LONGHORN ARMY AMMUNITION PLANT

KARNACK, TEXAS

ADMINISTRATIVE RECORD

VOLUME 3 of 5

1993

Bate Stamp Numbers
006306 - 006639

Prepared for:

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

1995

VOLUME 3 of 5

1993

F. **Title:** Letter - Subject: Draft Workplan For Phase I Investigations OF 125 Waste Process Sumps And 20 Waste Rack Sumps, May 1993
Attach(s): Comments - EPA Comments Of Workplan For Phase I
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, U.S. Corps Of Engineers
Author(s): Robert W. Bringman
Recipient: Lisa Marie Price, Remedial Project Manager, Superfund Texas Enforcement
Date: May 13, 1993
Bate Stamp: 006306

G. **Title:** Final Workplan - Phase I Investigations Of 125 Waste Process Sumps And 20 Waste Rack Sumps for Remedial Investigation
Soil And Groundwater Background Concentration Study
Attach(s): Chain Of Custody Field Data Forms
Group(s): 4
Site(s): LHAAP-35 Process Wastewater Sumps - Various
LHAAP-36 Explosive Waste Pads
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: June, 1993
Bate Stamp: 006307 - 006402

H. **Title:** Memorandum - Subject: Summary Data Report For Unlined Evaporation Pond / Burning Ground No. 3
Group(s): Early Interim Action At Burning Ground No. 3
Site(s): LHAAP - 18 & LHAAP - 24 Burning Ground / Washout Pond & Unlined Evaporation Pond
Location: Longhorn Army Ammunition Plant, Marshall, Texas
Agency: Department Of The Army, Longhorn Army Ammunition Plant
Author(s): Robert W. Bringman
Recipient: Distribution
Date: June 4, 1993
Bate Stamp: 006403

I. **Title:** Letter - Subject: Draft Workplan For Phase I Investigations OF 125 Waste Process Sumps And 20 Waste Rack Sumps, May 1993

VOLUME 3 of 5 (Continued)

1993

Attach(s): Comments - EPA Comments Of Workplan For Phase I
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, Remedial Project Manager, Superfund Texas Enforcement
Recipient: Lynn Muckelrath, Project Manager, Longhorn Army Ammunition Plant
Date: June 14, 1993
Bate Stamp: 006404 - 006405

J. Title: Letter - Subject: Remedial Investigation / Feasibility Study (RI / FS) Work Plan For Sumps
Attach(s): EPA Comments Of Phase I Draft Workplan
Group(s): 4
Site(s): LHAAP-35 Process Wastewater Sumps - Various
LHAAP-36 Explosive Waste Pads
Location: Longhorn Army Ammunition Plant, Marshall, Texas
Agency: Texas Water Commission
Author(s): Michael A. Moore, Texas Water Commission
Recipient: Lynn Muckelrath, Project Manager, Longhorn Army Ammunition Plant
Date: June 15, 1993
Bate Stamp: 006406 - 006409

K. Title: Letter - Subject: Additional TWC Comments On Draft RI / FS For 125 Waste Rack Sumps And 20 Waste Rack Sum,ps
Group(s): 4
Site(s): LHAAP-35 Process Wastewater Sumps - Various
LHAAP-36 Explosive Waste Pads
Location: Longhorn Army Ammunition Plant, Marshall, Texas
Agency: Texas Water Commission
Author(s): Michael A. Moore, Texas Water Commission
Recipient: Lynn Muckelrath, Project Manager, Longhorn Army Ammunition Plant
Date: June 17, 1993
Bate Stamp: 006410 - 006411

L. Title: Meeting Agenda - LHAAP Technical Review Committee Meeting, March 10, 1994
Attach(s): Attendance List
Schedule - Phase I Investigations
Group(s): All
Site(s): General

VOLUME 3 of 5 (Continued)

1993

Location: Longhorn Army Ammunition Plant, Marshall, Texas
Agency: U.S. Army
Author(s): U.S. Army Corps of Engineers, Tulsa District
Recipient: Meeting Participants
Date: June 22, 1993
Bate Stamp: 006412 - 006417

M. **Title:** Letter - Subject: EPA And TWC Approval Of RI / FS Work Plan Addendum For Site 1
Group(s): 1 (Partial)
Site(s): LHAAP - 1 Inert Burning Grounds
Location: Longhorn Army Ammunition Plant, Marshall, Texas
Agency: Environmental Protection Agency
Author(s): Lisa Marie Price, Environmental Protection Agency
Recipient: Lynn Muckelrath, Longhorn Army Ammunition Plant
Date: August 18, 1993
Bate Stamp: 006418

N. **Title:** Letter - Subject: Draft Work Plan For Additional Investigation At Unlined Evaporation Pond / Burning Ground No. 3
Group(s): Early Interim Action At Burning Ground No. 3
Site(s): LHAAP-18 & LHAAP-24 Burning Ground / Washout Pond & Unlined Evaporation Pond
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 31, 1993
Bate Stamp: 006419

O. **Title:** Final Workplan - Phase I Remedial Investigation / Feasibility Study (RI / FS) Work Plan Addendum
Group(s): 1
Site(s): LHAAP-1 Inert Burning Grounds
Location: Longhorn Army Ammunition Plant, Marshall, Texas
Company: Roy F. Weston, Inc.
Author(s): Roy F. Weston, Inc.
Recipient: U.S. Corps Of Engineers, Tulsa District
Date: September, 1993
Bate Stamp: 006420 - 006639

Note: 006640 - 006666 Used in Volume 5 of 1989, J.

DEPARTMENT OF THE ARMY
LONGHORN/LOUISIANA ARMY AMMUNITION PLANTS
MARSHALL, TEXAS 75671-1059

RECEIVED
EPA REGION VI
1993 MAY 14 AM 8 AUG 13 1993
SUPERFUND BRANCH

00630

006306

REPLY TO
ATTENTION OF

SMCLO-EV (200-1a)

Subject: Sump Inventory Final Report and Sump Draft Workplan

Environmental Protection Agency
ATTN: Lisa M. Price (6H-ET)
1445 Ross Avenue
Dallas, Texas 752021-3087

Dear Ms. Price:

Enclosed are two copies of subject report and workplan for your review.

If you have any comments regarding this report, please provide them to Mr. Lynn Muckelrath, SMCLO-EV, (903)679-2980 by May 31, 1993, so that the workplan can be finalized.

