes appropriate for the suspected contaminants within the confined space.

(3) Optional equipment may include photoionization detectors (PID), flame ionization detectors (FID), organic vapor analyzers (OVA), and infra-red detectors (IRD).

Equipment must be maintained, operated and calibrated in accordance with manufacturers recommended procedures. All monitoring equipment must be factory approved for use in hazardous and flammable atmospheres.

(e) Attendant/Competent Person. A person certified in CPR/First Aid and trained in emergency rescue, including respiratory usage, shall be assigned to remain on the outside of the confined space at all times the space is occupied. The authorized attendant shall maintain continuous communication with those working inside the space. The attendant shall have the primary responsibility of monitoring the confined space and performing emergency rescue. Rescue procedures shall be specifically designed for each confined space and recorded on the entry permit. The attendant/competent person shall not enter the confined space.

(f) Emergency Rescue Equipment. Minimum equipment required on the site while the space is occupied shall consist of the following minimums:

(1) A full body harness with attached lifeline;

(2) A tripod if the confined space is more than six feet deep.

(3) A supplied air respirator or self contained breathing apparatus.

(g) Personal Protective Equipment. Personal protective equipment necessary for confined space entry will be selected based upon site specific conditions. The personal protective equipment necessary for confined space entry will be listed on the entry permit. All use of personal protective equipment, including respirators, will be under the direction of the Safety and Occupational Health Office.

7.0 SPECIFIC LOW HAZARD PERMIT REQUIRED CONFINED SPACE ENTRY PROCEDURES.

(a) General. A low hazard permit space is a confined space with a very low likelihood of a flammable or explosive atmosphere, atmospheric toxins or engulfment hazards. No attendant/competent person is necessary while the space is occupied.

(b) Entry Permit. When supervisors, in consultation with the Safety and Occupational Health Office, determine based on documentation which appears on the entry permit (attachment 1), that the confined space is a low hazard permit space, entry may be authorized without providing an attendant for a period of up to one year. The permit shall be clearly posted at the point of entry into the confined space.

(c) Supervisors who plan to have employees enter low hazard permit spaces to perform minor maintenance work and inspections which will not generate any serious hazard, shall ensure the authorized entrants receive the necessary training and that the following conditions are met:

(1) Appropriate entry practices and procedures are in effect before authorizing entry and followed throughout the entry.

(2) If the space has a potential for a hazardous atmosphere, the low hazard permit space shall be shown to be, and to remain, acceptable for entry using one of the following means, as appropriate to make the determination:

(A) Ventilation of the low hazard permit space prior to entry, using a mechanically powered ventilator for at least the time specified by the manufacturer and continuously throughout the entry.

(B) A combination of mechanically powered ventilation and atmospheric testing using appropriate direct reading atmospheric testing and monitoring equipment.

(C) Continuous atmospheric monitoring using appropriate direct reading atmospheric testing and monitoring equipment.

TULSA DISTRICT CONFINED SPACE ENTRY PERMIT

D09291

NOTE: COPY OF PERMIT WILL REMAIN AT THE ENTRY POINT OF THE CONFINED SPACE WHILE THE SPACE IS OCCUPIED

[1] |___| Confined Space Entry Permit -- Valid Until |________________________|

|___| Low-Hazard Confined Space Entry Permit -- Valid Until |________________________|

[2] LOCATION AND DESCRIPTION OF CONFINED SPACE

____

____

[3] PURPOSE OF ENTRY

____

____

[4] DEPARTMENT ______________________________

[5] AUTHORIZED ENTRANTS ____________________ ____________________

____________________ ____________________

[6] SPECIAL REQUIREMENTS

	YES	NO	N/A		YES	NO	N/A
Lock Out / De-Energize				Escape Harness			
Lines Broken - Capped/Blanked				Tripod			
Purge - Flush and Vent				Lifelines			
Ventilation				Fire Extinguishers			
Secure Area				Lighting			
Breathing Apparatus				Protective Clothing			
Resuscitator - Inhaler				Respiratory Protection			
Attendant/Competent Person				____________			

[7]

TEST(S) TO BE TAKEN	PERMISSIBLE ENTRY LEVEL	INITIAL TESTING REQUIRED YES	NO	N/A	CONTINUOUS TESTING REQUIRED YES	NO	N/A
% Oxygen	19.5% - 22.0%						
% Explosive Gas	< 10% LEL						
Carbon Monoxide	< 35 ppm						
Hydrogen Sulfide	< 10 ppm						
____________	____________						

[8]

MONITORING INSTRUMENTS USED	SERIAL NUMBER	CALIBRATED YES	NO	N/A
____________	____________			
____________	____________			

[9] AUTHORIZED ATTENDANT/COMPETENT PERSON ____________________

[10] EMERGENCY PHONE NUMBERS

FIRE DEPARTMENT ____________________ AMBULANCE ____________________

[11] SUPERVISOR AUTHORIZING ALL ABOVE CONDITIONS SATISFIED ____________________

signature

ATCH 1

009292

DANGER
CONFINED SPACE

NO UNAUTHORIZED ENTRANTS

ENTER BY PERMIT ONLY

CHEMICAL HAZARDS: ______________________	CONTROL: ______________________
PHYSICAL HAZARDS: ______________________	CONTROL: ______________________
MECHANICAL HAZARDS: ______________________	CONTROL: ______________________
ENGULFMENT HAZARDS: ______________________	CONTROL: ______________________
ELECTRICAL HAZARDS: ______________________	CONTROL: ______________________
ATMOSPHERIC HAZARDS: ______________________	CONTROL: ______________________

SUPERVISOR IN CHARGE: ____

SAFETY AND OCCUPATIONAL HEALTH OFFICE: (918) 669-7360

STANDARD OPERATING PROCEDURE 2 - SNAKE BITE

Normally, the noise created by a person approaching a snake habitat is sufficient to frighten the snake off. However, extreme caution is necessary when exploring areas where snakes might be found, such as behind rocks, under bushes, or in holes, crevices, and abandoned pipes.

The rules to follow if bitten by a snake are:

- **Do not** cut the bite area as it will exacerbate the effect of the venom.

- **Do not** apply suction to the wound as it is minimally effective in removing venom.

- **Do not** apply a tourniquet since venom is most dangerous when concentrated in a small area.

- **Do not** allow the victim to run for help as this will accelerate circulation.

- **Do** seek immediate medical attention.

- **Do** keep the victim calm and immobile.

- **Do** have the victim hold the affected extremity lower than the body while waiting for medical assistance.

STANDARD OPERATING PROCEDURE 3 - TEMPERATURE STRESS

1.0 Heat Stress. Heat produced by the body and the environmental heat together determine the total heat load. Therefore, if work is to be performed under hot environmental conditions, the workload of each job shall be established and the heat exposure limit pertinent to the workload evaluated against the applicable standard in order to protect the employee from exposure beyond the permissible limit. For the purpose of this SOP, the American Conference of Governmental Industrial Hygienist published Threshold Limit Values and Biological Exposure Indices, latest edition shall be considered the standard for work operations conducted in permeable protective clothing. NIOSH/OSHA/USCG/EPA heat stress monitoring recommendations shall be considered the standard for work operations conducted in impermeable protective clothing.

1.1 Heat Stress Monitoring.

1.1.1 Permeable Work Ensembles. Since measurement of deep body temperature is impractical for monitoring the employees' heat load, the measurement of environmental factors is required which most nearly correlate with deep body temperature and other physiological response to heat. At the present time Wet Bulb Globe Temperature Index (WBGT) is the simplest and most suitable technique to measure the environmental factors. WBGT values are calculated by the following equations:

Outdoor with solar load: WBGT = 0.7 NWB + 0.2 GT + 0.1 DB
Indoors or outdoors with no solar load: WBGT = 0.7 NWB + 0.3 GT

Where:
WBGT = Wet Bulb Globe Temperature Index
NWB = Natural Wet-Bulb Temperature
DB = Dry-Bulb Temperature
GT = Globe Temperature

The determination of WBGT requires the use of a black globe thermometer, a natural (static) wet-bulb thermometer, and a dry-bulb thermometer, such as the Reuter-Stokes, Thermo-environmental Monitor, (WIBGET).

TABLE 1 - PERMISSIBLE HEAT EXPOSURE THRESHOLD LIMIT VALUES
Values are given in degrees Fahrenheit WBGT

	WORK LOAD		
Work-Rest Regimen	Light	Moderate	Heavy
Continuous Work	86	80	77
75% Work 25% Rest each hour	87	82	78
50% Work 50% Rest each hour	89	85	82
25% Work 75% Rest each hour	90	88	86

1.1.2 Impermeable Work Ensembles. For workers wearing semipermeable or impermeable encapsulating ensembles, the ACGIH work/rest standard cannot be used. For these situations workers should be monitored as described below when the temperature in the work area exceeds 70 degrees fahrenheit.

Count the radial pulse during a 30-second period as early as possible in the rest period. If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same. If the heart rate still exceeds 110 beats per minute at the next rest period, shorten the following work cycle by one-third.

1.2 Heat Stress Prevention. Proper training and preventive measures will avert serious illness and loss of work productivity. Preventing heat stress is particularly important because once someone suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heat injuries. To avoid heat stress, the following steps should be taken:

- Adjust work schedules
- Provide shelters
- Maintain body fluids
- Encourage physical fitness
- Utilize cooling devises
- Recognize heat stress warning symptoms

TABLE 2 - SIGNS AND SYMPTOMS OF HEAT STRESS

Heat rash may result from continuous exposure to heat or humid air.

Heat cramps are caused by heavy sweating with inadequate electrolyte replacement. To reduce occurrence of heat cramps increase amount of water consumption. Sign and symptoms include:

- muscle spasms
- pain in the hands, feet and abdomen

Heat exhaustion occurs from increased stress on various body organs including inadequate blood circulation due to cardio-vascular insufficiency or dehydration. In the event of heat exhaustion measures need to be taken to cool the body and replace body electrolytes. Signs and symptoms include:

- pale, cool, moist skin
- heavy sweating
- dizziness
- nausea
- fainting

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

- red, hot, usually dry skin
- lack of or reduced perspiration
- nausea
- dizziness and confusion
- strong, rapid pulse
- coma

2.0 Cold Stress. Fatal exposure to cold among workers have almost always resulted from accidental exposures involving failure to escape from low air temperatures or from immersion in low temperature water. The single most important aspect of life-threatening hypothermia is the fall in deep core temperature of the body. Employees should be protected from exposure to cold so that the deep core temperatures does not fall below 36 degrees Celsius (96.8 F); lower body temperature will very likely result in reduced mental alertness, reduction in rational decision making, or loss of consciousness with the threat of fatal consequences.

2.1 Evaluation and Control. For exposed skin, continuous exposure should not be permitted when the air speed and temperature results in an equivalent chill temperature of -32 degrees Celsius. At temperatures of 2 degrees Celsius or less it is imperative that employees who become immersed in water or whose clothing becomes wet be immediately provided with a change of clothing and treatment for hypothermia. Special protection of the hands is required to maintain manual dexterity for the prevention of accidents.

2.1.1 Provisions for additional total body protection is required if work is performed at or below 4 degrees Celsius as follows:

- The employees shall wear cold protective clothing appropriate for the level of cold and physical activity.

- If the air velocity at the site is increased by wind or artificial ventilation, the cooling effect of the wind shall be reduced by shielding the work area, or by wearing a removable outer windbreak garment.

- If the available clothing does not give adequate protection to prevent hypothermia or frostbite, work shall be modified or suspended until adequate clothing is made available or until weather conditions improve.

- Employees handling evaporative liquids at temperatures below 4 degrees Celsius shall take special precautions to avoid soaking of clothing or gloves because of the added danger of cold injury due to the evaporative cooling.

2.1.2 For work practices at or below -12 degrees Celsius the following shall apply:

- The worker shall be under constant protective observation (buddy system).

- If work must be done, rest periods must be taken in heated shelters and opportunity for changing into dry clothing shall be provided.

- New employees shall not be required to work full-time in cold in the first few days until they have become accustomed to the working conditions and required protective clothing.

- The work shall be arranged in such a way that sitting still or standing for long periods is minimized.

- The workers shall be instructed in safety and health procedures. The training program shall include as a minimum instruction in:

a. Proper rewarming procedures and appropriate first aid treatment.
b. Proper clothing practices.
c. Proper eating and drinking habits.
d. Recognition of impending frostbite.

e. Recognition signs and symptoms of impending hypothermia or excessive cooling of the body even when shivering does not occur.

f. Safe work practices.

2.2 Special Workplace Recommendations. Special caution shall be exercised when working with toxic substances and when workers are exposed to vibration. Cold exposure may require reduced exposure limits. Eye protection shall be provided to workers employed out-of-doors in snow and/or ice terrain. Trauma sustained in freezing or subzero conditions requires special attention because an injured worker is predisposed to secondary cold injury. Special provisions must be made to prevent hypothermia and secondary freezing of damaged tissues in addition to providing for first aid treatment.

STANDARD OPERATING PROCEDURE 4 - THUNDERSTORMS AND TORNADOES

Meteorological conditions shall be closely watched, especially in the spring, when severe thunderstorms and tornadoes are most likely to occur. Thunderstorms and tornadoes often occur late in the afternoon on hot spring days, but can occur at any time of the day in any season of the year. Tornadoes are usually preceded by severe thunderstorms with frequent lightning, heavy rainfall, and strong winds.

A **severe thunderstorm watch** or a **tornado watch** announcement on radio or television indicates that a severe thunderstorm or tornado is possible. Work may continue at the work site during severe thunderstorm watches or tornado watches if conditions allow. A **severe thunderstorm warning** or a **tornado warning** signifies that a severe thunderstorm or a tornado has been sighted or detected by radar and may be approaching. All work on site shall cease during a thunderstorm, severe thunderstorm warning, or a tornado warning.

Personnel of site during a tornado shall take the following steps:

- evacuate office trailers or vehicles.
- If outdoors, lie flat in a nearby ditch.
- Stay away from power poles, electrical appliances, and metal objects.
- Do not try to outrun a tornado.

009300

APPENDIX C

SITE SPECIFIC TRAINING FORMS

SITE SPECIFIC TRAINING RECORD FORM

Location: Longhorn Army Ammunition Plant

Project: Old and Active Landfill Investigations

Meeting Date:____________________ Time:_______________

Meeting Conducted By:____________________________

____

Topics:

_____ History of the site

_____ Field activities planned

_____ Safety, health and other hazards present at the site

_____ Use of personal protective equipment

_____ Work practices which will minimize potential hazards

_____ Safety use of equipment at the site

_____ Air monitoring activities

_____ Industrial hygiene sampling activities

_____ Recognition of signs and symptoms indicating possible overexposure to chemical hazards

_____ Decontamination procedures

_____ Emergency response and evacuation procedures

_____ Public relations

_____ Right and responsibilities under OSHA

_____ Special workplace requirements

Meeting Participants:

SITE SAFETY AND HEALTH PLAN ACKNOWLEDGEMENT FORM

I have read, understand, and agree to follow the guidelines described in this Site Safety and Health Plan.

PROJECT: LAAP, Old and Active Landfill Investigations

NAME	ORGANIZATION	SIGNATURE	DATE

DEPARTMENT OF THE ARMY
LONGHORN ARMY AMMUNITION PLANT
MARSHALL, TEXAS 75671-1059

RECEIVED
EPA REGION VI
1994 AUG -3 PM 1:33
SUPERFUND BRANCH

REPLY TO
ATTENTION OF

August 1, 1994

Engineering Division

Ms. Lisa Price
Superfund Enforcement
U.S. Environmental Protection Agency
1445 Ross Avenue
Dallas, Texas 75202

Dear Ms. Price:

Enclosed are two copies of the Draft Final RI/FS Report for Sites 13 & 14, for Longhorn Army Ammunition Plant, in Karnack, Texas.

Please review and send your comments back to us by 31 August 1994.

If there are any questions, please contact Mr. David Tolbert at 903-679-2728.

Sincerely,

Lawrence J. Sowa

Encls

Lawrence J. Sowa
Lieutenant Colonel, U.S. Army
Commanding Officer

009304

August 5, 1994

United States
Environmental Protection Agency
Region VI
Allied Bank Tower at Fountain Place
1445 Ross Avenue
Dallas, Texas 75202-2733

Att: Ms. Lisa Price

REF: Technical Assistance Grant
Longhorn Army Ammunition Plant
Karnack, Texas

Dear Ms. Price:

The Uncertain Audubon Society, hereinafter referred to as "UAS", consist of individuals from both the immediate area of the Longhorn Army Ammunition Plant, hereinafter referred to as "LHAAP", and the entire Cypress Valley Watershed including the northwestern section of Louisiana. This includes individuals from groups such as the Sierra Club, Ozark Society, Audubon, and individuals that are effected by the water quality of Caddo Lake. UAS is incorporated in both Texas and Louisiana.

In brief, the UAS was formed for the protection and preservation of Caddo Lake.

The major creeks and bayous that drain the LHAAP are the Goose Prairie Creek, Central Creek, Harrison Bayou, and Saunders Branch. A small section of the LHAAP, at the northwest corner of the Plant, drains directly into Big Cypress Bayou, which enters Caddo Lake to the east. East of Caddo Lake, Big Cypress Bayou continues. At Shreveport, Louisiana, Big Cypress Bayou joins the Red River, which flows southeast across Louisiana and enters the Mississippi River at Simmesport, Louisiana.

The headwaters of Goose Prairie Creek are located near the northwest corner of the LHAAP and consist of one large creek with several small tributaries. Goose Prairie Creek flows along the northern edge of the Plant and drains approximately 30 percent of the LHAAP, including the former TNT Disposal Plant, the Inert Burning Grounds, sections of the former TNT Production Area, and the active rocket motor production Plant 3.

UNCERTAIN AUDUBON SOCIETY

BILL WIENER, PRESIDENT + 401 MARKET #1110 + SHREVEPORT, LA 71101 ++ 318 221-3334
RUTH CULVER, VP/CONSERVATION + ROUTE 1, 787 + KARNACK, TX 75661 ++ 903 679-3179

Central Creek, or Caddo Lake Bayou, enters the LHAAP on its western edge and approximately 29 percent of the surface drainage from the LHAAP enters Caddo Lake via the drainage course. Areas which drain directly into Central Creek include the former TNT Production Area, the Central Magazine Area, the Active Landfill site, and portions of the Static Test Area.

Harrison Bayou enters the LHAAP on its southern edge and drains approximately 30 percent of the surface of LHAAP. Harrison Bayou receives runoff from the South Test Area, the western edge of the Ground Signal Test Area, the Old Landfill, the Flashing Area, the Active Burning Grounds, and portions of the Static Test Area.

Saunders Branch flows onto the LHAAP near the southeast corner and flows northward to Caddo Lake. Approximately 11 percent of the heavily wooded eastern section of LHAAP is drained by Saunders Branch and receives runoff from the eastern edge of the Ground Signal Test Area.

Please accept this as the UAS's Letter of Intent for application of the Technical Assistance Grant.

Yours truly,

R. Culver

Ruth Culver,
Conservation Chairman
Uncertain Audubon Society

CC: Mr. Jim Bolin, President
UAS

UNCERTAIN AUDUBON SOCIETY

BILL WIENER, PRESIDENT + 401 MARKET #1110 + SHREVEPORT, LA 71101 ++ 318 221-3334
RUTH CULVER, VP/CONSERVATION + ROUTE 1, 787 + KARNACK, TX 75661 ++ 903 679-3179

009306

AUG 1 0 1994

CERTIFIED MAIL: RETURN RECEIPT REQUESTED P 435 988 064

David Tolbert, Project Manager
Longhorn Army Ammunition Plant
Attn: SMCLO-EN
Marshall, Texas 75671-1059

Re: Draft Phase II Work Plan for
125 Work Process Sumps and 20 Waste Rack Sumps
Longhorn Army Ammunition Plant

Dear David:

Pursuant to the Federal Facility Agreement for the Longhorn Army Ammunition Plant, EPA is submitting comments on the Draft Phase II Work Plan for 125 Work Process Sumps and 20 Waste Rack Sumps for Longhorn Army Ammunition Plant. EPA's comments are included as an enclosure to this letter.

If you have any questions about EPA's comments or any other matter, please contact me at my new phone number (214) 665-6744.

Sincerely,

Lisa Marie Price
Remedial Project Manager
Superfund Texas Enforcement

Enclosure

cc: Lieutenant Colonel Lawrence J. Sowa
Commanding Officer, U.S. Army
Longhorn Army Ammunition Plant
Marshall, Texas 75671-1059

Tulsa District Corps of Engineers
P.O. Box 61
Attn: Mr. Ross Nguyen
CESWT-PP-E

009307

Tulsa, OK 74121-0061

Mike Moore, Superfund
Texas Natural Resource Conservation Commission
P.O. Box 13087
Capital Station
1700 N. Congress Avenue
Austin, TX 78711-3087

Draft Phase II Work Plan for
125 Work Process Sumps and 20 Waste Rack Sumps
Longhorn Army Ammunition Plant
EPA's Comments 8/10/94

Comment #1

Page 1-4: Draft Report Phase I Investigations of 125 Waste Process Sumps and 20 Waste Racks, February 1994, is referenced in this draft work plan. The Phase I Investigations report must either be finalized pursuant to EPA's comment letter dated April 19, 1994, or all relevant information (including a summary of all contaminant information) must be included in this document.

Comment #2

Section 2.1, page 2-1: "*Data collection for use in the development of a Ecological Risk Assessment will be discussed under a separate workplan, if required.*" Delete "*if required*".

Comment #3

Section 2.2, page 2-1 and Appendix B: As EPA requested during the August 1994 Project Coordinators meeting and as was done for phase I field investigations, EPA requests that <u>one</u> facility-wide Chemical Data Acquisition Plan (CDAP) and one facility-wide Site Health and Safety Plan be developed for all phase II field investigations. All of the comments regarding issues pertaining to the CDAP made in this comment letter as well as comments made in EPA's July 29, 1994, comment letter on the draft CDAP for Group #1 sites should be addressed and incorporated into the facility-wide phase II CDAP.

Comment #4

Section 2.3, page 2-2: Is this data management tool compatible with GIS?

Comment #5

Section 3.0, page 3-1: EPA does not disagree technically with the field investigations that are planned for in phase II, however, the premise on which this investigation is based is not clear. Furthermore, EPA does not agree with the premise on which any future activities or investigations will be based.

EPA's opinion of the purpose of this phase II investigation is to determine the overall impact of the sumps in the various production areas by monitoring the groundwater, given that the investigation conducted during phase I indicated that a release had occurred at all of the sumps. Therefore, at the conclusion of phase II, the potential extent of the contamination should be known. However, EPA's feels that a phase III investigation will be necessary to determine source(s) of the contamination. This phase III investigation will include the collection of additional samples and may or may not be contingent upon the removal of all or some the sumps. Contemplation of the phase III investigation is not contingent upon the availability of funding. Any reference to funding issues should be deleted from this document.

Comment #6 Section 3.0, page 3-1: Please define "*areas of concern*" and "*areas of interest*".

Comment #7 Section 4.3.1.2, page 4-3: EPA is very confused regarding the purpose of physical testing of samples collected during the installation of the monitoring wells. EPA is equally confused as to why chemical testing will not be conducted on samples collected from the installation of the monitoring wells. If no soil samples are collected for chemical analysis and the groundwater is contaminated at that location, it cannot be determined if the source of contamination is the well location itself or if the contamination is emanating from an upgradient location. EPA requests that chemical analysis be conducted on a minimum of two samples per monitoring well installation: one sample above the saturated zone and one sample within the saturated zone.

Comment #8 Section 4.3.1.2, page 4-3 and 4-4, Table 2 and Section 5.7.1.2 CDAP 5-16: EPA requests that SVOCs be included in the analysis for samples collected.

Comment #9 Section 4.3.1.2, page 4-3 and Appendix B: Reference EPA's July 29, 1994, letter regarding the use of SQLs for analysis on samples for the quantification of risk. Refer to EPA's *Guidance for Data Useability in Risk Assessment (Part A), Publication 9285.7-09A*. SQL is specifically discussed in Section 3.2.4 starting on page 47 of the *Data Useability* guidance.

Comment #10 Section 5.2, CDAP 5-1: What method other than using a hollow stem auger would be used for the drilling and installation of monitoring wells? EPA request that the hollow stem method be identified as the only technique that will be used for the drilling and installation of monitoring wells.

Comment #11 Section 5.2.5, CDAP 5-6 and Section 5.3, CDAP 5-6: Reference EPA's July 13, 1994, letter regarding the use of compatible grout and seal materials for the abandonment of boreholes and the installation of monitoring wells in suspected DNAPL-contaminated environments.

Comment #12

Section 5.7.1.3, CDAP 5-16: The use of Teflon bailers is questionable, given the presence of methylene chloride. Please research this issue and determine the most appropriate sample collection material (i.e. PVC or stainless).

DEPARTMENT OF THE ARMY
LONGHORN/LOUISIANA ARMY AMMUNITION PLANTS
MARSHALL, TEXAS 75671-1059

0093

REPLY TO
ATTENTION OF

August 16, 1994

Mr. Michael Moore
Superfund Investigation Section
Texas Natural Resource Conservation Commission
P.O. Box 13087
Austin, Texas 78711-3087

Dear Mr. Moore:

Enclosed is a copy of the Final Deadlines for Primary and Secondary Document of the Installation Restoration Program at Longhorn Army Ammunition Plant.

If there are any questions, please contact Mr. David Tolbert at 903-679-2728.

Sincerely,

David Tolbert
for
Lawrence J. Sowa
Lieutenant Colonel, U.S. Army
Commanding Officer

Enclosure

LONGHORN ARMY AMMUNITION PLANT

ASSUMPTIONS

- Funding is available and remedial activities will not be delayed because of lack of funding.
- For Group #1, 2, & Sumps additional field work will not be required after Phase II field investigation.
- For Group #3, public will concur with our no-action recommendation.
- For Group #5, this schedule is based on Site Investigation of 7 new sites.
- All reviews will be completed and all comments can be resolved within the scheduled amount of time.
- For IRA and Removal Action:
  - * Concurrent review on all deliverables.
  - * No significant public comments for concurrent preparation of Responsiveness Summary and Record of Decision documents.
- The turn around time for field sample analysis (w/validation) is 75 days. And 30 days for review/summarize field data.
- No significant delays due to active burning.
- No significant weather delays.
- No significant changed site conditions (such as large buried debris or munitions).

LONGHORN ARMY AMMUNITION PLANT

DEADLINES FOR PRIMARY AND SECONDARY DOCUMENTS

009313

TASK NAME	GROUP #1 (1,11, XX,27)	GROUP #2 (12,16 17,18,24,29)	GROUP #4 (SUMPS)
Phase I Field Investigation (S)	(31 Mar 93)	(14 Jun 93)	(29 Aug 93)
Phase I Field Summary Report (S)			
Regulators	(19 Nov 93)	(13 Jan 94)	(7 Jan 94)
Phase II Work Plan (S)			
Regulators	(28 Jun 94)	28 Oct 94	(11 Jul 94)
Phase II Field Investigations (S)			
Mobilize	1 Sep 94	12 Dec 94	25 Aug 94
Data Results	19 Feb 95	29 Sep 95	12 Jun 95
Site Characterization Summary (S)			
Regulators	9 Jun 95	17 Jan 96	30 Sep 95
Risk Assessment (P)			
Regulator	17 Aug 95	26 Mar 96	8 Dec 95
Final	13 Oct 95	22 May 96	3 Feb 96
RI Report (P)			
Regulators	19 Nov 95	28 Jun 96	11 Mar 96
Final	15 Jan 96	24 Aug 96	7 May 96

() Actual Completion Date

009314

LONGHORN ARMY AMMUNITION PLANT

DEADLINES FOR PRIMARY AND SECONDARY DOCUMENTS (cont'd)

TASK NAME	GROUP #3 (13 & 14)	IRA (18 & 24)	IRA (LANDFILL CAPS)	REMOVAL TNT PIPELINE
RI/FS Report (P)				
Regulators	(2 Aug 94)			
Final	24 Sep 94			
Proposed Plan (P)				
Regulators	9 Nov 94	(30 Jul 94)	29 Nov 94	28 Jan 95
Final	5 Jan 95	9 Sep 94	11 Jan 95	12 Mar 95
Public Meeting	6 Jan 95	15 Sep 94	12 Jan 95	13 Mar 95
Final Public Comment	4 Feb 95	10 Oct 94	10 Feb 95	11 Apr 95
Responsiveness Summary (P)				
Regulators	4 May 95	18 Oct 94	13 Mar 95	12 May 95
Final	30 Jun 95	30 Nov 94	25 Apr 95	24 Jun 95
Record of Decision (P)				
Regulators	4 May 95	18 Oct 94	13 Mar 95	12 May 95
Final	30 Jun 95	30 Nov 94	25 Apr 95	24 Jun 95
IRA Work Plan (P)				
Regulators		18 Feb 95	9 Sep 95	27 May 95
Final		24 Apr 95	22 Oct 95	25 Jul 95
Mobilization (P)		25 Apr 95	23 Oct 95	26 Jul 95

() Ac al Completion Date

009315

LONGHORN ARMY AMMUNITION PLANT

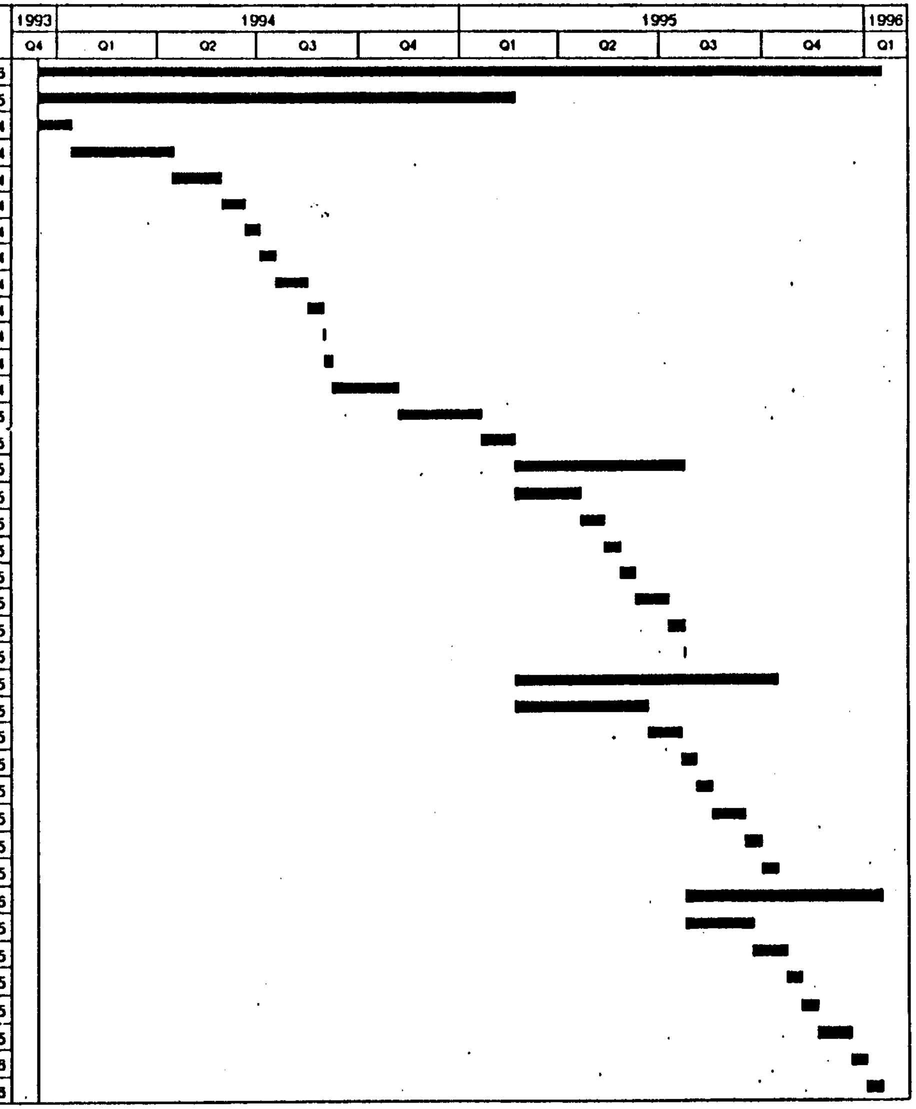
DEADLINES FOR PRIMARY AND SECONDARY DOCUMENTS (cont'd)

TASK NAME	GROUP #5 (Site Investigation)	BACKGROUND (Soil)	BACKGROUND (Groundwater)	HYDROGEOLOGICAL
Work Plan (P)				
Regulators	25 Feb 95	(29 Jun 94)	(29 Jun 94)	17 Jan 95
Final	23 Apr 95	5 Aug 94	14 Aug 94	2 Mar 95
Field Investigation (S)				
Mobilize	24 Apr 95	6 Aug 94	15 Aug 94	
Data Results	19 Sep 95	7 Oct 94	22 Nov 94	
Field Summary Report (S)				
Regulators	8 Jan 96	17 Dec 94	22 Feb 95	

() Actual Completion Date

GROUP #1 (LHAAP #1, 11, XX, 27)

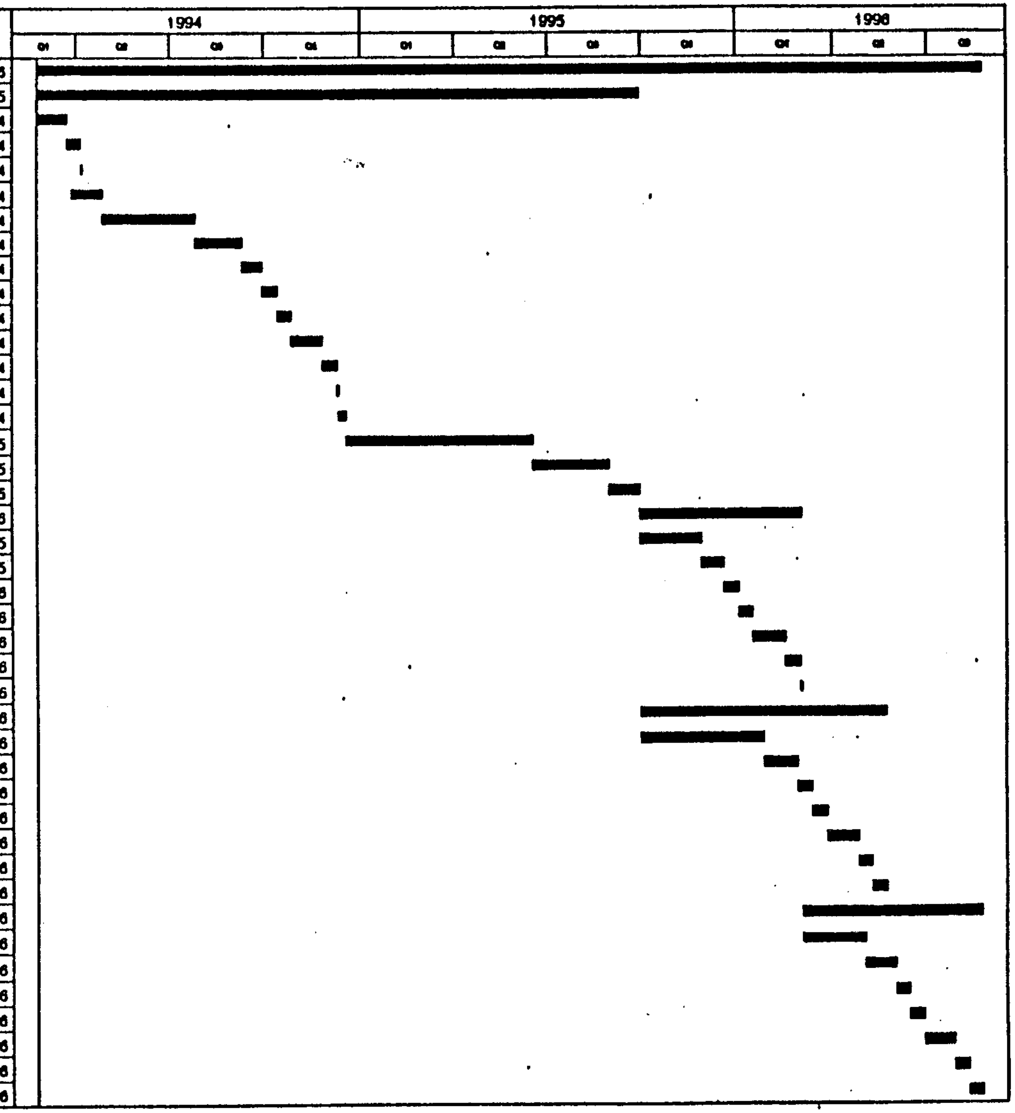
Task Name	Start Date	Duration		End Date
GROUP #1	16-Dec-93	761 0 d		15-Jan-96
INVESTIGATION & ANALYSIS	16-Dec-93	431 0 d		19-Feb-95
Prepare scope Phase II	16-Dec-93	30 0 d		14-Jan-94
Procure A-E Contractor	15-Jan-94	90 0 d		14-Apr-94
Prepare DF Ph II WP	14-Apr-94	45 0 d		29-May-94
Army Review Draft Ph II WP Adm	30-May-94	21 0 d		19-Jun-94
Comment Resolution	20-Jun-94	14 0 d		3-Jul-94
Prepare DF Ph II WP	4-Jul-94	14 0 d		17-Jul-94
Regulators Review Draft Final	18-Jul-94	30 0 d		16-Aug-94
Comment Resolution	17-Aug-94	14 0 d		30-Aug-94
Final Ph II Work Plan Approval	31-Aug-94	1 0 d		31-Aug-94
Mob for PH II FW	1-Sep-94	7 0 d		7-Sep-94
Perform Ph II FW	8-Sep-94	60 0 d		6-Nov-94
Ph II Sample Analysis	7-Nov-94	75 0 d		20-Jan-95
Rev/Sum Ph II Data	21-Jan-95	30 0 d		19-Feb-95
SITE CHARAC SUMMARY	20-Feb-95	154 0 d		23-Jul-95
Prepare Draft SCS Report	20-Feb-95	60 0 d		20-Apr-95
Army Rev Draft SCS Rep	21-Apr-95	21 0 d		11-May-95
Comment Res/Final	12-May-95	14 0 d		25-May-95
Prep DF SCS Report	26-May-95	14 0 d		8-Jun-95
Reg Rev DF CS	9-Jun-95	30 0 d		8-Jul-95
Comment Resolution	9-Jul-95	14 0 d		22-Jul-95
Final SCS Report Appr	23-Jul-95	1 0 d		23-Jul-95
RISK ASSESSMENT	20-Feb-95	236 0 d		13-Oct-95
Prepare Draft RA	20-Feb-95	120 0 d		19-Jun-95
Army Rev Draft RA Assessment	20-Jun-95	30 0 d		19-Jul-95
Comment Resolution	20-Jul-95	14 0 d		2-Aug-95
Prep DF RA Report	3-Aug-95	14 0 d		16-Aug-95
Reg Rev DF RA Rep	17-Aug-95	30 0 d		15-Sep-95
Comment Resolution	16-Sep-95	14 0 d		29-Sep-95
Fnl Risk Assmt Rept Approval	30-Sep-95	14 0 d		13-Oct-95
RI REPORT	24-Jul-95	176 0 d		15-Jan-96
Prepare Draft RI Report	24-Jul-95	60 0 d		21-Sep-95
Army Review Draft RI Report	22-Sep-95	30 0 d		21-Oct-95
Comment Resolution	22-Oct-95	14 0 d		4-Nov-95
Prepare DF RI Report	5-Nov-95	14 0 d		18-Nov-95
Reg Review DF RI Rept	19-Nov-95	30 0 d		18-Dec-95
Comment Resolution	19-Dec-95	14 0 d		1-Jan-96
Final RI Report	2-Jan-96	14 0 d		15-Jan-96