Sincerely,

R Bringman

Robert W. Bringman
Lieutenant Colonel, U. S. Army
Commanding Officer

Enclosure

CF: w/o encl: CESWT-PP-EP (Hunter Davidson)

006307

LONGHORN ARMY AMMUNITION PLANT
PHASE I INVESTIGATIONS OF 125 WASTE PROCESS SUMPS
AND 20 WASTE RACK SUMPS

FINAL WORK PLAN

Prepared For:
Longhorn Army Ammunition Plant
Karnack, Texas

Prepared By:
U.S. Army Corps of Engineers
Tulsa District

JUNE 1993

006308

LONGHORN ARMY AMMUNITION PLANT
PHASE I INVESTIGATIONS OF 125 WASTE PROCESS SUMPS
AND 20 WASTE RACK SUMPS

TABLE OF CONTENTS

1. Introduction.

This work plan presents the scope of Phase I investigation activities required to characterize possible contamination at 125 waste process sumps and 20 waste rack sumps at the Longhorn Army Ammunition Plant. The scope of Phase I of this project is to determine if contamination exists immediately around the active and inactive sumps and corresponding drain lines which extend from the buildings out to the sumps. Future Phase II investigations will likely be needed to delineate the full extent of any contamination, if contamination is discovered in the soils near the sumps and drain lines. The ultimate goal of these investigations is to provide data which can be used to remediate the sites, if necessary. Activities for the Phase I investigation will include drilling of shallow borings and chemical testing of soil. In addition, samples of the bottom sludges will be taken from the inside of the inactive sumps. Each separate liquid phase in the inactive sumps will be sampled also. Proposed sampling methods and sampling frequency are presented in this workplan along with a discussion of how the data will be interpreted and reported. The Chemical Data Acquisition Plan (CDAP) is included as Appendix A and the Site Specific Health and Safety Plan (HSP) is included as Appendix B.

1.1 Previous Investigations. In 1992, BCM Engineers, Planners, Scientists and Laboratory Services was retained by the Thiokol Corporation to evaluate the integrity of the sumps system and the waste water treatment system at Longhorn. During the evaluation 24 soil samples were taken at 12 randomly selected sump sites. In addition, 1 background soil sample was taken. Results of the sampling indicated that all of the 12 sumps had significant contamination in the soil immediately around them (BCM, 1992). In 1993 the U.S. Army Corps of Engineers conducted an inventory of all of the existing active, in-active and closed sumps located at Longhorn. The inventory identified the numbers, locations, historical data, operational status, structural dimensions, characteristics and potential contaminants of the sumps. The inventory identified the presence of 125 process waste sumps distributed among 76 building/locations. In addition, 20 sumps associated with process waste racks were also identified (USACE, 1993).

1.2 Regulatory Authorities. The work to be performed under this work plan is intended to fulfill the Phase I site investigations requirements of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Section 129 Federal Facility Agreement (FFA) entered into by the U.S. Environmental Protection Agency (EPA), The Texas Water Commission (TWC), and Longhorn Army Ammunition Plant on 30 December 1991.

2. Phase I Field Work Plan.

2.1 Description of Field Work.

The field work will consist of drilling 2 shallow borings at each sump site in which the sump volume is greater than 1000 gallons. One boring will be drilled at sump sites where the sump volume is less than 1000 gallons. The depth of the borings will be site dependent and will be drilled to the top of the saturated zone. In addition, soil borings will be completed along the sump drain lines which extend from the edge or corner of the building out to the sump at a maximum spacing of approximately 50 feet or where there is a sharp bend, intersection or location where a leak is suspected. All borings along the drain lines will be drilled to a depth of 2 feet or just below the bottom of the drain line if their depth is greater that 2 feet. Soil samples will be collected at 6-inches below the top of ground, at the depth at which the bottom of the sump is located, and at the top of the saturated zone. If obvious contamination is noted at any depth in the boring, a sample will be taken from that interval and substituted for another sample. One soil sample will be taken in the borings along the drain lines. Soil samples will be analyzed for volatile organics, semi-volatile organics, and 18 total metals. Selected soil samples will be analyzed for high explosives in areas where sumps and drain lines may have contained wastes contaminated with high explosives. Where isophorone diisocyanate (IPDI) has been used, soil samples will additionally be sampled for cyanide. At the locations where petroleum products have been used and at the vehicle wash rack, samples will additionally be sampled for total petroleum hydrocarbons.

A total of 12 background borings will be drilled and sampled in uncontaminated areas across the plant. Samples in the background borings will be taken in lithologies that are similar to the lithologies noted during the drilling at the sump sites. Samples will also be taken at similar depths as those taken at the sump sites assuming the lithologies are comparable. Background samples will be tested for 18 total metals, cyanide, volatile organics and semi-volatile organics.

Field activities will require the use of a hand auger, or similar hand tools, and a drilling rig with augers and splitspoons.

In inactive sumps, a sludge sample and sample of each liquid phase will be taken from the sump and analyzed for volatile organics, semi-volatile organics, and 18 total metals. Where sumps may have contained high explosives, petroleum products or IPDI, high explosives, total petroleum hydrocarbons and/or cyanide, as appropriate, will be analyzed.

Supporting activities will include procuring sample supplies and materials, and surveying boring and well locations and elevations. All field work will be conducted in accordance with the site specific CDAP (Appendix A) and the HSP (Appendix B).

2.1.1. Access Permits. Permits for drilling will be obtained under agreement by the Longhorn Army Ammunition Plant

Environmental Division. The Longhorn Army Ammunition Plant Safety Office will be contacted for guidance when sampling at sites where IPDI is being used or where access is restricted due to ongoing active processing.

2.1.2. Procurement. Appropriate materials will be ordered and support contracts obtained as soon as funding is received. Materials include sampling materials and personal protective clothing. Support contracts which may be procured include contracts for on-site waste storage and surveying.

2.1.3. Soil and Sludge Sampling. Procedures set forth in the CDAP (Appendix A) HSP (Appendix B) will be followed for the soil and sludge sampling. Three soil samples will be collected for chemical testing from each boring location adjacent to the sumps. One soil sample will be collected in borings located along the sump drain lines. Samples will be collected using a splitspoon or similar stainless steel sampling device. In boring locations where it is prohibitive to use a drilling rig, soil samples will be taken using hand augers or other appropriate hand sampling devices. Care will be taken so that minimal disturbance to the sample occurs when hand sampling devices are used. Borings will be located as close to the sumps and drain lines as possible. Locations will be based on the topographic characteristics of the surface and the condition of the sumps and drain lines. An undetermined number of borings will be required along the sump drain lines. Borings will be placed at a maximum distance of every 50 feet along the drain lines. Additional borings will be placed at points along the drain line where sharp bends or possible leaks are suspected. Locations of all completed borings will be plotted by hand onto a site sketch map which will include measurements in reference to a nearby landmark (i.e. building).

All borings, once completed, will be pressure grouted to the surface using a portland cement grout consisting of 5% bentonite.