009317

GROUP #2 (LHAAP #12, 16, 17, 18, 24, 29, 32)

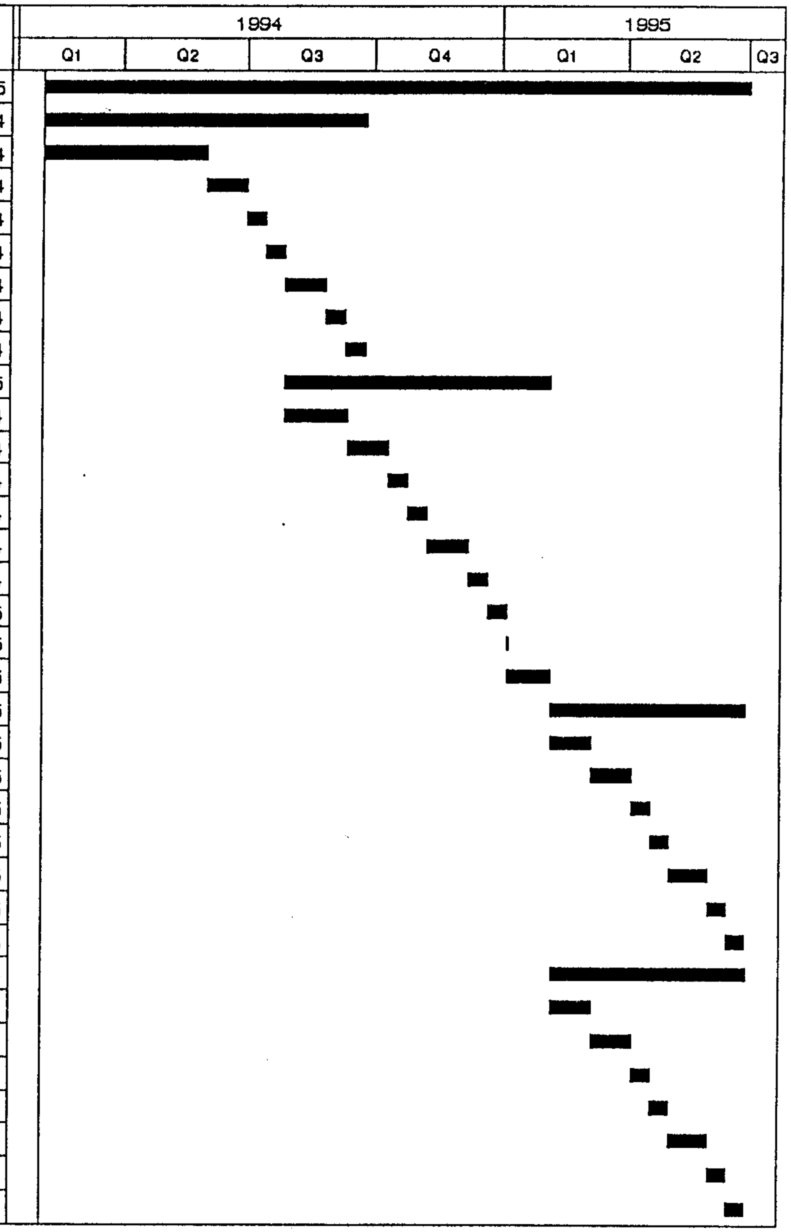
Task Name	Start Date	Duration		End Date
GROUP #2	21-Feb-94	916.0 d		24-Aug-96
INVESTIGATION & ANALYSIS	21-Feb-94	586.0 d		29-Sep-95
Reg Rev DF FSR	21-Feb-94	30.0 d		22-Mar-94
Comment Resolution	23-Mar-94	14.0 d		5-Apr-94
Final Phase I FSR Approval	6-Apr-94	1.0 d		7-Apr-94
Prepare Scope for Phase II	28-Mar-94	30.0 d		26-Apr-94
Procure A-E Contractor	27-Apr-94	90.0 d		25-Jul-94
Prepare Draft Ph II WP Addm	26-Jul-94	45.0 d		8-Sep-94
Army Rev Draft Phase II Addm	9-Sep-94	21.0 d		29-Sep-94
Comment Resolution	30-Sep-94	14.0 d		13-Oct-94
Prepare DF Ph II WP	14-Oct-94	14.0 d		27-Oct-94
Reg Rev DF WP	28-Oct-94	30.0 d		26-Nov-94
Comment Resolution	27-Nov-94	14.0 d		10-Dec-94
Final Ph II Work Plan Approval	11-Dec-94	1.0 d		11-Dec-94
Mob for Ph II FW	12-Dec-94	7.0 d		18-Dec-94
Perform Phase II Field Work	19-Dec-94	180.0 d		16-Jun-95
Phase II Sample Analysis	17-Jun-95	75.0 d		30-Aug-95
Rev/Sum Ph II Data	31-Aug-95	30.0 d		29-Sep-95
SITE CHARAC SUMMARY	30-Sep-95	154.0 d		1-Mar-96
Prepare Draft SCS Report	30-Sep-95	60.0 d		28-Nov-95
Army Rev D SCS Report	29-Nov-95	21.0 d		19-Dec-95
Comment Resolution	20-Dec-95	14.0 d		2-Jan-96
Prep DF SCS Report	3-Jan-96	14.0 d		16-Jan-96
Reg Rev DF SCS Rpt	17-Jan-96	30.0 d		15-Feb-96
Comment Resolution	16-Feb-96	14.0 d		29-Feb-96
Final SCS Report Approval	1-Mar-96	1.0 d		1-Mar-96
RISK ASSESSMENT	30-Sep-95	236.0 d		22-May-96
Prep D RA Report	30-Sep-95	120.0 d		27-Jan-96
Army Rev D RA	28-Jan-96	30.0 d		26-Feb-96
Comment Resolution	27-Feb-96	14.0 d		11-Mar-96
Prep DF RA Report	12-Mar-96	14.0 d		25-Mar-96
Reg Rev DF RA Rpt	26-Mar-96	30.0 d		24-Apr-96
Comment Resolution	25-Apr-96	14.0 d		8-May-96
Final Risk Assessment	9-May-96	14.0 d		22-May-96
RI REPORT	2-Mar-96	176.0 d		24-Aug-96
Prepare Draft RI Report	2-Mar-96	60.0 d		30-Apr-96
Army Rev Draft RI Report	1-May-96	30.0 d		30-May-96
Comment Resolution	31-May-96	14.0 d		13-Jun-96
Prep DF RI Report	14-Jun-96	14.0 d		27-Jun-96
Reg Rev DF RI	28-Jun-96	30.0 d		27-Jul-96
Comment Resolution	28-Jul-96	14.0 d		10-Aug-96
Final RI Report	11-Aug-96	14.0 d		24-Aug-96



009318

GROUP #3 (LHAAP #13, 14) as of 19 Aug 94

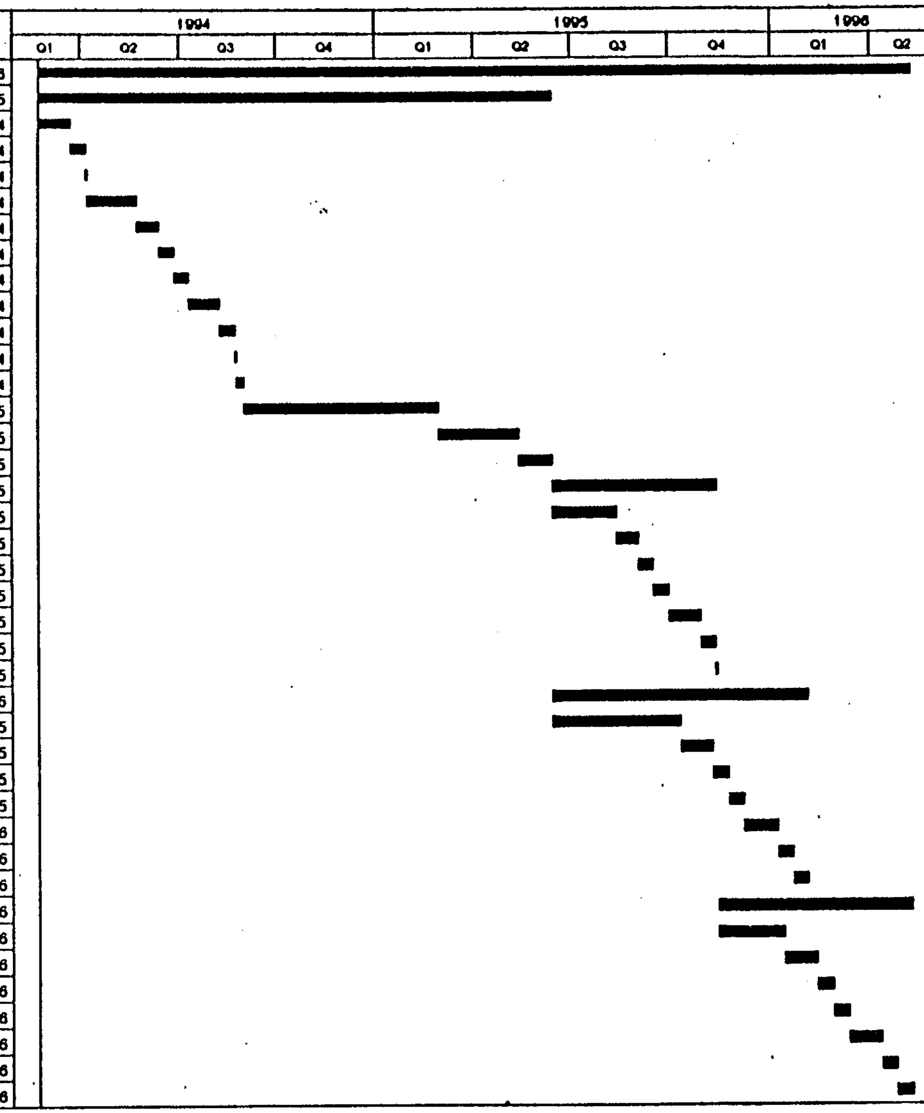
Task Name	Start Date	Duration		End Date
GROUP #3	1-Feb-94	516. 0 d		1-Jul-95
RI/FS REPORT	1-Feb-94	236. 0 d		24-Sep-94
Pre Draft RI Report	1-Feb-94	120. 0 d		31-May-94
Army Rev Draft RI Rep	1-Jun-94	30. 0 d		30-Jun-94
Comment Resolution	1-Jul-94	14. 0 d		14-Jul-94
Pre Draft Final RI Rep	15-Jul-94	14. 0 d		28-Jul-94
Reg Rev Draft Final RI	29-Jul-94	30. 0 d		27-Aug-94
Comment Resolution	28-Aug-94	14. 0 d		10-Sep-94
Final RI Report	11-Sep-94	14. 0 d		24-Sep-94
PROPOSED PLAN	29-Jul-94	191. 0 d		4-Feb-95
Pre Draft PP	29-Jul-94	45. 0 d		11-Sep-94
Army Rev Draft PP	12-Sep-94	30. 0 d		11-Oct-94
Comment Resolution	12-Oct-94	14. 0 d		25-Oct-94
Prepare DF PP	26-Oct-94	14. 0 d		8-Nov-94
Regulators Rev DF PP	9-Nov-94	30. 0 d		8-Dec-94
Comment Resolution	9-Dec-94	14. 0 d		22-Dec-94
Final Pro Plan Approval	23-Dec-94	14. 0 d		5-Jan-95
Public Meeting	6-Jan-95	1. 0 d		6-Jan-95
Pub Comment Period	6-Jan-95	30. 0 d		4-Feb-95
RESPONSIVENESS SUMMARY	5-Feb-95	146. 0 d		30-Jun-95
Pre Draft Summary	5-Feb-95	30. 0 d		6-Mar-95
Army Rev Draft RS	7-Mar-95	30. 0 d		5-Apr-95
Comment Resolution	6-Apr-95	14. 0 d		19-Apr-95
Prepare DF RS	20-Apr-95	14. 0 d		3-May-95
Regulators Rev DF RS	4-May-95	30. 0 d		2-Jun-95
Comment Resolution	3-Jun-95	14. 0 d		16-Jun-95
Final RS	17-Jun-95	14. 0 d		30-Jun-95
RECORD OF DECISION	6-Feb-95	146. 0 d		1-Jul-95
Prepare Draft Rod	6-Feb-95	30. 0 d		7-Mar-95
Army Rev Draft Rod	8-Mar-95	30. 0 d		6-Apr-95
Comment Resolution	7-Apr-95	14. 0 d		20-Apr-95
Prepare DF Rod	21-Apr-95	14. 0 d		4-May-95
Reg Rev DF Rod	5-May-95	30. 0 d		3-Jun-95
Comment Resolution	4-Jun-95	14. 0 d		17-Jun-95
Final Rod	18-Jun-95	14. 0 d		1-Jul-95



009319

GROUP #4 SUMPS

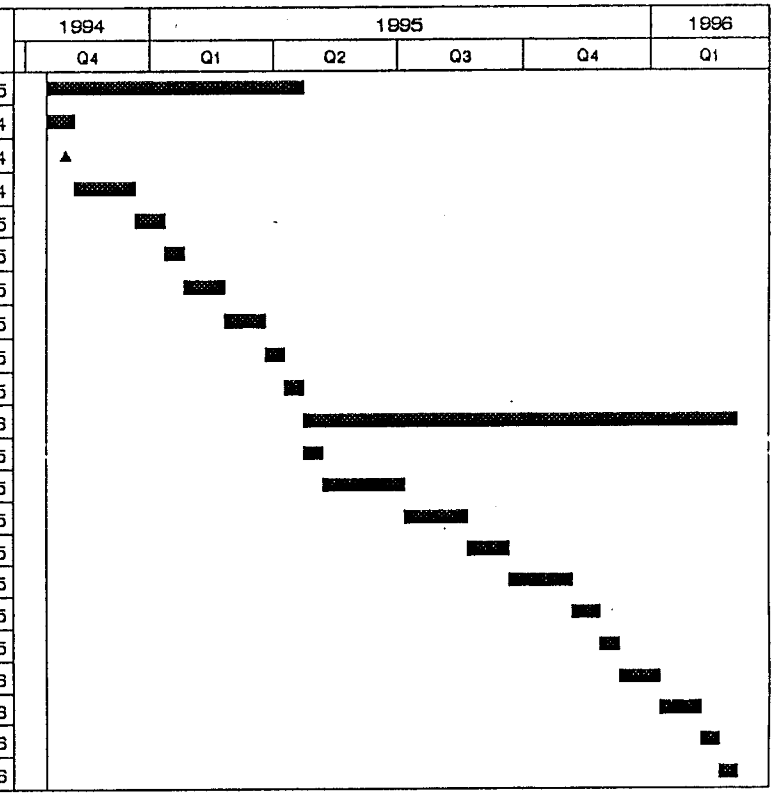
Task Name	Start Date	Duration	End Date
GROUP #4 - SUMPS	22-Feb-94	806 0 d	7-May-96
INVESTIGATION AND ANALYSIS	22-Feb-94	476 0 d	12-Jun-95
Reg Rev DF FSR	22-Feb-94	30 0 d	23-Mar-94
Comment Resolution	24-Mar-94	14 0 d	6-Apr-94
Final Ph I FSR Approval	7-Apr-94	1. 0 d	7-Apr-94
Pre Draft Ph II WP	8-Apr-94	45 0 d	22-May-94
Army Rev Draft Ph II WP	23-May-94	21. 0 d	12-Jun-94
Comment Resolution	13-Jun-94	14 0 d	26-Jun-94
Prepare DF Ph II WP	27-Jun-94	14 0 d	10-Jul-94
Reg Rev DF WP	11-Jul-94	30 0 d	9-Aug-94
Comment Resolution	10-Aug-94	14 0 d	23-Aug-94
Final Ph II WP Approval	24-Aug-94	1. 0 d	24-Aug-94
Mob for PH II Field Wk	25-Aug-94	7. 0 d	31-Aug-94
Perform Ph II Field Work	1-Sep-94	180 0 d	27-Feb-95
P[illegible] Sample Analysis	28-Feb-95	75 0 d	13-May-95
Rev/Summarize Ph II Data	14-May-95	30 0 d	12-Jun-95
SITE CHARACTERIZATION SUMMARY	13-Jun-95	154 0 d	13-Nov-95
Pre Draft SCS Report	13-Jun-95	60 0 d	11-Aug-95
Army Rev Draft SCS Rep	12-Aug-95	21. 0 d	1-Sep-95
Comment Resolution	2-Sep-95	14 0 d	15-Sep-95
Pre DF SCS Report	16-Sep-95	14 0 d	29-Sep-95
Reg Rev Draft Final SCS	30-Sep-95	30 0 d	29-Oct-95
Comment Resolution	30-Oct-95	14 0 d	12-Nov-95
Final SCS Rep Approval	13-Nov-95	1 0 d	13-Nov-95
RISK ASSESSMENT	13-Jun-95	236 0 d	3-Feb-96
Pre Draft Risk Assess Rpt	13-Jun-95	120 0 d	10-Oct-95
Army Rev Draft RA Rep	11-Oct-95	30 0 d	9-Nov-95
Comment Resolution	10-Nov-95	14 0 d	23-Nov-95
Pre DF RA Report	24-Nov-95	14 0 d	7-Dec-95
Reg Review DF RA	8-Dec-95	30 0 d	6-Jan-96
Comment Resolution	7-Jan-96	14 0 d	20-Jan-96
Final Risk Assessment Rep App	21-Jan-96	14 0 d	3-Feb-96
RI REPORT	14-Nov-95	176 0 d	7-May-96
Pre Draft RI Report	14-Nov-95	60 0 d	12-Jan-96
Army Rev Draft RI Rep	13-Jan-96	30 0 d	11-Feb-96
Comment Resolution	12-Feb-96	14 0 d	25-Feb-96
Pre DF RI Report	26-Feb-96	14 0 d	10-Mar-96
Reg Rev DF RI	11-Mar-96	30 0 d	9-Apr-96
Comment Resolution	10-Apr-96	14 0 d	23-Apr-96
Final RI Rep Approval	24-Apr-96	14 0 d	7-May-96



009320

Group #5 as of 9 Aug 94

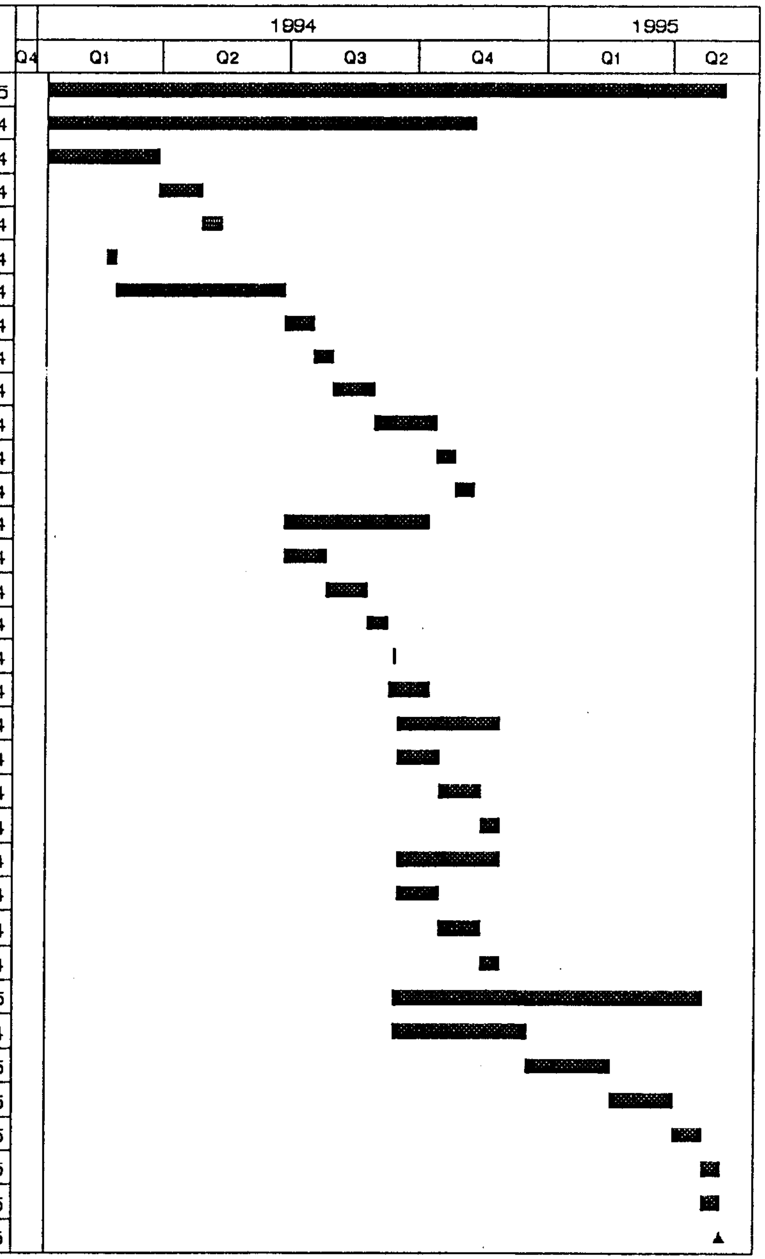
Task Name	Start Date	Duration		End Date
GROUP 5 LHAAP SITE INVEST	17-Oct-94	189.0 d		23-Apr-95
Rec Srch/Rev xst rep	17-Oct-94	21.0 d		6-Nov-94
Scoping Meeting	1-Nov-94	0.0		1-Nov-94
Prepare Draft WP	7-Nov-94	45.0 d		21-Dec-94
Army Review Draft WP	22-Dec-94	21.0 d		11-Jan-95
Comments Resolution	12-Jan-95	14.0 d		25-Jan-95
Prepare Draft Final WP	26-Jan-95	30.0 d		24-Feb-95
Regulators Rev DF WP	25-Feb-95	30.0 d		26-Mar-95
Comments Resolution	27-Mar-95	14.0 d		9-Apr-95
Final WP Approval	10-Apr-95	14.0 d		23-Apr-95
INVESTIGATION & ANALYSIS	24-Apr-95	317.0 d		5-Mar-96
Mobil for Field Work	24-Apr-95	14.0 d		7-May-95
Perform Site Invest	8-May-95	60.0 d		6-Jul-95
Laboratory Analysis	7-Jul-95	45.0 d		20-Aug-95
Data Validation	21-Aug-95	30.0 d		19-Sep-95
Pre DF Sum Rep FSR	20-Sep-95	45.0 d		3-Nov-95
Army Rev Draft FSR	4-Nov-95	21.0 d		24-Nov-95
Comments Resolution	25-Nov-95	14.0 d		8-Dec-95
Prepare DF FSR	9-Dec-95	30.0 d		7-Jan-96
Reg Review DF FSR	8-Jan-96	30.0 d		6-Feb-96
Comments Resolution	7-Feb-96	14.0 d		20-Feb-96
Final FSR Approval	21-Feb-96	14.0 d		5-Mar-96



009321

IRA AT 18 & 24 as of 9 Aug 94

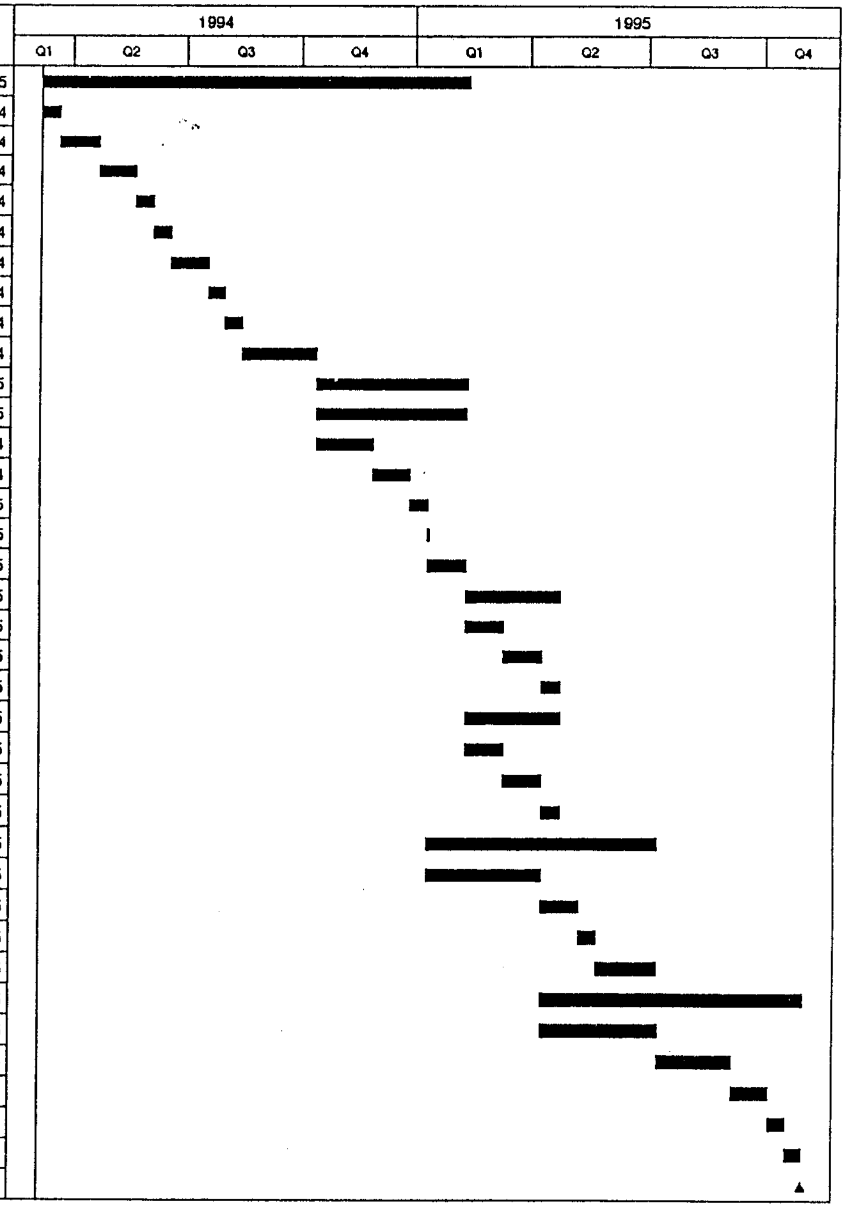
Task Name	Start Date	Duration		End Date
IRA AT 18 & 24	9-Jan-94	485. 0 d		8-May-95
INVEST & ANALYSIS	9-Jan-94	308. 0 d		12-Nov-94
Ph I Treatibility Test Results	9-Jan-94	80. 0 d		29-Mar-94
Data Validation	30-Mar-94	30. 0 d		28-Apr-94
Review/Summarize Phase I Data	29-Apr-94	14. 0 d		12-May-94
Mobil Ph II Field Work	21-Feb-94	7. 0 d		27-Feb-94
Ph II Field Work	28-Feb-94	120. 0 d		27-Jun-94
Ph II Sample Anal	28-Jun-94	21. 0 d		18-Jul-94
Rev/Sum Ph II Data	19-Jul-94	14. 0 d		1-Aug-94
Data Validation	2-Aug-94	30. 0 d		31-Aug-94
Prep Draft Ph II FSR	1-Sep-94	45. 0 d		15-Oct-94
Rev D Ph II FSR	16-Oct-94	14. 0 d		29-Oct-94
Com Res/Final FSR	30-Oct-94	14. 0 d		12-Nov-94
PROPOSED PLAN	28-Jun-94	105. 0 d		10-Oct-94
Prep Draft PP	28-Jun-94	30. 0 d		27-Jul-94
Review Draft PP	28-Jul-94	30. 0 d		26-Aug-94
Com Res/Final PP	27-Aug-94	14. 0 d		9-Sep-94
Public Meeting	15-Sep-94	1. 0 d		15-Sep-94
Pub Com Period	11-Sep-94	30. 0 d		10-Oct-94
RESPONSIVENESS SUMMARY	18-Sep-94	74. 0 d		30-Nov-94
Prepare Draft RS	18-Sep-94	30. 0 d		17-Oct-94
Review Draft RS	18-Oct-94	30. 0 d		16-Nov-94
Com Res/Final RS	17-Nov-94	14. 0 d		30-Nov-94
RECORD OF DECISION	18-Sep-94	74. 0 d		30-Nov-94
Prepare Draft ROD	18-Sep-94	30. 0 d		17-Oct-94
Review Draft ROD	18-Oct-94	30. 0 d		16-Nov-94
Com Res/Final ROD	17-Nov-94	14. 0 d		30-Nov-94
IRA WORK PLAN	15-Sep-94	222. 0 d		24-Apr-95
Procure Contractor	15-Sep-94	96. 0 d		19-Dec-94
Prep Draft IRA WP	20-Dec-94	60. 0 d		17-Feb-95
Review D IRA WP	18-Feb-95	45. 0 d		3-Apr-95
Com Res/Final WP	4-Apr-95	21. 0 d		24-Apr-95
IRA FINAL DES/CONSTRUCTION	25-Apr-95	14. 0 d		8-May-95
Mobilize for IRA	25-Apr-95	14. 0 d		8-May-95
IRA Begin	9-May-95	0. 0		9-May-95



009322

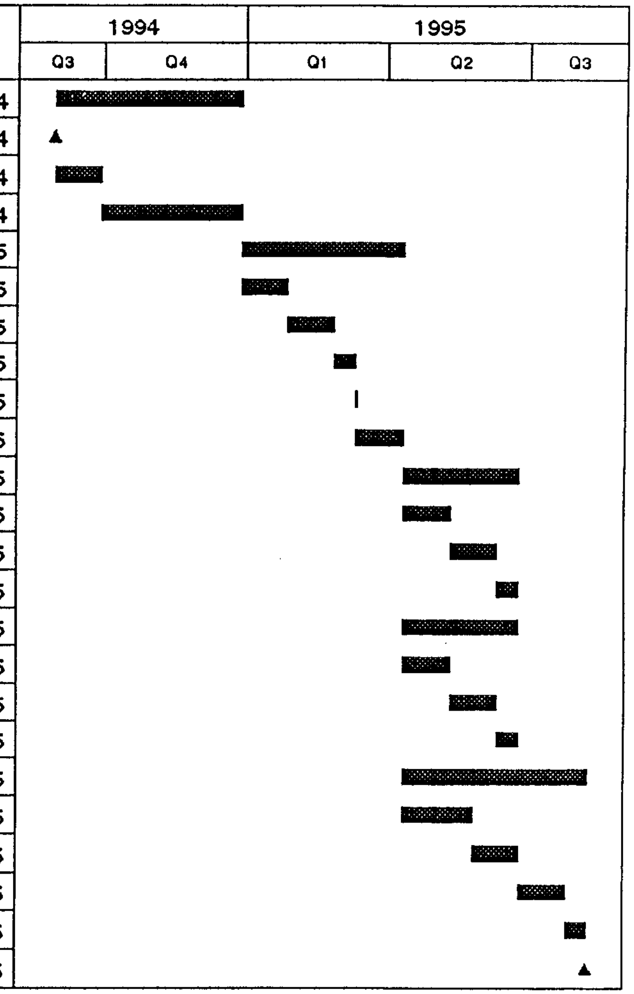
LANDFILL CAPS as of 9 Aug 94

Task Name	Start Date	Duration		End Date
LANDFILL CAPS	7-Mar-94	342.0 d		11-Feb-95
Rev Existing Reports	7-Mar-94	14.0 d		20-Mar-94
RD Invest WP	21-Mar-94	32.0 d		21-Apr-94
Army Review Workplans	22-Apr-94	30.0 d		21-May-94
Resolve Comments	22-May-94	14.0 d		4-Jun-94
Revise Workplans	5-Jun-94	14.0 d		18-Jun-94
Regulatory Review	19-Jun-94	30.0 d		18-Jul-94
Resolve Comments	19-Jul-94	14.0 d		1-Aug-94
Final Workplans	2-Aug-94	14.0 d		15-Aug-94
RD Investigations	16-Aug-94	60.0 d		14-Oct-94
Borrow Testing	15-Oct-94	120.0 d		11-Feb-95
PROPOSE PLAN	15-Oct-94	119.0 d		10-Feb-95
Prep Draft PP	15-Oct-94	45.0 d		28-Nov-94
Review Draft PP	29-Nov-94	30.0 d		28-Dec-94
Com Res/Final PP	29-Dec-94	14.0 d		11-Jan-95
Public Meeting	12-Jan-95	1.0 d		12-Jan-95
Public Comment Period	12-Jan-95	30.0 d		10-Feb-95
RESPONSIVENESS SUMMARY	11-Feb-95	74.0 d		25-Apr-95
Prepare Draft RS	11-Feb-95	30.0 d		12-Mar-95
Review Draft RS	13-Mar-95	30.0 d		11-Apr-95
Com Res/Final RS	12-Apr-95	14.0 d		25-Apr-95
RECORD OF DECISION	11-Feb-95	74.0 d		25-Apr-95
Prepare Draft RS	11-Feb-95	30.0 d		12-Mar-95
Review Draft RS	13-Mar-95	30.0 d		11-Apr-95
Com Res/Final RS	12-Apr-95	14.0 d		25-Apr-95
PLANS & SPECS	12-Jan-95	179.0 d		9-Jul-95
60% Plans and Specs	12-Jan-95	90.0 d		11-Apr-95
Review 60%	12-Apr-95	30.0 d		11-May-95
Resolve Comments	12-May-95	14.0 d		25-May-95
Dev Final Pln & Spec	26-May-95	45.0 d		9-Jul-95
IRA WORK PLAN	12-Apr-95	208.0 d		5-Nov-95
Adver/Award Construc	12-Apr-95	90.0 d		10-Jul-95
Prepare Draft IRA WP	11-Jul-95	60.0 d		8-Sep-95
Rev D IRA WP	9-Sep-95	30.0 d		8-Oct-95
Res Com/Final WP	9-Oct-95	14.0 d		22-Oct-95
Mobilize for IRA	23-Oct-95	14.0 d		5-Nov-95
IRA Begin	6-Nov-95	0.0		6-Nov-95