A geologic log will be made for each boring. Logs will be completed on an ENG1836 form. Drill logs shall subscribe to the following requirements: (1) Logs shall be prepared in the field, as borings are drilled, by a qualified drilling and sampling inspector. (2) Borehole depth information shall be from direct measurements (3) All relevant information blanks in the log heading and log body shall be completed. If surveyed horizontal control is not available at the time of drilling, location sketches referenced by measured distances or prominent surface features, shall be shown on, or attached to the log. (4) Each and every material type encountered shall be described in column c of the log form. (5) Unconsolidated materials shall be described using the descriptive Unified Soil Classification System (USCS) which shall include consistency of cohesive materials or apparent density of non-cohesive materials; moisture content assessment, e.g., moist, wet, saturated, etc.; color; and other descriptive features (bedding characteristics, organic materials, macrostructure of fine-grained soils; e.g., root holes, fractures, etc.). (6) Stratigraphic/lithologic changes shall be identified in column c by a solid horizontal line at the appropriate scale depth on the log which corresponds to measured borehole depths at which changes occur. (7) Logs shall clearly show in columns e and f, the depth intervals from which all samples are retained. (8) Logs shall identify the depth at which water is first encountered, the depth to water at the completion of drilling and the stabilized depth to water. The absence of water in borings shall also be indicated. Stabilized water level data shall include time allowed for levels to stabilize. (9) Logs shall show borehole and sample diameters and depths at which drilling or sampling methods or equipment change. (10) Logs shall show total depth of penetration and sampling. (11) Any special drilling or sampling problems shall be recorded on logs, including descriptions of problem resolutions.

Soil samples will be analyzed for volatile organics, semi-volatile organics, and 18 total metals. Selected soil samples will be tested for high explosives in areas where sumps and drain lines may have contained wastes contaminated with high explosives. Where isophorone diisocynate (IPDI) has been used, soil samples will additionally be sampled for cyanide. At the locations where petroleum products had been used and at the vehicle wash rack, samples will additionally be sampled for total petroleum hydrocarbons.

One sludge sample and one sample of each separate liquid phase from each inactive sump will also be taken. The samples will be taken so as to obtain a sample with a minimal amount of disturbance. Sludge and liquid samples will be analyzed for volatile organics, semi-volatile organics, and 18 total metals. Selected sludge samples will be tested for high explosives in areas where sumps and drain lines may have contained wastes contaminated with high explosives. In addition, where isophorone diisocynate (IPDI) has been used, sludge and liquid samples will additionally be sampled for cyanide. Where sumps may have contained petroleum products, total petroleum hydrocarbons will be analyzed. Sludge and liquid sampling will be done in accordance with the CDAP in Appendix A.

2.1.4. Surveys. Locations of soil borings will be determined by conventional surveys to determine the elevation of the top of the ground surface and the horizontal state plane coordinates of the boring.

2.1.5. Investigation Derived Wastes. Drill cuttings and will be stored on site in areas designated by the Long Horn Army Ammunition Plant Environmental Coordinator. Soil wastes will be stored in covered 55 gallon drums and will be segregated by sump sites. Water wastes will be stored in 55 gallon liquid waste drums. All drums will be labeled clearly using paint with the boring number(s), sump number, date, depths from where the soil was taken, and a unique inventory number. Results of the totals analysis for the borings will be used to determine if the waste stored in the drums is hazardous. Disposal of the investigation derived wastes will be accomplished following all applicable state and federal regulations.

2.1.6 Equipment Decontamination. All equipment used for drilling and soil sampling which is placed down-hole will be decontaminated using a high pressure washer prior to drilling each boring. In addition, prior to taking each sample, the sampling device (i.e. splitspoon etc.) will be decontaminated according to the CDAP found in appendix A. All equipment used will be decontaminated between each sump site. For purposes of decontamination, a station will be set up at a location designated by the Longhorn Army Ammunition Plant Environmental Coordinator for decontamination purposes. The decontamination station will consist of an above ground collection basin constructed to prevent decontamination fluids from escaping onto the ground. A pump will be used to pump the decontamination fluids from the collection basin to an appropriate liquid storage tank. All decontamination fluids will be containerized and later tested and disposed of in accordance with applicable state and federal regulations. All water used for the decontamination will be clean potable water.

3. Sample and Data Analysis.

3.1 Sample and Data Management. Field personnel will package all samples for shipment via overnight carrier and will coordinate sample transportation and analysis with the Corps of Engineers Southwestern Division analytical laboratory.

3.2 Data Evaluation. The physical and chemical data generated during the investigations will be evaluated, interpreted, and summarized in a report. The report will include a sketch map of each sump site, a stratigraphic description of the area around the sump and a description of the chemical results. Recommendations for the Phase II studies, if necessary, will be included in the report, with the ultimate goal of implementing any necessary remedial actions. Data evaluation may involve preparation of tables and plotting of data on maps and graphs. This evaluation may include the following:

- Summarizing data in the following categories:
  - -- Soil chemical analyses results
  - -- Sludge chemical analyses results
  - -- Liquid chemical analysis results
  - -- Field survey results.
- Reducing data for a report.
- Determining any additional data needs.

The evaluation of each of these is discussed below:

- Soil Chemical Analyses Results. Chemical analyses of soil samples from localized areas will be used to help evaluate the potential sources and nature of contamination if it exists.

- Sludge Chemical Analyses Results. The chemical analyses results for the sludge samples will be used to evaluate the contaminants in the inactive sumps.
- Liquid Chemical Analyses Results. The chemical analyses results for the liquid samples will be used to evaluate the contaminants in the inactive sumps.
- Field Survey Results. Survey results will be used to accurately locate data points for use in the hydrogeologic and chemical contaminant interpretation. Data such as contaminant concentrations may be plotted with respect to locations utilizing the survey data.

4.0 REFERENCES.

BCM, Engineers, Planners, Scientists and Laboratory Services, Draft Final Report, Wastewater Collection and Treatment System Evaluation, Project No. 06-7959-01, February 1992.

U.S. Army Corps of Engineers, Waste Sump Inventory, Longhorn Army Ammunition Plant, Karnack, Texas, April 1993.

006321

APPENDIX A
LONGHORN AAP
CHEMICAL DATA ACQUISITION PLAN

006322

LONGHORN ARMY AMMUNITION PLANT
PHASE I INVESTIGATIONS OF 125 WASTE PROCESS SUMPS AND 20 WASTE RACK SUMPS

FINAL WORK PLAN
APPENDIX A
CHEMICAL DATA ACQUISITION PLAN

Prepared For:
Longhorn Army Ammunition Plant
Karnack, Texas

Prepared By:

U.S. ARMY CORPS OF ENGINEERS
Tulsa District

LONGHORN ARMY AMMUNITION PLANT
PHASE I INVESTIGATIONS OF 125 WASTE PROCESS SUMPS AND 20 WASTE RACK SUMPS

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

APPENDIX

Appendix I Tables

LIST OF ACRONYMS

ASTM	American Society of Testing Materials
CDAP	Chemical Data Acquisition Plan
COC	chain of custody form
DQO	data quality objective
EPA	U. S. Environmental Protection Agency
HTW	hazardous and toxic waste
QA	quality assurance
QC	quality control
MRD Lab	Corps of Engineers Missouri River Division Laboratory
NIOSH	National Institute of Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
RCRA	Resource Conservation and Recovery Act
RPD	relative percent difference
SSHP	Site Specific Health and Safety Plan
SWD Lab	Corps of Engineers Southwestern Division Laboratory
TAC	Texas Administrative Code

SECTION 1.0
INTRODUCTION

1.1 General. The purpose of this Chemical Data Acquisition Plan (CDAP) is to document the procedures required to ensure that all data obtained from the Phase I investigative activities at the Longhorn Army Ammunition Plant sump investigation 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 Minimum Chemistry Data Reporting Requirements (Ref. 2).

1.2 Organization. This document discusses the data quality procedures and techniques to be used in the work plan for the Phase I sump investigation at Longhorn Army Ammunition Plant, Karnack, Texas. The study will be accomplished through the sampling and analysis of soil and materials from the sumps. Section 2 discusses project organization; Section 3 discusses the quality assurance objectives for this project; Section 4 discusses the procedures to be used in sampling; and Section 5 discusses sample handling and testing. Sections 6 through 9 discuss sample integrity, data reduction and validation, audits, and corrective action.

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 Tulsa and Ft. Worth District personnel.

2.1 <u>Field Personnel</u>. Field drilling operations will be conducted by drill crews from the Tulsa and Ft. Worth District Corps of Engineers. Sampling activities for both soil and sediment or other materials from the sumps will be performed by inspectors from the Tulsa District.

2.2 <u>Quality Control Personnel</u>. 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. All quality control officers will be Tulsa District employees.

2.3 <u>Quality Assurance Personnel</u>. Quality assurance will be performed by the Tulsa District, Geotechnical Branch, Chemistry and Industrial Hygiene Section. This section 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 staff from this section.

2.4 <u>Laboratory</u>. Analytical testing and quality control testing will be performed by laboratories under contract to the Corps of Engineers Southwestern Division Laboratory (SWD Lab). Quality assurance testing will also be performed by either SWD Lab or an independent laboratory under contract to 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. 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 contamination 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 investigation. Data developed during the study will be used to determine the presence and lateral and vertical extent of contamination in the soil and sump materials. The evaluation of this data will be used to characterize the site and support 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 (Cooler Receipt Form).
- Fully Executed Chain of Custody Form.
- Each analyte reported as an actual value or less than a specified quantitation limit as listed in Tables I.3 through I.6.
- Dilution factors, extraction dates, and analysis dates also reported.
- QC sample analysis for 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 5% of field samples. Standard matrix sample spiking will be required in instances where recoveries are outside laboratory acceptance limits and matrix interference is suspected. 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 for each sample analyzed for organic compounds. Acceptable recovery ranges for each class of organic compounds for both surrogates and standard matrix spikes 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/ matrix spike duplicate pairs. Acceptable ranges of precision are provided in the laboratory methods for the matrix spike/matrix spike duplicates. Precision of the analytical method, for field duplicates, is determined by calculation of a factor. The factor is expressed as simply the higher value divided by the lower value. Acceptable ranges of precision for field sample/quality control duplicates are factors of 2 for aqueous samples and 5 for soil/sediment/sludge matrices.

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:

$$C = \frac{P_1}{P_0} \times 100\%$$

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 <u>Representativeness</u>. 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. Comparability of the analytical method, for field duplicates, is determined by calculation of a factor. The factor is expressed as simply the higher value divided by the lower value. Acceptable ranges of precision for field sample/quality assurance duplicates are factors of 2 for aqueous samples and 5 for soil/sediment/sludge matrices.

3.6 <u>Sensitivity</u>. 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 represent 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 I.3 to I.6.

3.7 __Field measurements__. Field measurements will be performed to Level I standards. These will include measurements of pH, conductivity, and temperature on aqueous 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 sampling and field QA/QC.

4.1 **Sampling**. Each of the media to be sampled are discussed below. Table I.1 lists container, preservation, and handling requirements for each parameter for aqueous "low-concentration" samples. For "low-concentration" soil and sediment samples, two separate ½-liter wide-mouth jars will be used for sample collection. Quality assured containers will be used. Table I.2 lists method requirements and holding times for both soil and water samples.

4.1.1 **Soil Sampling**. Sampling of these borings will be performed by split spoon or shelby tube. Drill pipe and other equipment used below ground will be steam cleaned as discussed in Section 4.2. Locations of the samples will be determined by the field inspector based on PID measurements, visual evidence of contamination or at major changes in lithology.

4.1.1.1 **Container and Shipment Requirements**. Samples will be placed in pre-cleaned glass jars with teflon-lined caps. Each sample shall consist of 2 jars of soil. The samples will be taken as described in paragraph 4.1.2. The samples will be packed in ice-filled 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 4.3.

4.2.1 **Sump Contents Sampling**. Sampling of the sumps shall be by a cleaned shovel, push sampling tube, peristaltic pump, coliwassa sampler, or other means necessary to sample each phase of each material present in each of the sumps.

4.2.1.1 **Container and Shipment Requirements**. The samples will be placed in jars as described for the soil samples in paragraph 4.1.1.1 or other containers dictated by the matrix being sampled. Containers for aqueous samples shall be as described in Table B.1. Some samples may be "medium or high-concentration" samples as defined by the SW-846 and require alternate sample container, preservative, and shipping requirements, as described in SW-846. The on-site quality control officer for each sampling crew shall be responsible for determining the appropriate concentration range of the samples. QA/QC samples for sediment or other sump contents consist of equipment blanks and replicates as discussed in Section 4.3. If aqueous contents are present and are sampled, travel blanks will also be required.

4.2 **Decontamination**.

4.2.1 **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 washing the drilling and sampling equipment at each drillsite or a common location. 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.

4.2.2 **Sampling Equipment**. 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 isopropyl alcohol, in that order, and allowed to air dry. 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.

4.3 **Field QA/QC**.

4.3.1 **Chemical Samples**. QA/QC samples for water 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 at one laboratory. QA samples are analyzed by SWD Lab or an independent laboratory to check the performance of the SWD's 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.

4.3.1.1 **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 aqueous 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. Travel blanks are not required when the only aqueous samples being shipped are equipment blanks.

4.3.1.2 **Equipment Blanks**. Equipment blanks for water or soil samples will consist of ASTM Type II water 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 samples and are analyzed for the same constituents as the associated soil or aqueous samples. The equipment blanks are not required for suspected "medium or high-concentration" samples.

4.3.1.3 <u>Replicate Samples</u>. 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 an independent lab as an audit sample (QA sample) for the primary laboratory, and the other two samples will be sent to the primary laboratory 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.

SECTION 5.0
SAMPLE HANDLING AND TESTING

5.1 <u>Sample Numbering System</u>. 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:

LHSsss-hhh-xaa-bb

LHSsss refers to the site or other unique building or drain line number being investigated at Longhorn Army Ammunition Plant. LHS (Longhorn Sump) is being used to distinguish these samples from the samples being generated as part of the Remedial Investigation /Feasibility Study (LH samples)

hhh is the boring number,

x describes the sample medium, where

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

aa is the top depth of the sample

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 replicate from the second soil sample (10-12 feet) of the second boring from Sump 833 would look like this: LHS833-002-210-QA.