Removal of TNT Pipeline as of 19 Aug 94

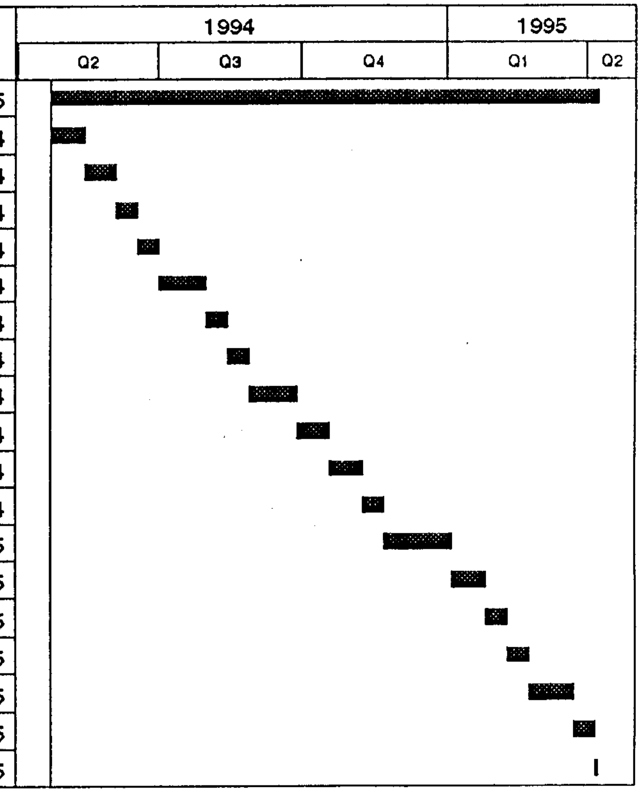
Task Name	Start Date	Duration		End Date
REMOVAL OF TNT PIPELINE	31-Aug-94	120. 0 d		28-Dec-94
Scoping Meeting	31-Aug-94	0. 0		31-Aug-94
Prepare Scope RA TNT	31-Aug-94	30. 0 d		29-Sep-94
Procure Contractor	30-Sep-94	90. 0 d		28-Dec-94
PROPOSED PLAN	29-Dec-94	104. 0 d		11-Apr-95
Prepare Draft PP	29-Dec-94	30. 0 d		27-Jan-95
Review Draft PP	28-Jan-95	30. 0 d		26-Feb-95
Com Res/Final PP	27-Feb-95	14. 0 d		12-Mar-95
Pub Mtg/Announcement	13-Mar-95	1. 0 d		13-Mar-95
Public Comment	13-Mar-95	30. 0 d		11-Apr-95
RESPONSIVENESS SUMMARY	12-Apr-95	74. 0 d		24-Jun-95
Prepare Draft RS	12-Apr-95	30. 0 d		11-May-95
Review Draft RS	12-May-95	30. 0 d		10-Jun-95
Com Res/Final RS	11-Jun-95	14. 0 d		24-Jun-95
RECORD OF DECISION	12-Apr-95	74. 0 d		24-Jun-95
Prepare Draft RS	12-Apr-95	30. 0 d		11-May-95
Review Draft RS	12-May-95	30. 0 d		10-Jun-95
Com Res/Final RS	11-Jun-95	14. 0 d		24-Jun-95
REMOVAL ACTION	12-Apr-95	119. 0 d		8-Aug-95
Pre Draft FW Plan RA	12-Apr-95	45. 0 d		26-May-95
Rev Draft FW Plan RA	27-May-95	30. 0 d		25-Jun-95
Com Res/Final FW Plan RA	26-Jun-95	30. 0 d		25-Jul-95
Mobilization	26-Jul-95	14. 0 d		8-Aug-95
RA Begin	9-Aug-95	0. 0		9-Aug-95



009324

Background Groundwater Concentration Report as of 15 Aug 94

Task Name	Start Date	Duration		End Date
BD GW CONC REPORT	23-Apr-94	350. 0 d		7-Apr-95
Prep of WP for Addtl monitorl	23-Apr-94	21. 0 d		13-May-94
Rev of WP by Army	14-May-94	21. 0 d		3-Jun-94
Comnts Res Draft WP	4-Jun-94	14. 0 d		17-Jun-94
Preparation of DF WP	18-Jun-94	14. 0 d		1-Jul-94
Reg Rev of DF WP	2-Jul-94	30. 0 d		31-Jul-94
Revision of DF WP	1-Aug-94	14. 0 d		14-Aug-94
Mob/Ins & Samp of Adtl mon	15-Aug-94	14. 0 d		28-Aug-94
Lab anasis of addtl watr sampl	29-Aug-94	30. 0 d		27-Sep-94
Data valid by Chem/IH	28-Sep-94	21. 0 d		18-Oct-94
Rev & Input of data	19-Oct-94	21. 0 d		8-Nov-94
Stat eval GW BD data	9-Nov-94	14. 0 d		22-Nov-94
Prepare Draft GW BD Report	23-Nov-94	42. 0 d		3-Jan-95
Army rev D GW BD Rep	4-Jan-95	21. 0 d		24-Jan-95
Comment Resolution	25-Jan-95	14. 0 d		7-Feb-95
Prep DF GW BD Report	8-Feb-95	14. 0 d		21-Feb-95
Reg rev DF GW BD Report	22-Feb-95	30. 0 d		23-Mar-95
Comment Resolution	24-Mar-95	14. 0 d		6-Apr-95
Final GW BD Report	7-Apr-95	1. 0 d		7-Apr-95



009325

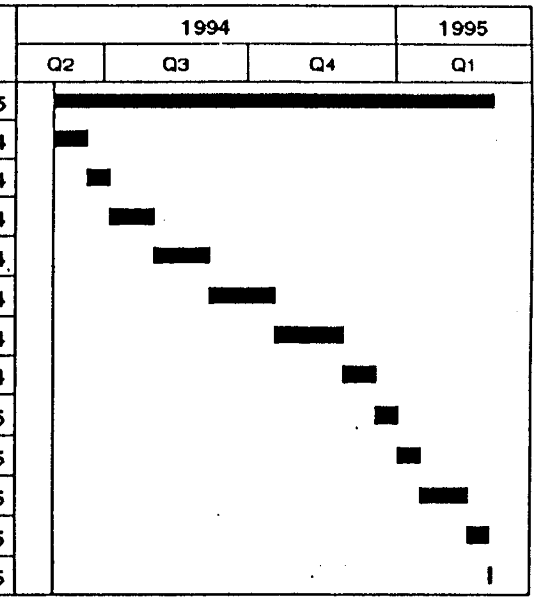
Background/Soil Assessment as of 19 Aug 94

Task Name	Start Date	Duration		End Date	1994 Q2	1994 Q3	1994 Q4	1995 Q1
BD SOIL CONC REPORT	21-Apr-94	285.0 d		30-Jan-95				
Prep of WP for additional samp	21-Apr-94	21.0 d		11-May-94				
Rev of WP by Army	12-May-94	21.0 d		1-Jun-94				
Comments Resolution	2-Jun-94	14.0 d		15-Jun-94				
Draft Final WP	16-Jun-94	14.0 d		29-Jun-94				
Regulator Review of WP	30-Jun-94	30.0 d		29-Jul-94				
Comment Resolution	30-Jul-94	7.0 d		5-Aug-94				
M & S for additnl soil samples	6-Aug-94	14.0 d		19-Aug-94				
Lab anasis adtl soil samp	20-Aug-94	14.0 d		2-Sep-94				
Data valid by Chem/IH	3-Sep-94	21.0 d		23-Sep-94				
Stat eval chem result	24-Sep-94	14.0 d		7-Oct-94				
Prep of drft field Summary Rep	8-Oct-94	21.0 d		28-Oct-94				
Army Rev Draft FSR	29-Oct-94	21.0 d		18-Nov-94				
Comments Resolution	19-Nov-94	14.0 d		2-Dec-94				
Prep of DF FSR	3-Dec-94	14.0 d		16-Dec-94				
Reg Rev DF FSR	17-Dec-94	30.0 d		15-Jan-95				
Comment Resolution	16-Jan-95	14.0 d		29-Jan-95				
Final FSR Approval	30-Jan-95	1.0 d		30-Jan-95				

009326

HYDROGEOLOGICAL ASSESSMENT AS OF 1 AUG 94

Task Name	Start Date	Duration		End Date
HYDROGEOLOGICAL ASSESSMENT	31-May-94	276. 0 d		2-Mar-95
Acqui & Rev of Geo Data	31-May-94	21. 0 d		20-Jun-94
Acqui of addtl FD	21-Jun-94	14. 0 d		4-Jul-94
Anasis of sub data & X-section	5-Jul-94	28. 0 d		1-Aug-94
Prep hydro & geochem maps	2-Aug-94	35. 0 d		5-Sep-94
Hydro Data from Sumps RI	6-Sep-94	42. 0 d		17-Oct-94
Prep Drft Hydro Assessment	18-Oct-94	42. 0 d		28-Nov-94
Army rev Drft Hydro Assmt	29-Nov-94	21. 0 d		19-Dec-94
Comment Resolution	20-Dec-94	14. 0 d		2-Jan-95
Pre DF Hydro Assess	3-Jan-95	14. 0 d		16-Jan-95
Regltrs rev DF Hydrogeo Assmt	17-Jan-95	30. 0 d		15-Feb-95
Comment Resolution	16-Feb-95	14. 0 d		1-Mar-95
Final Hydrogeo Assessmt	2-Mar-95	1. 0 d		2-Mar-95



DEPARTMENT OF THE ARMY
LONGHORN/LOUISIANA ARMY AMMUNITION PLANTS
MARSHALL, TEXAS 75671-1059

009327

REPLY TO ATTENTION OF

August 16, 1994

Engineering Division

Ms. Lisa Price
Superfund Enforcement
U.S. Environmental Protection Agency
1445 Ross Avenue
Dallas, Texas 75202

Dear Ms. Price:

Enclosed are two copies of the Final Landfill Caps Remedial Design Investigations Work Plan for LHAAP 12 and 16 of Longhorn Army Ammunition Plant.

If there are any questions, please contact Mr. David Tolbert at 903-679-2728.

Sincerely,

Lawrence J. Sowa
Lieutenant Colonel, U.S. Army
Commanding Officer

Encls

003328

DEPARTMENT OF THE ARMY
LONGHORN/LOUISIANA ARMY AMMUNITION PLANTS
MARSHALL, TEXAS 75671-1059

REPLY TO
ATTENTION OF

August 16, 1994

Ms. Lisa Price
Superfund Enforcement
U.S. Environmental Protection Agency
1445 Ross Avenue
Dallas, Texas 75202

Dear Ms. Price:

Enclosed is a copy of the Final Deadlines for Primary and Secondary Document of the Installation Restoration Program at Longhorn Army Ammunition Plant.

If there are any questions, please contact Mr. David Tolbert at 903-679-2728.

Sincerely,

David Tolbert

for Lawrence J. Sowa
Lieutenant Colonel, U.S. Army
Commnading Officer

Enclosure

009329

LONGHORN ARMY AMMUNITION PLANT

ASSUMPTIONS

- Funding is available and remedial activities will not be delayed because of lack of funding.
- For Group #1, 2, & Sumps additional field work will not be required after Phase II field investigation.
- For Group #3, public will concur with our no-action recommendation.
- For Group #5, this schedule is based on Site Investigation of 7 new sites.
- All reviews will be completed and all comments can be resolved within the scheduled amount of time.
- For IRA and Removal Action:
  - * Concurrent review on all deliverables.
  - * No significant public comments for concurrent preparation of Responsiveness Summary and Record of Decision documents.
- The turn around time for field sample analysis (w/validation) is 75 days. And 30 days for review/summarize field data.
- No significant delays due to active burning.
- No significant weather delays.
- No significant changed site conditions (such as large buried debris or munitions).

LONGHORN ARMY AMMUNITION PLANT

DEADLINES FOR PRIMARY AND SECONDARY DOCUMENTS

TASK NAME	GROUP #1 (1,11, XX,27)	GROUP #2 (12,16 17,18,24,29)	GROUP #4 (SUMPS)
Phase I Field Investigation (S)	(31 Mar 93)	(14 Jun 93)	(29 Aug 93)
Phase I Field Summary Report (S)			
Regulators	(19 Nov 93)	(13 Jan 94)	(7 Jan 94)
Phase II Work Plan (S)			
Regulators	(28 Jun 94)	28 Oct 94	(11 Jul 94)
Phase II Field Investigations (S)			
Mobilize	1 Sep 94	12 Dec 94	25 Aug 94
Data Results	19 Feb 95	29 Sep 95	12 Jun 95
Site Characterization Summary (S)			
Regulators	9 Jun 95	17 Jan 96	30 Sep 95
Risk Assessment (P)			
Regulator	17 Aug 95	26 Mar 96	8 Dec 95
Final	13 Oct 95	22 May 96	3 Feb 96
RI Report (P)			
Regulators	19 Nov 95	28 Jun 96	11 Mar 96
Final	15 Jan 96	24 Aug 96	7 May 96

() Actu-l Completion Date

009331

LONGHORN ARMY AMMUNITION PLANT
DEADLINES FOR PRIMARY AND SECONDARY DOCUMENTS (cont'd)

TASK NAME	GROUP #3 (13 & 14)	IRA (18 & 24)	IRA (LANDFILL CAPS)	REMOVAL TNT PIPELINE
RI/FS Report (P)				
Regulators	(2 Aug 94)			
Final	24 Sep 94			
Proposed Plan (P)				
Regulators	9 Nov 94	(30 Jul 94)	29 Nov 94	28 Jan 95
Final	5 Jan 95	9 Sep 94	11 Jan 95	12 Mar 95
Public Meeting	6 Jan 95	15 Sep 94	12 Jan 95	13 Mar 95
Final Public Comment	4 Feb 95	10 Oct 94	10 Feb 95	11 Apr 95
Responsiveness Summary (P)				
Regulators	4 May 95	18 Oct 94	13 Mar 95	12 May 95
Final	30 Jun 95	30 Nov 94	25 Apr 95	24 Jun 95
Record of Decision (P)				
Regulators	4 May 95	18 Oct 94	13 Mar 95	12 May 95
Final	30 Jun 95	30 Nov 94	25 Apr 95	24 Jun 95
IRA Work Plan (P)				
Regulators		18 Feb 95	9 Sep 95	27 May 95
Final		24 Apr 95	22 Oct 95	25 Jul 95
Mobilization (P)		25 Apr 95	23 Oct 95	26 Jul 95

() Actu. Completion Date

LONGHORN ARMY AMMUNITION PLANT

DEADLINES FOR PRIMARY AND SECONDARY DOCUMENTS (cont'd)

009332

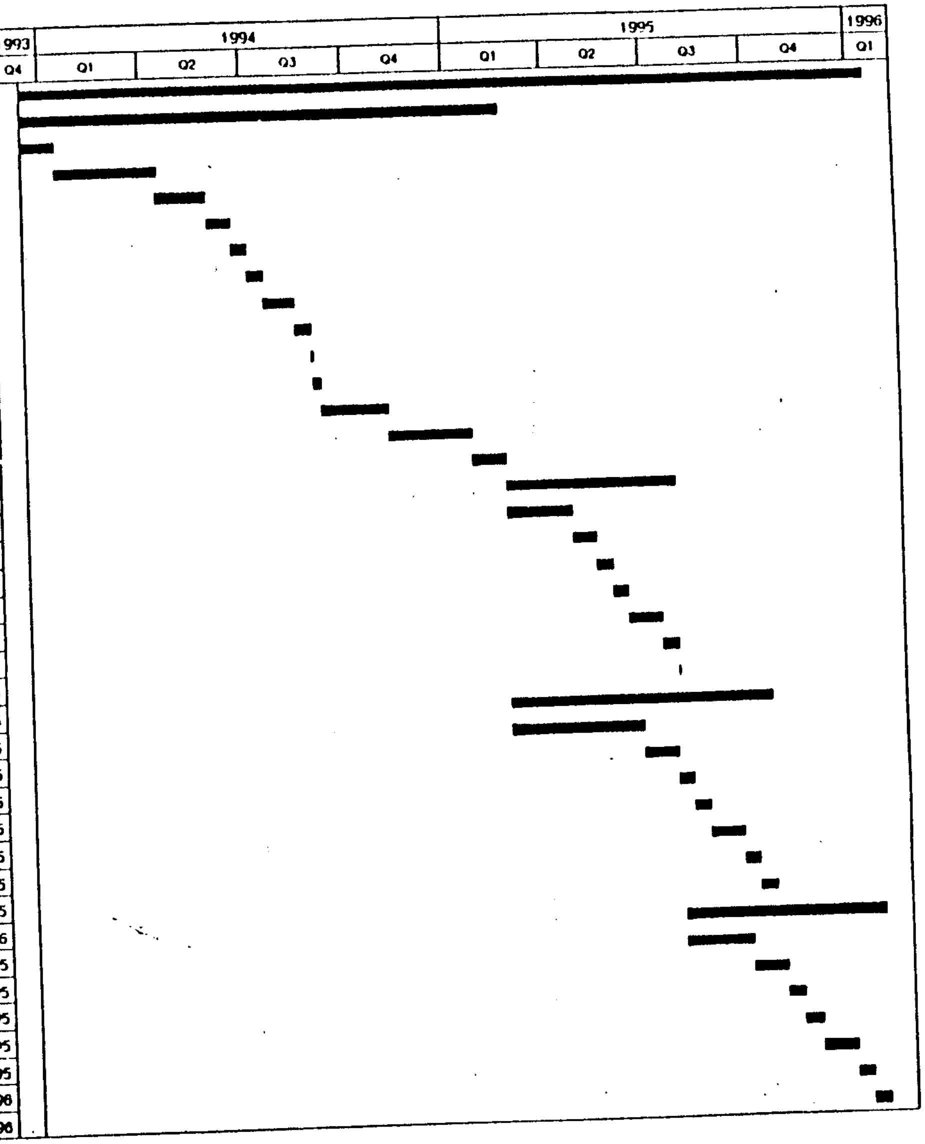
TASK NAME	GROUP #5 (Site Investigation)	BACKGROUND (Soil)	BACKGROUND (Groundwater)	HYDROGEOLOGICAL
Work Plan (P)				
Regulators	25 Feb 95	(29 Jun 94)	(29 Jun 94)	17 Jan 95
Final	23 Apr 95	5 Aug 94	14 Aug 94	2 Mar 95
Field Investigation (S)				
Mobilize	24 Apr 95	6 Aug 94	15 Aug 94	
ata Results	19 Sep 95	7 Oct 94	22 Nov 94	
Field Summary Report (S)				
Regulators	8 Jan 96	17 Dec 94	22 Feb 95	