5.2 <u>Preparing Samples</u>. When samples are taken in the field, they are preserved according to Table I.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 are shipped on the day they are sampled if possible.

5.3 <u>Receiving Samples</u>. 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 Cooler Receipt Form 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 and quantitation limits are given in Table I.3 through I.6. 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 Samples in the Field**. Once taken, samples 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 required. 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.

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 sampling crew, in which sampling information is recorded. It is taken to the site to record sampling data 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.

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.

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:

- Sample identification numbers cross-referenced with laboratory ID's and QC sample numbers.
- Problems with arriving samples noted on an appropriate form (Cooler Receipt Form).
- Fully executed Chain of Custody Form.
- Each analyte reported as an actual value or less than a specified quantitation limit as listed in Tables I.3 through I.6.
- Dilution factors, extraction dates, and analysis dates also reported.
- QC sample analysis for laboratory blanks, surrogate spikes, matrix spikes, laboratory duplicates, field duplicates, and field blanks.
- ASCII or DBASE format data files.

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.

006342

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 Army Ammunition sump 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 finally,the laboratory QA procedures as specified by the analytical method.

TABLE 8.1 AUDIT ELEMENTS FOR Longhorn Army Ammunition Plant Sump INVESTIGATIONS

Element	By	Frequency
laboratory site inspection	MRD Lab	at laboratory selection and then every 18 months
field inspections	COE	once during startup
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
laboratory QA summary report report	SWD Lab	one for each lab

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 whenever 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.
- Conductivity - Measurements should agree within two numbers of the last significant digit.

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 with 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 charge 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.

006344

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.

APPENDIX I

TABLES

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

PARAMETER	SIZE AND TYPE OF CONTAINER	# OF CONTAINERS	ICE	METHOD OF PRESERVATION
pH	½ pint glass	1	N	field test
conductivity	½ pint glass	1	N	field test
temperature	½ pint glass	1	N	field test
Metals	1 liter plastic	1	Y	nitric acid to pH<2
Volatiles	40 ml glass vial	3	Y	no head space, air bubbles or agitation, HCl to pH<2
Semi-Volatiles	1 liter amber glass	3	Y	none
High Explosives	1 liter amber glass	2	Y	none
Cyanide	1 liter plastic	1	Y	NaOH to pH>12
TPH	1 liter amber glass	2	Y	HCl to ph<2

Note: All soil or sediment samples shall consist of two ½-liter amber glass wide mouth jars, full, with teflon lined lids. The jars shall be kept refrigerated or iced.

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

PARAMETER	HOLDING TIMES EXTRACTION	HOLDING TIMES ANALYSIS	ANALYTICAL METHOD REFERENCE	METHOD #
Field tests				
pH	-	immediate		
conductivity	-	immediate		
temperature	-	immediate		
Metals				
Aluminum	-	6 months	SW-846	6010
Antimony	-	6 months	SW-846	7041
Arsenic	-	6 months	SW-846	7060
Barium	-	6 months	SW-846	6010
Cadmium	-	6 months	SW-846	6010
Calcium	-	6 months	SW-846	6010
Chromium	-	6 months	SW-846	6010
Cobalt	-	6 months	SW-846	6010
Copper	-	6 months	SW-846	6010
Iron	-	6 months	SW-846	7421
Lead	-	6 months	SW-846	6010
Magnesium	-	6 months	SW-846	6010
Manganese	-	6 months	SW-846	6010
Mercury	-	28 days	SW-846	7470
Potassium	-	6 months	SW-846	7610
Selenium	-	6 months	SW-846	7740
Silver	-	6 months	SW-846	6010
Strontium	-	6 months	SW-846	6010
Zinc	-	6 months	SW-846	6010
Volatiles	-	14 days	SW-846	8240
Semivolatiles				
Water	7 days	40 days	SW-846	8270
Soil	14 days	40 days	SW-846	8270
High Explosives				
Water	7 days	40 days	SW-846	8330
Soil	14 days	40 days	SW-846	8330
Cyanide	-	14 days	SW-846	9010
TPH	-	28 days	EPA-600	418.1

(1) SW-846 reference 6;
(2) EPA-600 reference 4.

TABLE I.3 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 I.4 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

TABLE I.4 (cont.) QUANTITATION LIMITS FOR SEMIVOLATILE ANALYSIS IN SOIL AND WATER BY METHOD 8270

PARAMETER	WATER (ug/l)	LOW-LEVEL SOIL/SEDIMENT (ug/kg)
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 I.5 REQUIRED QUANTITATION LIMITS FOR EXPLOSIVES IN SOIL AND WATER BY METHOD 8330

PARAMETER	WATER (ug/l)	LOW-LEVEL SOIL/SEDIMENT (ug/kg)
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

TABLE I.6 QUANTITATION LIMITS FOR OTHER ANALYSES IN SOIL AND WATER

PARAMETER	WATER (mg/l)	LOW-LEVEL SOIL/SEDIMENT (mg/kg)
METALS		
aluminum	0.10	1.0
antimony	0.03	1.0
arsenic	0.01	1.0
barium	0.02	10.0
cadmium	0.005	1.0
calcium	0.10	1.0
chromium	0.01	1.0
cobalt	0.05	1.0
copper	0.05	1.0
iron	0.05	1.0
lead	0.002	1.0
magnesium	0.10	1.0
manganese	0.10	1.0
mercury	0.002	0.1
~~nickel~~	0.05	1.0
potassium	0.10	1.0
selenium	0.01	1.0
silver	0.07	1.0
strontium	0.10	1.0
~~thallium~~	0.01	1.0
zinc	0.10	1.0
TPH	0.10	1.0
COMMON ANIONS		
cyanide	0.05	1.0

006353

APPENDIX B
SITE SPECIFIC HEALTH AND SAFETY PLAN

006354

LONGHORN ARMY AMMUNITION PLANT

WASTE PROCESS SUMPS INVESTIGATION

APRIL 1993

SITE SAFETY AND HEALTH PLAN

U.S. ARMY CORPS OF ENGINEERS
TULSA DISTRICT

006355

TABLE OF CONTENTS

1.0 PLAN APPROVAL

This Site Safety and Health Plan for waste process sump investigative activities at Longhorn Army Ammunition Plant has been prepared and approved by the following:

M. Snider Date: 4/16/93

GREG SNIDER
Project Industrial Hygienist

Yolane Hartsfield Date: 19 April 93

YOLANE HARTSFIELD
Acting Chief, HTW QA and IH Section

William B. Hull Jr Date: 19 April 93

BOB W. VANDEGRIFF
Chief, Safety and Occupational
Health Office

2.0 PURPOSE AND SCOPE

This Site Safety and Health Plan (SSHP) establishes procedures and work practices to protect Tulsa District and Fort Worth District Corps of Engineers (COE) employees from potential safety and health hazards resulting from investigative activities in support of Phase I Waste Process Sump Investigations at Longhorn Army Ammunition Plant.