() Actual Completion Date

009333

GROUP #1 (LHAAP #1, 11, XX, 27)

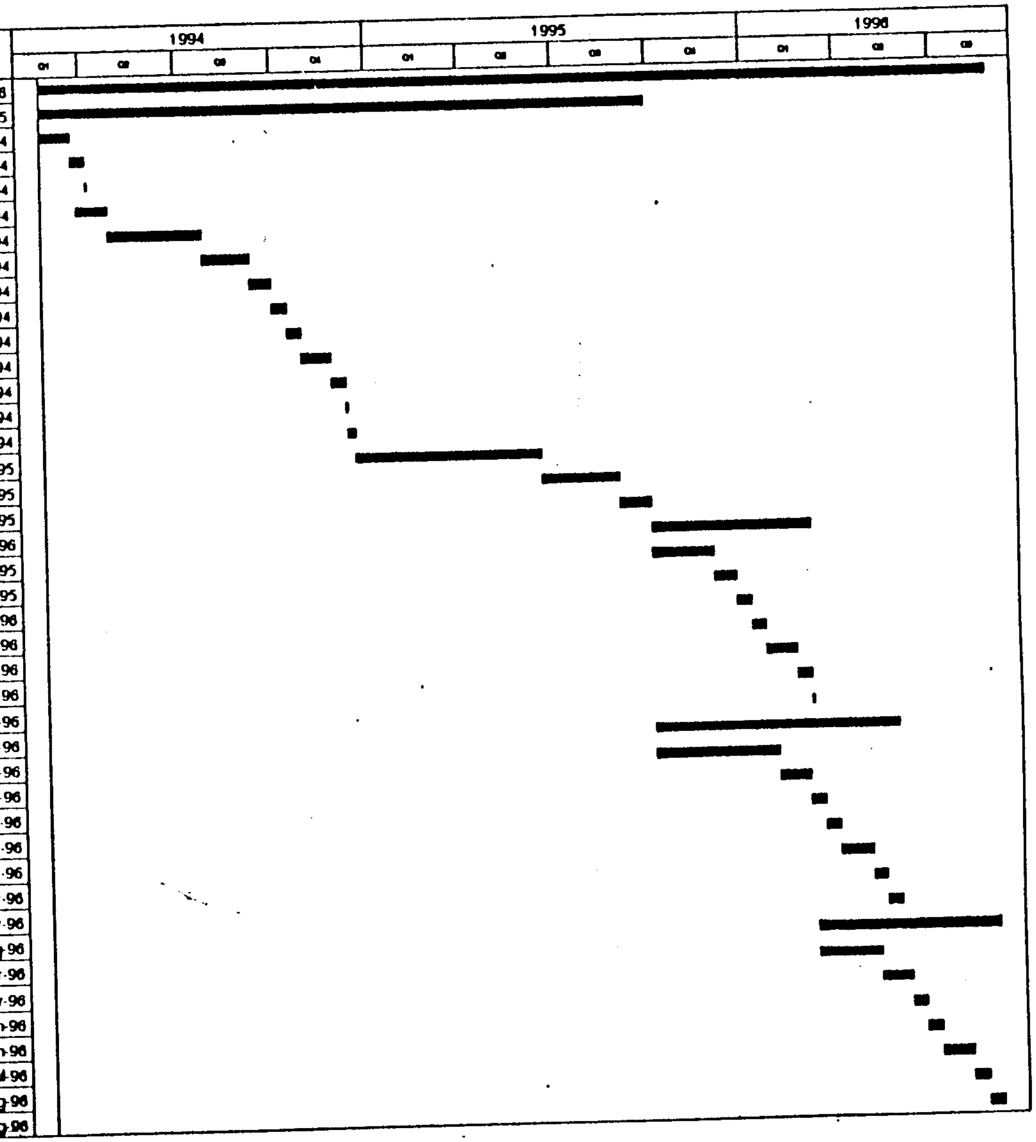
Task Name	Start Date	Duration		End Date
GROUP #1	16-Dec-93	761 0 d		15-Jan-96
INVESTIGATI^N & ANALYSIS	16-Dec-93	431 0 d		19-Feb-95
Prepare scope Phase II	16-Dec-93	30 0 d		14-Jan-94
Procure A-E Contractor	15-Jan-94	90 0 d		14-Apr-94
Prepare DF Ph II WP	14-Apr-94	45 0 d		29-May-94
Army Review Draft Ph II WP Adm	30-May-94	21 0 d		19-Jun-94
Comment Resolution	20-Jun-94	14 0 d		3-Jul-94
Prepare DF Ph II WP	4-Jul-94	14 0 d		17-Jul-94
Regulators Review Draft Final	18-Jul-94	30 0 d		16-Aug-94
Comment Resolution	17-Aug-94	14 0 d		30-Aug-94
Final Ph II Work Plan Approval	31-Aug-94	1 0 d		31-Aug-94
Mob for PH II FW	1-Sep-94	7 0 d		7-Sep-94
Perform Ph II FW	8-Sep-94	60 0 d		6-Nov-94
Ph II Sample Analysis	7-Nov-94	75 0 d		20-Jan-95
Rev/Sum Ph II Data	21-Jan-95	30 0 d		19-Feb-95
SITE CHARAC SUMMARY	20-Feb-95	154 0 d		23-Jul-95
Prepare Draft SCS Report	20-Feb-95	60 0 d		20-Apr-95
Army Rev Draft SCS Rep	21-Apr-95	21 0 d		11-May-95
Comment Res/Final	12-May-95	14 0 d		25-May-95
Prep DF SCS Report	26-May-95	14 0 d		8-Jun-95
Reg Rev DF CS	9-Jun-95	30 0 d		8-Jul-95
Comment Resolution	9-Jul-95	14 0 d		22-Jul-95
Final SCS Report Appr	23-Jul-95	1 0 d		23-Jul-95
RISK ASSESSMENT	20-Feb-95	236 0 d		13-Oct-95
Prepare Draft RA	20-Feb-95	120 0 d		19-Jun-95
Army Rev Draft RA Assessment	20-Jun-95	30 0 d		19-Jul-95
Comment Resolution	20-Jul-95	14 0 d		2-Aug-95
Prep DF RA Report	3-Aug-95	14 0 d		16-Aug-95
Reg Rev DF RA Rep	17-Aug-95	30 0 d		15-Sep-95
Comment Resolution	16-Sep-95	14 0 d		29-Sep-95
Fnl Risk Assmt Rept Approval	30-Sep-95	14 0 d		13-Oct-95
RI REPORT	24-Jul-95	176 0 d		15-Jan-96
Prepare Draft RI Report	24-Jul-95	60 0 d		21-Sep-95
Army Review Draft RI Report	22-Sep-95	30 0 d		21-Oct-95
Comment Resolution	22-Oct-95	14 0 d		4-Nov-95
Prepare DF RI Report	5-Nov-95	14 0 d		18-Nov-95
Reg Review DF RI Rept	19-Nov-95	30 0 d		18-Dec-95
Comment Resolution	19-Dec-95	14 0 d		1-Jan-96
Final RI Report	2-Jan-96	14 0 d		15-Jan-96



009334

GROUP #2 (LHAAP #12, 16, 17, 18, 24, 29, 32)

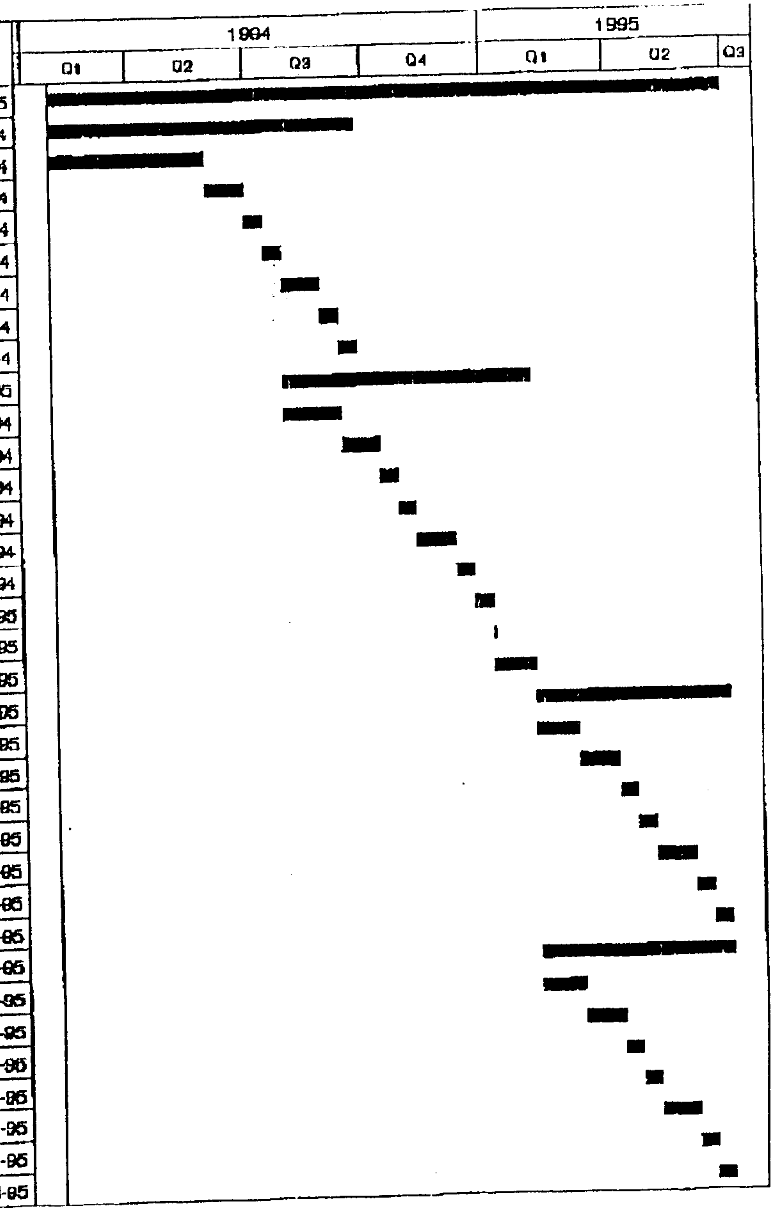
Task Name	Start Date	Duration		End Date
GROUP #2	21-Feb-94	916.0 d		24-Aug-96
INVESTIGATION & ANALYSIS	21-Feb-94	586.0 d		29-Sep-95
Reg Rev DF FSR	21-Feb-94	30.0 d		22-Mar-94
Comment Resolution	23-Mar-94	14.0 d		5-Apr-94
Final Phase I FSR Approval	6-Apr-94	1.0 d		7-Apr-94
Prepare Scope for Phase II	28-Mar-94	30.0 d		26-Apr-94
Procure A-E Contractor	27-Apr-94	90.0 d		25-Jul-94
Prepare Draft Ph II WP Addm	26-Jul-94	45.0 d		8-Sep-94
Army Rev Draft Phase II Addm	9-Sep-94	21.0 d		29-Sep-94
Comment Resolution	30-Sep-94	14.0 d		13-Oct-94
Prepare DF Ph II WP	14-Oct-94	14.0 d		27-Oct-94
Reg Rev DF WP	28-Oct-94	30.0 d		26-Nov-94
Comment Resolution	27-Nov-94	14.0 d		10-Dec-94
Final Ph II Work Plan Approval	11-Dec-94	1.0 d		11-Dec-94
Mob for Ph II FW	12-Dec-94	7.0 d		18-Dec-94
Perform Phase II Field Work	19-Dec-94	180.0 d		16-Jun-95
Phase II Sample Analysis	17-Jun-95	75.0 d		30-Aug-95
Rev/Sum Ph II Data	31-Aug-95	30.0 d		29-Sep-95
SITE CHARAC SUMMARY	30-Sep-95	154.0 d		1-Mar-96
Prepare Draft SCS Report	30-Sep-95	60.0 d		28-Nov-95
Army Rev D SCS Report	29-Nov-95	21.0 d		19-Dec-95
Comment Resolution	20-Dec-95	14.0 d		2-Jan-96
Prep DF SCS Report	3-Jan-96	14.0 d		16-Jan-96
Reg Rev DF SCS Rpt	17-Jan-96	30.0 d		15-Feb-96
Comment Resolution	16-Feb-96	14.0 d		29-Feb-96
Final SCS Report Approval	1-Mar-96	1.0 d		1-Mar-96
RISK ASSESSMENT	30-Sep-95	236.0 d		22-May-96
Prep D RA Report	30-Sep-95	120.0 d		27-Jan-96
Army Rev D RA	28-Jan-96	30.0 d		26-Feb-96
Comment Resolution	27-Feb-96	14.0 d		11-Mar-96
Prep DF RA Report	12-Mar-96	14.0 d		25-Mar-96
Reg Rev DF RA Rpt	26-Mar-96	30.0 d		24-Apr-96
Comment Resolution	25-Apr-96	14.0 d		8-May-96
Final Risk Assessment	9-May-96	14.0 d		22-May-96
RI REPORT	2-Mar-96	176.0 d		24-Aug-96
Prepare Draft RI Report	2-Mar-96	60.0 d		30-Apr-96
Army Rev Draft RI Report	1-May-96	30.0 d		30-May-96
Comment Resolution	31-May-96	14.0 d		13-Jun-96
Prep DF RI Report	14-Jun-96	14.0 d		27-Jun-96
Reg Rev DF RI	28-Jun-96	30.0 d		27-Jul-96
Comment Resolution	28-Jul-96	14.0 d		10-Aug-96
Final RI Report	11-Aug-96	14.0 d		24-Aug-96



009335

GROUP #3 (LHAAP #13, 14) AS OF 16 AUG 94

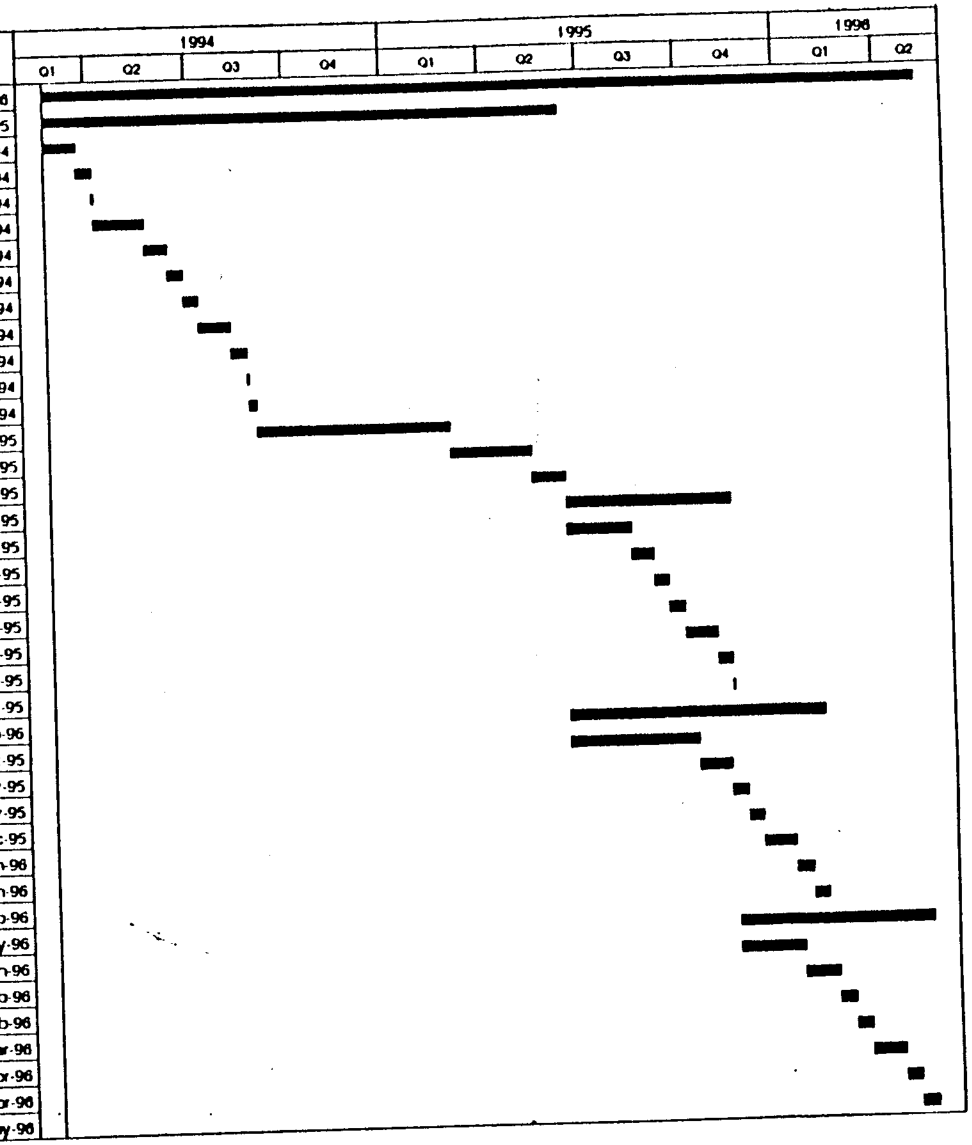
Task Name	Start Date	Duration		End Date
GROUP #3	1-Feb-94	518.0 d		1-Jul-95
RI/FS REPORT	1-Feb-94	238.0 d		24-Sep-94
Pre Draft RI Report	1-Feb-94	120.0 d		31-May-94
Army Rev Draft RI Rep	1-Jun-94	30.0 d		30-Jun-94
Comment Resolution	1-Jul-94	14.0 d		14-Jul-94
Pre Draft Final RI Rep	15-Jul-94	14.0 d		28-Jul-94
Reg Rev Draft Final RI	29-Jul-94	30.0 d		27-Aug-94
Comment Resolution	28-Aug-94	14.0 d		10-Sep-94
Final RI Report	11-Sep-94	14.0 d		24-Sep-94
PROPOSED PLAN	29-Jul-94	191.0 d		4-Feb-95
Pre Draft PP	29-Jul-94	45.0 d		11-Sep-94
Army Rev Draft PP	12-Sep-94	30.0 d		11-Oct-94
Comment Resolution	12-Oct-94	14.0 d		25-Oct-94
Prepare DF PP	26-Oct-94	14.0 d		8-Nov-94
Regulators Rev DF PP	9-Nov-94	30.0 d		8-Dec-94
Comment Resolution	9-Dec-94	14.0 d		22-Dec-94
Final Pro Plan Approval	23-Dec-94	14.0 d		5-Jan-95
Public Meeting	6-Jan-95	1.0 d		6-Jan-95
Pub Comment Period	6-Jan-95	30.0 d		4-Feb-95
RESPONSIVENESS SUMMARY	5-Feb-95	146.0 d		30-Jun-95
Pre Draft Summary	5-Feb-95	30.0 d		6-Mar-95
Army Rev Draft RS	7-Mar-95	30.0 d		5-Apr-95
Comment Resolution	6-Apr-95	14.0 d		19-Apr-95
Prepare DF RS	20-Apr-95	14.0 d		3-May-95
Regulators Rev DF RS	4-May-95	30.0 d		2-Jun-95
Comment Resolution	3-Jun-95	14.0 d		16-Jun-95
Final RS	17-Jun-95	14.0 d		30-Jun-95
RECORD OF DECISION	6-Feb-95	146.0 d		1-Jul-95
Prepare Draft Rod	6-Feb-95	30.0 d		7-Mar-95
Army Rev Draft Rod	8-Mar-95	30.0 d		6-Apr-95
Comment Resolution	7-Apr-95	14.0 d		20-Apr-95
Prepare DF Rod	21-Apr-95	14.0 d		4-May-95
Reg Rev DF Rod	5-May-95	30.0 d		3-Jun-95
Comment Resolution	4-Jun-95	14.0 d		17-Jun-95
Final Rod	18-Jun-95	14.0 d		1-Jul-95



009336

GROUP #4 SUMPS

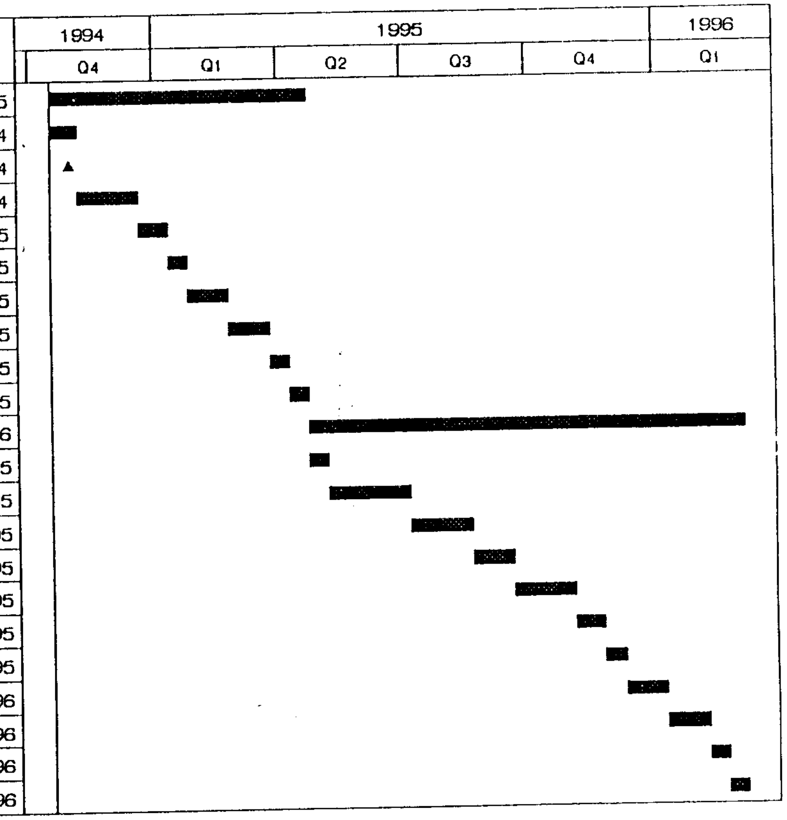
Task Name	Start Date	Duration	End Date
GROUP #4 - SUMPS	22-Feb-94	806 0 d	7-May-96
INVESTIGATION AND ANALYSIS	22-Feb-94	476 0 d	12-Jun-95
Reg Rev DF FSR	22-Feb-94	30 0 d	23-Mar-94
Comment Resolution	24-Mar-94	14 0 d	6-Apr-94
Final Ph I FSR Approval	7-Apr-94	1 0 d	7-Apr-94
Pre Draft Ph II WP	8-Apr-94	45 0 d	22-May-94
Army Rev Draft Ph II WP	23-May-94	21 0 d	12-Jun-94
Comment Resolution	13-Jun-94	14 0 d	26-Jun-94
Prepare DF Ph II WP	27-Jun-94	14 0 d	10-Jul-94
Reg Rev DF WP	11-Jul-94	30 0 d	9-Aug-94
Comment Resolution	10-Aug-94	14 0 d	23-Aug-94
Final Ph II WP Approval	24-Aug-94	1 0 d	24-Aug-94
Mob for PH II Field Wk	25-Aug-94	7 0 d	31-Aug-94
Perform Ph II Field Work	1-Sep-94	180 0 d	27-Feb-95
P[illegible] Sample Analysis	28-Feb-95	75 0 d	13-May-95
Rev/Summarize Ph II Data	14-May-95	30 0 d	12-Jun-95
SITE CHARACTERIZATION SUMMARY	13-Jun-95	154 0 d	13-Nov-95
Pre Draft SCS Report	13-Jun-95	60 0 d	11-Aug-95
Army Rev Draft SCS Rep	12-Aug-95	21 0 d	1-Sep-95
Comment Resolution	2-Sep-95	14 0 d	15-Sep-95
Pre DF SCS Report	16-Sep-95	14 0 d	29-Sep-95
Reg Rev Draft Final SCS	30-Sep-95	30 0 d	29-Oct-95
Comment Resolution	30-Oct-95	14 0 d	12-Nov-95
Final SCS Rep Approval	13-Nov-95	1 0 d	13-Nov-95
RISK ASSESSMENT	13-Jun-95	236 0 d	3-Feb-96
Pre Draft Risk Assess Rpt	13-Jun-95	120 0 d	10-Oct-95
Army Rev Draft RA Rep	11-Oct-95	30 0 d	9-Nov-95
Comment Resolution	10-Nov-95	14 0 d	23-Nov-95
Pre DF RA Report	24-Nov-95	14 0 d	7-Dec-95
Reg Review DF RA	8-Dec-95	30 0 d	6-Jan-96
Comment Resolution	7-Jan-96	14 0 d	20-Jan-96
Final Risk Assessment Rep App	21-Jan-96	14 0 d	3-Feb-96
RI REPORT	14-Nov-95	176 0 d	7-May-96
Pre Draft RI Report	14-Nov-95	60 0 d	12-Jan-96
Army Rev Draft RI Rep	13-Jan-96	30 0 d	11-Feb-96
Comment Resolution	12-Feb-96	14 0 d	25-Feb-96
Pre DF RI Report	26-Feb-96	14 0 d	10-Mar-96
Reg Rev DF RI	11-Mar-96	30 0 d	9-Apr-96
Comment Resolution	10-Apr-96	14 0 d	23-Apr-96
Final RI Rep Approval	24-Apr-96	14 0 d	7-May-96



009337

Group #5 as of 9 Aug 94

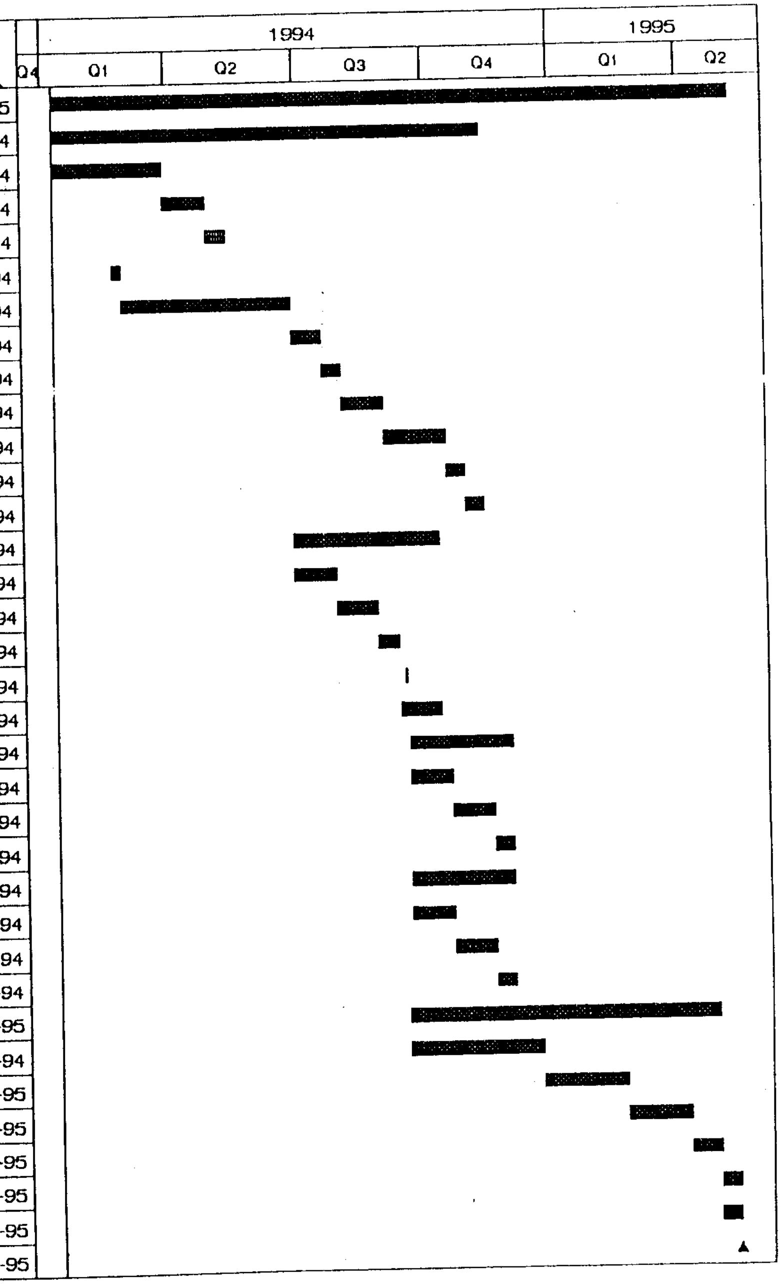
Task Name	Start Date	Duration		End Date
GROUP 5 LHAAP SITE INVEST	17-Oct-94	189.0 d		23-Apr-95
Rec Srch/Rev xst rep	17-Oct-94	21.0 d		6-Nov-94
Scoping Meeting	1-Nov-94	0.0		1-Nov-94
Prepare Draft WP	7-Nov-94	45.0 d		21-Dec-94
Army Review Draft WP	22-Dec-94	21.0 d		11-Jan-95
Comments Resolution	12-Jan-95	14.0 d		25-Jan-95
Prepare Draft Final WP	26-Jan-95	30.0 d		24-Feb-95
Regulators Rev DF WP	25-Feb-95	30.0 d		26-Mar-95
Comments Resolution	27-Mar-95	14.0 d		9-Apr-95
Final WP Approval	10-Apr-95	14.0 d		23-Apr-95
INVESTIGATION & ANALYSIS	24-Apr-95	317.0 d		5-Mar-96
Mobil for Field Work	24-Apr-95	14.0 d		7-May-95
Perform Site Invest	8-May-95	60.0 d		6-Jul-95
Laboratory Analysis	7-Jul-95	45.0 d		20-Aug-95
Data Validation	21-Aug-95	30.0 d		19-Sep-95
Pre DF Sum Rep FSR	20-Sep-95	45.0 d		3-Nov-95
Army Rev Draft FSR	4-Nov-95	21.0 d		24-Nov-95
Comments Resolution	25-Nov-95	14.0 d		8-Dec-95
Prepare DF FSR	9-Dec-95	30.0 d		7-Jan-96
Reg Review DF FSR	8-Jan-96	30.0 d		6-Feb-96
Comments Resolution	7-Feb-96	14.0 d		20-Feb-96
Final FSR Approval	21-Feb-96	14.0 d		5-Mar-96



009338

IRA AT 18 & 24 as of 9 Aug, 94

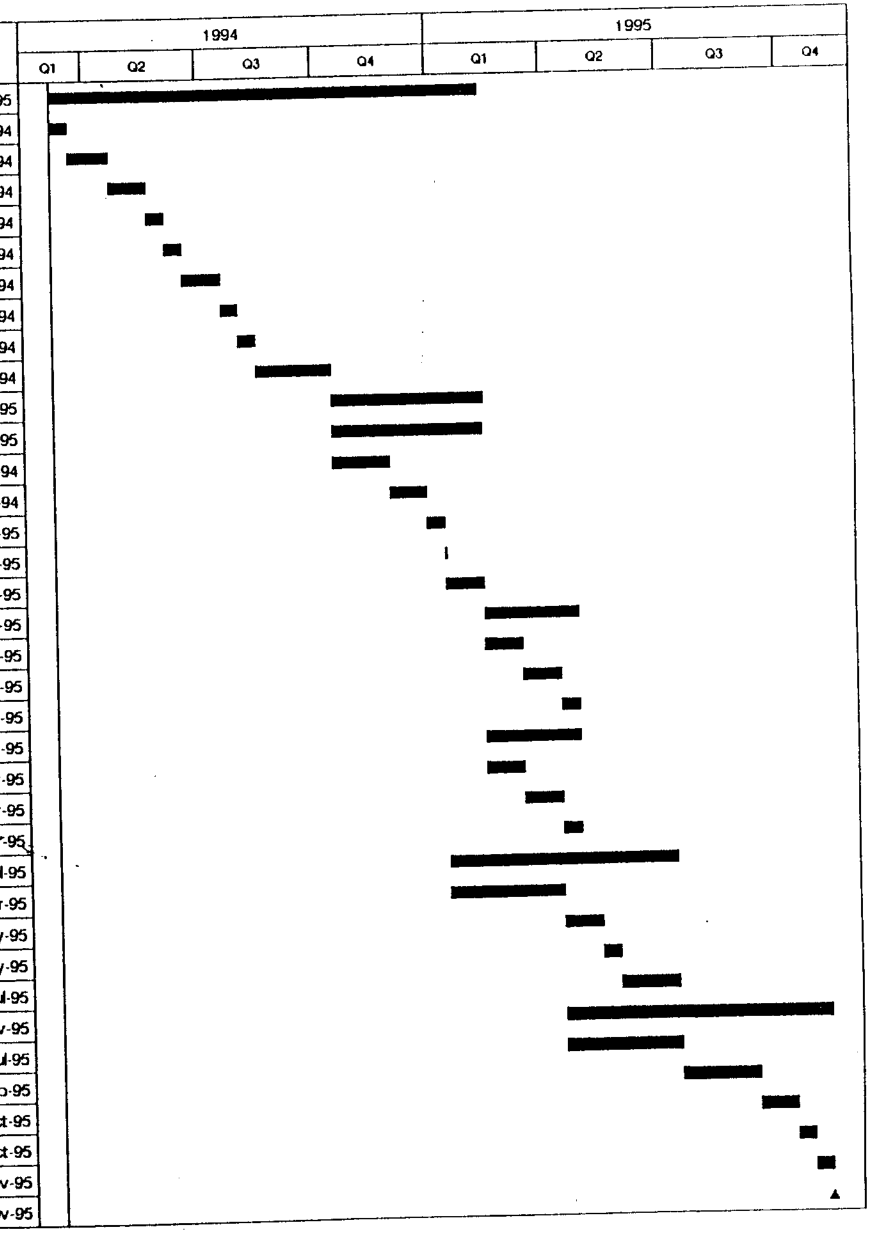
Task Name	Start Date	Duration		End Date
IRA AT 18 & 24	9-Jan-94	485. 0 d		8-May-95
INVEST & ANALYSIS	9-Jan-94	308. 0 d		12-Nov-94
Ph I Treatibility Test Results	9-Jan-94	80. 0 d		29-Mar-94
Data Validation	30-Mar-94	30. 0 d		28-Apr-94
Review/Summarize Phase I Data	29-Apr-94	14. 0 d		12-May-94
Mobil Ph II Field Work	21-Feb-94	7. 0 d		27-Feb-94
Ph II Field Work	28-Feb-94	120. 0 d		27-Jun-94
Ph II Sample Anal	28-Jun-94	21. 0 d		18-Jul-94
Rev/Sum Ph II Data	19-Jul-94	14. 0 d		1-Aug-94
Data Validation	2-Aug-94	30. 0 d		31-Aug-94
Prep Draft Ph II FSR	1-Sep-94	45. 0 d		15-Oct-94
Rev D Ph II FSR	16-Oct-94	14. 0 d		29-Oct-94
Com Res/Final FSR	30-Oct-94	14. 0 d		12-Nov-94
PROPOSED PLAN	28-Jun-94	105. 0 d		10-Oct-94
Prep Draft PP	28-Jun-94	30. 0 d		27-Jul-94
Review Draft PP	28-Jul-94	30. 0 d		26-Aug-94
Com Res/Final PP	27-Aug-94	14. 0 d		9-Sep-94
Public Meeting	15-Sep-94	1. 0 d		15-Sep-94
Pub Com Period	11-Sep-94	30. 0 d		10-Oct-94
RESPONSIVENESS SUMMARY	18-Sep-94	74. 0 d		30-Nov-94
Prepare Draft RS	18-Sep-94	30. 0 d		17-Oct-94
Review Draft RS	18-Oct-94	30. 0 d		16-Nov-94
Com Res/Final RS	17-Nov-94	14. 0 d		30-Nov-94
RECORD OF DECISION	18-Sep-94	74. 0 d		30-Nov-94
Prepare Draft ROD	18-Sep-94	30. 0 d		17-Oct-94
Review Draft ROD	18-Oct-94	30. 0 d		16-Nov-94
Com Res/Final ROD	17-Nov-94	14. 0 d		30-Nov-94
IRA WORK PLAN	15-Sep-94	222. 0 d		24-Apr-95
Procure Contractor	15-Sep-94	96. 0 d		19-Dec-94
Prep Draft IRA WP	20-Dec-94	60. 0 d		17-Feb-95
Review D IRA WP	18-Feb-95	45. 0 d		3-Apr-95
Com Res/Final WP	4-Apr-95	21. 0 d		24-Apr-95
IRA FINAL DES/CONSTRUCTION	25-Apr-95	14. 0 d		8-May-95
Mobilize for IRA	25-Apr-95	14. 0 d		8-May-95
IRA Begin	9-May-95	0. 0		9-May-95



009339

LANDFILL CAPS as of 9 Aug 94.