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.

3.0 APPLICABILITY

This SSHP applies 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.

(a) Bob Vandegriff, Tulsa District Safety Officer
(b) Greg Snider, Project Industrial Hygienist
(c) Tracey Jordan, Project Industrial Hygienist
(d) TBD, Drill Rig Inspector, SSHO
(e) TBD, Crew Chief, Drill Rig Operator
(f) TBD, Drill Rig Inspector, SSHO
(f) TBD, Crew Chief, Drill Rig Operator
(g) TBD, Water Sampling Crew Chief

4.1 Safety Officer

* Overall responsibility for safety and health on Corps of Engineers projects.
* Oversite 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.

4.4 Drill Rig Operator, Crew Chief

* Inspect drilling equipment daily and ensure equipment is in safe operating condition.
* Suspend drilling activities and report unsafe drilling conditions to the SSHO and Core Drill Chief.
* Ensure that all drilling operations are performed in accordance with the SSHP and EM 385-1-1 requirements along with the drilling activity hazard analysis.

4.5 Water Sampling Crew Chief

* Inspect all sampling and purging equipment daily and ensure equipment is in safe operating condition.
* Serve as the SSHO during sampling operations and ensure all activities are conducted in accordance with the SSHP

and EM 385-1 along with the water sampling activity hazard analysis.

* Suspend sampling activities and report unsafe conditions to the project industrial hygienist and Geology Section Chief.

5.0 SITE LOCATION AND HISTORY

Longhorn Army Ammunition Plant (LAAP) is located in central east 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 (Figure 5-1).

LAAP is a government-owned contractor-operated (GOCO) industrial facility under the jurisdiction of the U.S. Army Armament, Munitions, and Chemical Command (AMCCOM). The Longhorn Division of Thiokol Corporation is the operating contractor. The primary mission of LAAP is to load, assemble, and pack pyrotechnic and illuminating/signal ammunition and solid propellant rocket motors. Other missions at LAAP consist of compounding pyrotechnic and propellant mixtures, accommodating receipt and shipment of containerized cargo, and the maintenance and layaway of standby facilities and equipment as they apply to mobilization planning. Static firing and elimination activities of Pershing I and II rocket motors by the United States and the former U.S.S.R. are also conducted at Longhorn as required by the Intermediate-Range Nuclear Force Treaty.

Previous activities at LAAP during the World War II era up to 1965 consisted of the production of 2,4,6-trinitrotoluene flake, photoflash ammunition and bombs, simulators, hand signals, and 40 mm tracer rounds.

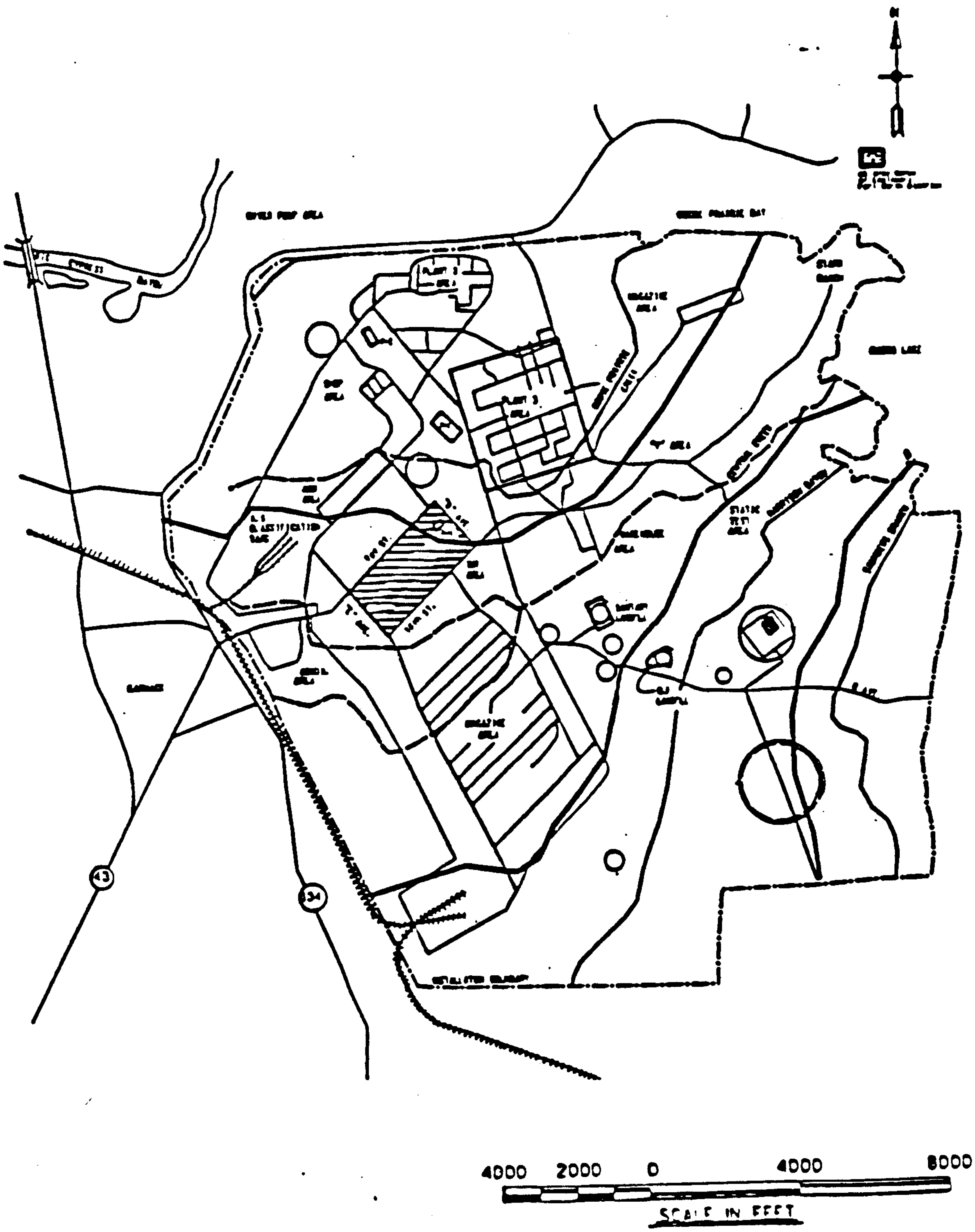
6.0 PROJECT SCOPE

Investigative activities planned in support of this project consist of drilling, by hand auger and drilling rig, 290 shallow borings around 145 waste process/waste rack sumps, and 100 shallow borings along the associated drain lines. Approximately 73 shallow monitoring wells will also be installed. Soil and groundwater samples will be taken and tested for field parameters, volatile organics, semi-volatile organics, and metals.

The process waste sumps, waste rack sumps, and drain lines are used to collect process waste runoff and rainwater runoff at active and inactive facilities throughout LHAAP. The scope of this project is to determine if the sumps have leaked contaminants into the environment.

006360

FIGURE 5-1
SITE LOCATION MAP



7.0 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 a competent person under the direction of the Project Industrial Hygienist and the Occupational Safety and Health Office 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.

Site specific training will be documented on forms included in Appendix C.

8.0 SITE WORK ZONES

8.1 Drilling and Soil Sampling Operations

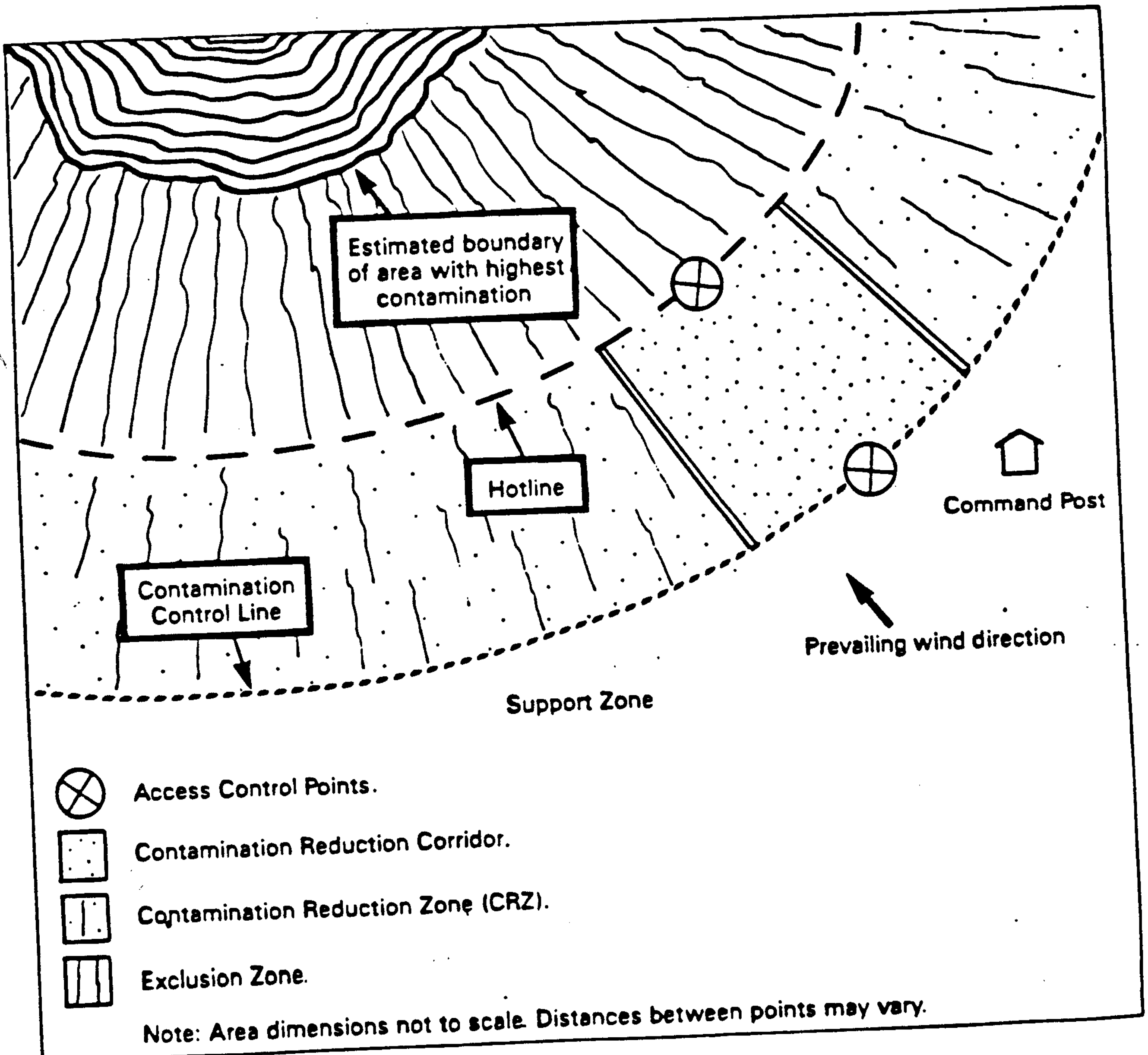
During drilling, soil sampling and associated decontamination activities the site will be formally segregated into an Exclusion Zone, Contamination Reduction Zone and a Support Zone. An illustration of site work zones is shown in Figure 8-1.

(a) Exclusion Zone. The exclusion zone shall be a 30-foot radius around the drilling rig, if space allows, formally marked with printed hazard tape. If necessary, the boundaries of the exclusion zone may be extended to prevent the spread of contaminants outside of the zone and prevent unauthorized personnel from entering the site. The exclusion zone is considered a contaminated zone, therefore, appropriate personal protective equipment is required for entry. All personnel and equipment exiting the exclusion zone must be properly decontaminated. Unauthorized personnel are not allowed within this zone.

(b) Contamination Reduction Zone. The contamination reduction zone will consist of a site specific area outside the exclusion zone serving as a buffer between the potentially contaminated exclusion zone and the non-contaminated support zone. Decontamination activities will take place in the contamination reduction zone. All authorized personnel must enter and exit the exclusion zone through the contamination reduction zone.

(c) Support Zone. The support zone is a staging area for equipment and personnel. A log will be kept in the support zone of all personnel entering and exiting the site. Access of personnel into the exclusion zone will be controlled in the support zone. The support zone is considered a non-contaminated zone.

FIGURE 8-1
SITE WORK ZONES



8.1 Water Sampling Operations

In most cases, the possibility for the spread of contaminants off the site has been diminished or eliminated when the well casing is installed. Therefore, formal segregation of the site into work zones is not necessary during water sampling operations. Chemical and equipment hazards are still present at the site, therefore, unauthorized personnel or personnel not meeting hazardous waste training requirements are not allowed at the site. If it is not possible to prevent unauthorized personnel from entering the site, then printed hazard tape shall be used to form a limited access exclusion zone.

9.0 HAZARD ANALYSIS

9.1 Chemical Hazard Evaluation

A variety of chemical hazards potentially exist at the site with primary routes of exposure through inhalation, ingestion, contact and absorption. A process waste sump inventory conducted in 1993 indicate that the most likely chemical contaminants at the site include a variety of metals (Al, Sb, Ba, B, Cr, Co, Cu, Pb, Ag, W, Zn, Zr), organic solvents (acetone, methyl ethyl ketone, methylene chloride, 1,1,1-trichlorethylene), and isophorone diisocyante. Exposure will be minimized through good work practices, proper decontamination, and the proper use of personal protective equipment. Chemical hazards will be continuously monitored at the site with appropriate air sampling techniques. A summary of potential site contaminant exposure data is summarized below.