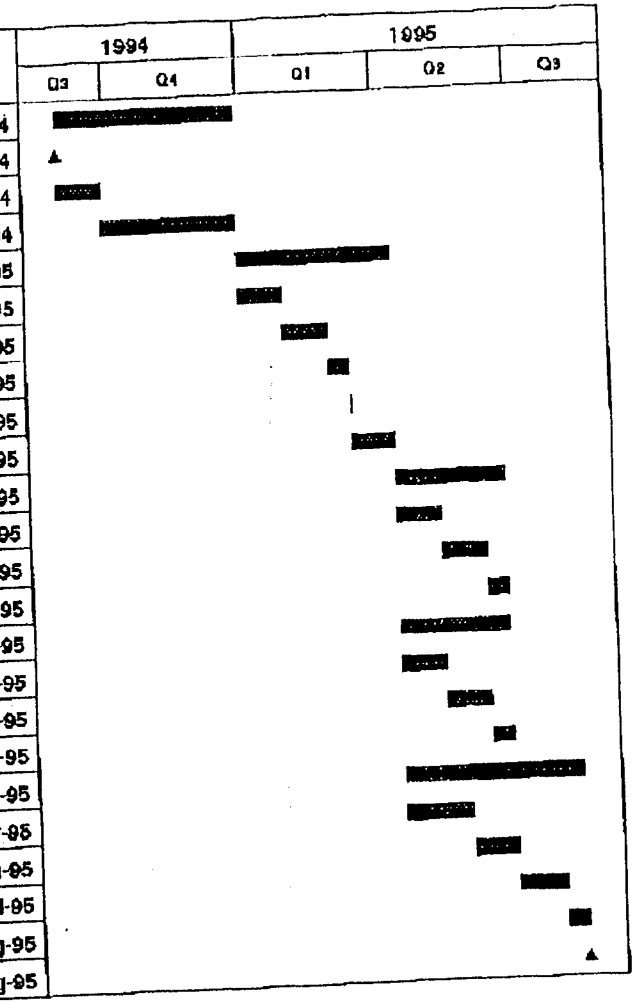
Task Name	Start Date	Duration		End Date
LANDFILL CAPS	7-Mar-94	342.0 d		11-Feb-95
Rev Existing Reports	7-Mar-94	14.0 d		20-Mar-94
RD Invest WP	21-Mar-94	32.0 d		21-Apr-94
Army Review Workplans	22-Apr-94	30.0 d		21-May-94
Resolve Comments	22-May-94	14.0 d		4-Jun-94
Revise Workplans	5-Jun-94	14.0 d		18-Jun-94
Regulatory Review	19-Jun-94	30.0 d		18-Jul-94
Resolve Comments	19-Jul-94	14.0 d		1-Aug-94
Final Workplans	2-Aug-94	14.0 d		15-Aug-94
RD Investigations	16-Aug-94	60.0 d		14-Oct-94
Borrow Testing	15-Oct-94	120.0 d		11-Feb-95
PROPOSE PLAN	15-Oct-94	119.0 d		10-Feb-95
Prep Draft PP	15-Oct-94	45.0 d		28-Nov-94
Review Draft PP	29-Nov-94	30.0 d		28-Dec-94
Com Res/Final PP	29-Dec-94	14.0 d		11-Jan-95
Public Meeting	12-Jan-95	1.0 d		12-Jan-95
Public Comment Period	12-Jan-95	30.0 d		10-Feb-95
RESPONSIVENESS SUMMARY	11-Feb-95	74.0 d		25-Apr-95
Prepare Draft RS	11-Feb-95	30.0 d		12-Mar-95
Review Draft RS	13-Mar-95	30.0 d		11-Apr-95
Com Res/Final RS	12-Apr-95	14.0 d		25-Apr-95
RECORD OF DECISION	11-Feb-95	74.0 d		25-Apr-95
Prepare Draft RS	11-Feb-95	30.0 d		12-Mar-95
Review Draft RS	13-Mar-95	30.0 d		11-Apr-95
Com Res/Final RS	12-Apr-95	14.0 d		25-Apr-95
PLANS & SPECS	12-Jan-95	179.0 d		9-Jul-95
60% Plans and Specs	12-Jan-95	90.0 d		11-Apr-95
Review 60%	12-Apr-95	30.0 d		11-May-95
Resolve Comments	12-May-95	14.0 d		25-May-95
Dev Final Pln & Spec	26-May-95	45.0 d		9-Jul-95
IRA WORK PLAN	12-Apr-95	208.0 d		5-Nov-95
Adver/Award Construc	12-Apr-95	90.0 d		10-Jul-95
Prepare Draft IRA WP	11-Jul-95	60.0 d		8-Sep-95
Rev D IRA WP	9-Sep-95	30.0 d		8-Oct-95
Res Com/Final WP	9-Oct-95	14.0 d		22-Oct-95
Mobilize for IRA	23-Oct-95	14.0 d		5-Nov-95
IRA Begin	6-Nov-95	0.0		6-Nov-95



009340

REMOVAL OF TNT PIPELINE

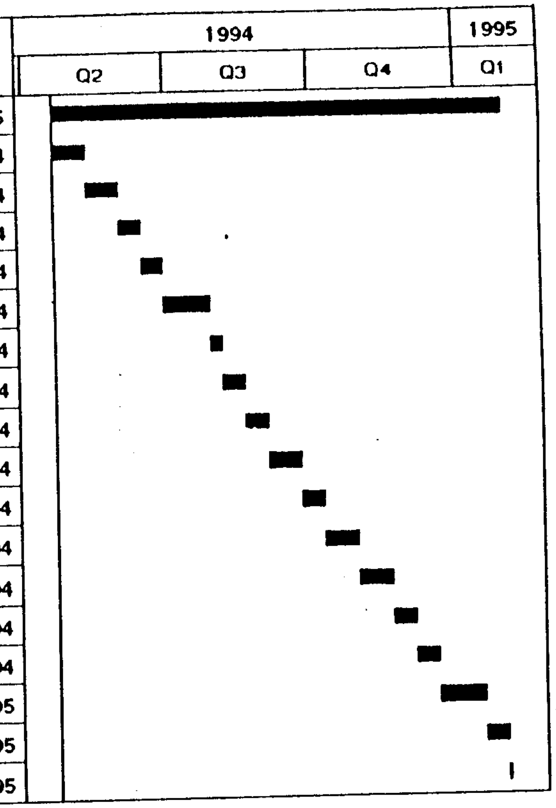
Task Name	Start Date	Duration		End Date
REMOVAL OF TNT PIPELINE	31-Aug-94	120.0 d		28-Dec-94
Scoping Meeting	31-Aug-94	0.0		31-Aug-94
Prepare Scope RA TNT	31-Aug-94	30.0 d		29-Sep-94
Procure Contractor	30-Sep-94	90.0 d		28-Dec-94
PROPOSED PLAN	29-Dec-94	104.0 d		11-Apr-95
Prepare Draft PP	29-Dec-94	30.0 d		27-Jan-95
Review Draft PP	28-Jan-95	30.0 d		26-Feb-95
Com Res/Final PP	27-Feb-95	14.0 d		12-Mar-95
Pub Mtg/Announcement	13-Mar-95	1.0 d		13-Mar-95
Public Comment	13-Mar-95	30.0 d		11-Apr-95
RESPONSIVENESS SUMMARY	12-Apr-95	74.0 d		24-Jun-95
Prepare Draft RS	12-Apr-95	30.0 d		11-May-95
Review Draft RS	12-May-95	30.0 d		10-Jun-95
Com Res/Final RS	11-Jun-95	14.0 d		24-Jun-95
RECORD OF DECISION	12-Apr-95	74.0 d		24-Jun-95
Prepare Draft RS	12-Apr-95	30.0 d		11-May-95
Review Draft RS	12-May-95	30.0 d		10-Jun-95
Com Res/Final RS	11-Jun-95	14.0 d		24-Jun-95
REMOVAL ACTION	12-Apr-95	119.0 d		8-Aug-95
Pre Draft FW Plan RA	12-Apr-95	46.0 d		26-May-95
Rev Draft FW Plan RA	27-May-95	30.0 d		25-Jun-95
Com Res/Final FW Plan RA	26-Jun-95	30.0 d		25-Jul-95
Mobilization	26-Jul-95	14.0 d		8-Aug-95
RA Begin	9-Aug-95	0.0		9-Aug-95



009341

BACKGROUND/~~[illegible]~~ SOIL ASSESSMENT

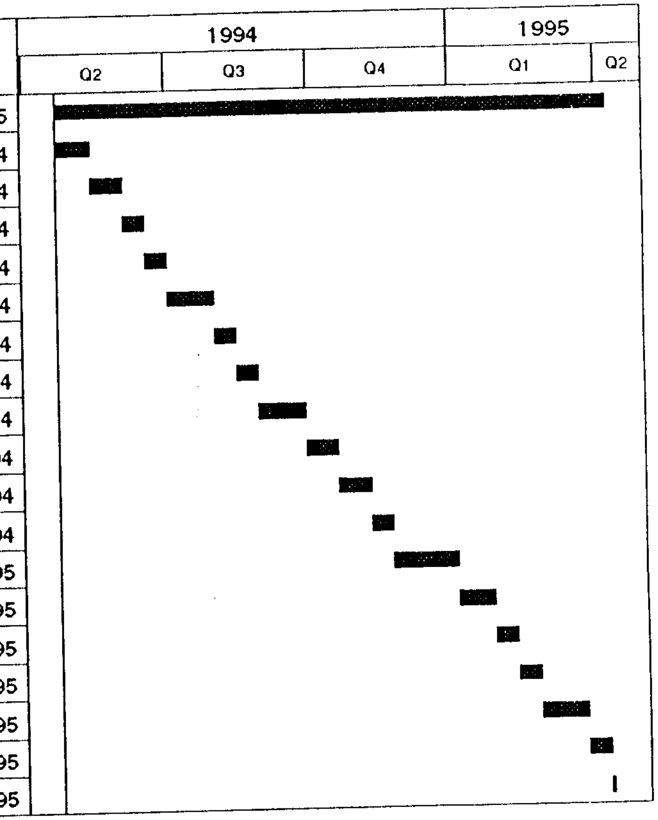
Task Name	Start Date	Duration		End Date
BD SOIL CONC REPORT	21-Apr-94	285. 0 d		30-Jan-95
Prep of WP for additional samp	21-Apr-94	21. 0 d		11-May-94
Rev of WP by Army	12-May-94	21. 0 d		1-Jun-94
Comments Resolution	2-Jun-94	14. 0 d		15-Jun-94
Draft Final WP	16-Jun-94	14. 0 d		29-Jun-94
Regulator Review of WP	30-Jun-94	30. 0 d		29-Jul-94
Comment Resolution	30-Jul-94	7. 0 d		5-Aug-94
M & S for addilnl soil samples	6-Aug-94	14. 0 d		19-Aug-94
Lab anlysis of addtl soil samp	20-Aug-94	14. 0 d		2-Sep-94
Data validation by Chem/IH	3-Sep-94	21. 0 d		23-Sep-94
Statistic eval of chem result	24-Sep-94	14. 0 d		7-Oct-94
Prep of drft field Summary Rep	8-Oct-94	21. 0 d		28-Oct-94
Army Rev Draft FSR	29-Oct-94	21. 0 d		18-Nov-94
Comments Resolution	19-Nov-94	14. 0 d		2-Dec-94
Prep of DF FSR	3-Dec-94	14. 0 d		16-Dec-94
Reg Rev DF FSR	17-Dec-94	30. 0 d		15-Jan-95
Comment Resolution	16-Jan-95	14. 0 d		29-Jan-95
Final FSR Approval	30-Jan-95	1. 0 d		30-Jan-95



009342

Background Groundwater Concentration Report as of 15 Aug 94

Task Name	Start Date	Duration		End Date
BD GW CONC REPORT	23-Apr-94	350.0 d		7-Apr-95
Prep of WP for Addtl monitorl	23-Apr-94	21.0 d		13-May-94
Rev of WP by Army	14-May-94	21.0 d		3-Jun-94
Comnts Res Draft WP	4-Jun-94	14.0 d		17-Jun-94
Preparation of DF WP	18-Jun-94	14.0 d		1-Jul-94
Reg Rev of DF WP	2-Jul-94	30.0 d		31-Jul-94
Revision of DF WP	1-Aug-94	14.0 d		14-Aug-94
Mob/Ins & Samp of Adtl mon	15-Aug-94	14.0 d		28-Aug-94
Lab anasis of addtl watr sampl	29-Aug-94	30.0 d		27-Sep-94
Data valid by Chem/IH	28-Sep-94	21.0 d		18-Oct-94
Rev & Input of data	19-Oct-94	21.0 d		8-Nov-94
Stat eval GW BD data	9-Nov-94	14.0 d		22-Nov-94
Prepare Draft GW BD Report	23-Nov-94	42.0 d		3-Jan-95
Army rev D GW BD Rep	4-Jan-95	21.0 d		24-Jan-95
Comment Resolution	25-Jan-95	14.0 d		7-Feb-95
Prep DF GW BD Report	8-Feb-95	14.0 d		21-Feb-95
Reg rev DF GW BD Report	22-Feb-95	30.0 d		23-Mar-95
Comment Resolution	24-Mar-95	14.0 d		6-Apr-95
Final GW BD Report	7-Apr-95	1.0 d		7-Apr-95



009343

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

August 16, 1994

CERTIFIED MAIL

RETURN RECEIPT REQUESTED

David Tolbert, Project Manager
Longhorn Army Ammunition Plant
Attn: SMCLO-EN
Marshall, Texas 75671-1059

Re: Longhorn Army Ammunition Plant
Draft Proposed Plan for Interim Remedial Action at
Burning Ground No. 3 and Unlined Evaporation Pond

Dear Mr. Tolbert:

The Texas Natural Resource Conservation Commission (TNRCC) staff have completed our review of the subject document, dated July 30, 1994. Our comments are enclosed.

If you have any additional questions or comments, please contact me at (512) 239-2483.

Sincerely yours,

Michael A. Moore
RI/FS II Unit
Superfund Investigation Section
Pollution Cleanup Division

MM:

Enclosure

cc: Capt. Ross Nguyen, COE Tulsa District
Lisa Price (6H-ET), EPA Region VI
Bud Jones, LEGAL/FO - Region 5/Tyler
Mark Weegar, WASTE/IHW - Corrective Action
Alvie Nichols, WASTE/PC - Superfund Engineering

TNRCC Comments
on
Longhorn Army Ammunition Plant
Draft Proposed Plan for Interim Remedial Action at
Burning Ground No. 3 and Unlined Evaporation Pond

Section	Page	Comment
	Title	The work "early" should be deleted throughout the document. The term "interim remedial action" infers that the action is to take place earlier than the final remedy.
1.	1	Omit the sentence beginning with "This is considered ... " in the 8th line.
1.	1	The term "vadose zone" in line 15 is probably too technical for this document. Recommend using something like "shallow soils".
	1	"National Contingency Act" in line 25 should read "National Contingency Plan".
	1	" ... contaminated shallow water at ... " in line 26 should read " ... contaminated shallow **ground** water at ... "
1.2.	3	The effective date of the Federal Facility Agreement in line 3 should be checked.
1.2.	3	The last three sentences, beginning with "LHAAP was issued ... ", are probably not relevant to this document and should be removed.

Section	Page	Comment
1.3.	3	According to the Guidance[1], "The first section of the Proposed Plan should stress that public input on all alternatives, and on the information that supports the alternatives, is an important contribution to the remedy selection process." There is no reference to public participation in the first section of this document. The introduction should also include a reference to the repository from which the public can get additional information.
2.	3-	This section is too long and contains too much detailed information. It is recommended that the following be changed or deleted:
2.	3	Delete the last two sentences, beginning with "The 8,483 acre facility ... "
2.1.	3	Change the first sentence to read "The UEP was in use from the late 1950's through 1985 to dispose of all types of process wastes from illumination and explosive production containing explosives, chlorinated solvents and heavy metals. Delete the rest of this paragraph.
2.2.	3-4	Delete this paragraph.
2.3.	4	Delete this paragraph.
2.4.	4	Delete this paragraph.
2.5.	4	Delete this paragraph.
2.6.	4	Delete this paragraph. Could probably be included in Section 4 - Summary of Site Risks.
2.7.	5	Delete this paragraph.
2.7.1.	5-8	Move to Section 4 - Summary of Site Risks.
Figure 4.	6	Delete.
Table 1.	7	Delete.

[1] Interim Final Guidance on Preparing Superfund Decision Documents: The Proposed Plan, The Record of Decision, Explanation of Significant Differences, The Record of Decision Amendment. June 1989. OSWER Directive 9355.3-02.

Section	Page	Comment
2.7.2.	8	Move to Section 4 - Summary of Site Risks.
3.	8	Delete "All" and "will not be treated under the Early IRA but" from the last sentence.
4.	8	This section needs more narrative description. Include information from sections 2.6, 2.7.1, and 2.7.2 here. Also, see Section 2.3.4 in the Guidance.
5	8-	This section does not provide enough information for each alternative (see sections 2.3.5 and 2.3.6 in the Guidance). If these alternatives are not discussed in detail in an RI report, more information needs to be presented here so that the public will have something on which to base its comments. It is doubtful that the public would find Table 2 an acceptable discussion of the alternatives which were studied for this site. It is recommended that the example in Appendix A of the Guidance be followed.
6.1	10	Need more information on <u>how</u> excavated soils will be stored prior to treatment.
Figure 5	11	This figure is pretty "busy", and probably won't have much meaning to the general public. If the Army feels that it is necessary for illustration of the proposed alternative, it is suggested that the groundwater contour lines be removed.
6.1	12	Need more discussion on treatment of water for organics. Also, was contaminated storm water included in the volume calculations? What procedures have been considered for reducing the amount of contaminated storm water during excavation?
6.2	14	What is meant by the "excavation limits" mentioned in the second paragraph? Also, what is the "debris" mentioned at the end of that same paragraph?
7	14	The title of this section ("Statutory Findings") probably will need to be changed.
Appendix A		Are all of the referenced documents in the repository?

Section	Page	Comment
Appendix B		This information is probably too technical for this document.
Appendix C		This information would probably be better incorporated into the "evaluation of alternatives" section.
Appendix D		This information is probably too technical for this document.

009348

August 26, 1994

Engineering Division

Ms. Lisa Price
Superfund Enforcement
U.S. Environmental Protection Agency
1445 Ross Avenue
Dallas, Texas 75202

Dear Ms. Price:

Enclosed are two copies of the Final Work Plan Addendum of the Longhorn Army Ammunition Plant Soil and Groundwater Background Concentration Study Phase I Investigation of 125 Waste Process Sumps and 20 Waste Rack Sumps.

If there are any questions, please contact Mr. David Tolbert at 903-679-2728.

Sincerely,

for Lawrence J. Sowa
Lieutenant Colonel, U.S. Army
Commanding Officer

Encls