<u>Acetone</u>

Route of Entry: Inhalation, Ingestion, Skin or eye contact
PEL: 750 ppm
TLV: 750 ppm
Ionization Potential: 9.69 eV
Hazard: Flammable, Toxic

May produce dermatitis after repeated exposure. High vapor concentrations may irritate eyes, nose and throat and cause headaches, dizziness and unconsciousness.

<u>Aluminum</u>

Route of Entry: Inhalation, Ingestion
PEL: 15 mg/m3
TLV: 10 mg/m3
Ionization Potential: N/A
Hazard: Flammable, Toxic

Inhalation of finely divided particles can cause pulmonary fibrosis. A reactive metal with greatest hazards associated with chemical reactions. Moderately flammable/explosive by heat, flame, or chemical reaction.

Antimony

Route of Entry: Inhalation, Skin or eye contact
PEL: 0.5 mg/m3
TLV: 0.5 mg/m3
Ionization Potential: N/A
Hazard: Flammable, Toxic

Poisonous by ingestion, inhalation, and intraperitoneal routes. Upon contact can cause irritation of the skin and mucous membranes.

Barium

Route of Entry: Inhalation, Ingestion, Skin or eye contact
PEL: 0.5 mg/m3
TLV: 0.5 mg/m3
Ionization Potential: N/A
Hazard: Flammable, Toxic

May cause local irritation to the eyes, nose, throat, and skin. Ingestion may cause heart rate to slow and stop. Vascular constriction and increased voluntary muscle tension.

Benzene

Route of Entry:
PEL: 1 ppm
TLV: 0.1 ppm
Ionization Potential: 9.25 eV
Hazard: Confirmed Human Carcinogen, Flammable

A human poison by inhalation and experimentally by skin contact. Confirmed human carcinogen producing leukemia, Hodgkins disease, and lymphomas. A severe eye and moderate skin irritant.

Boron

Route of Entry: Inhalation, Ingestion, Skin or eye contact
PEL: 10 mg/m3
TLV: 10 mg/m3
Ionization Potential: N/A
Hazard: Flammable, Toxic

Poisonous by ingestion. Flammable in the form of dust when exposed to air or by chemical reaction. Very unstable and reactive in the form of dust.

Chromium

Route of Entry: Inhalation, Ingestion
PEL: 1.0 mg/m3
TLV: 0.5 mg/m3
Ionization Potential: N/A
Hazard: Toxic

Exposure can cause dermatitis to exposed skin and pulmonary sensitization. Acute exposure may cause coughing, headache, dyspnea, fever, weight loss.

Cobalt

Route of Entry: Inhalation, Contact, Skin or eye contact
PEL: 0.05 mg/m3
TLV: 0.05 mg/m3
Ionization Potential: N/A
Hazard: Toxic

Poison by intravenous, intratracheal, and intraperitoneal routes. Moderately toxic by ingestion. Inhalation of dust may cause pulmonary damage. Dermatitis may be caused by contact.

Copper

Route of Entry: Inhalation, Ingestion, Skin or eye contact
PEL: 1.0 mg/m3
TLV: 1.0 mg/m3
Ionization Potential: N/A
Hazard: Toxic

Copper may act as an irritant to skin causing itching, erythema, and dermatitis. Contact with the eye may cause conjunctivitis and ulceration and turbidity of the cornea. Contact with skin may cause keratinization. Irritation of the upper respiratory tract results from inhalation. Extreme nausea and gastric pain may result from ingestion.

Isophorone Diisocyanate

Route of Exposure: Inhalation, Ingestion, Absorption, Skin or eye contact
PEL: 0.005 ppm
TLV: 0.005 ppm (skin)
Ionization Potential: Unknown
Hazard: Toxic

Poisonous if inhaled, ingested or absorbed through skin. A severe irritant to the eyes, skin and mucous membranes causing burns.

Lead

Route of Entry: Inhalation, Ingestion, Skin or eye contact
PEL: .05 mg/m3
TLV: .15 mg/m3
Ionization Potential: N/A
Hazard: Toxic

Inhalation or ingestion may cause headache, weakness, irritability, aching muscles, constipation, anorexia, abdominal pains, anemia, high blood pressure, fine tremors.

Methylene Chloride (Dichloromethane)

Route of Entry: Inhalation, Ingestion, Skin or eye contact
PEL: 25 ppm
TLV: 50 ppm
Ionization Potential: 11.32 eV
Hazard: Suspected Human Carcinogen, Toxic

Methyl Ethyl Ketone

Route of Entry: Inhalation, Ingestion, Skin or eye contact
PEL: 200 ppm
TLV: 200 ppm
Ionization Potential: 9.53
Hazard: Toxic

Moderately toxic by ingestion, skin contact, and intraperitoneal routes. Inhalation may cause systemic effects, conjunctiva, nose and throat irritation.

Silver

Route of Entry: Inhalation, Ingestion, Skin or eye contact
PEL: 0.01 mg/m3
TLV: 0.01 mg/m3
Ionization Potential: N/A
Hazard: Toxic

Local contact with metallic silver can cause skin discoloration. Solutions of silver may be highly corrosive to the skin, eyes, and intestinal tract. All forms of silver are cumulative in body tissue.

1,1,1-Trichloroethylene

Route of Entry: Inhalation, Ingestion, Skin or eye contact
PEL: 50 ppm
TLV: 50 ppm
Ionization Potential: 9.45 eV
Hazard: Toxic

Poisonous by intravenous and subcutaneous routes. Moderately toxic by ingestion, inhalation and intraperitoneal routes. A severe eye and skin irritant. Severe headaches and drowsiness after prolonged inhalation to moderate concentrations.

Tungsten

Route of Entry: Inhalation, Ingestion, Skin or eye contact
PEL: 5 mg/m3
TLV: 5 mg/m3
Ionization Potential: N/A
Hazard: Flammable, Toxic

A skin and eye irritant. Flammable in the form of dust when exposed to flame. May ignite in air or by chemical reaction with oxidants. Mildly toxic.

Zinc

Route of Entry: Inhalation, Ingestion, Skin or eye contact
PEL: 1.0 mg/m3
TLV: 1.0 mg/m3
Ionization Potential: N/A
Hazard: Toxic

Zinc may be corrosive to the skin and mucous membranes. Contact with eyes may cause inflammation, swelling, and corneal ulceration. May produce skin sensitization and dermatitis. Ingestion may produce corrosive effects to the esophagus and stomach. Inhalation may produce metal fume fever resulting in a metallic taste in the mouth, cough, shortness of breath, fatigue and muscle pain.

9.2 Physical Hazard Evaluation

Work activities associated with environmental investigations create inherent physical and safety hazards. These hazards will be reduced by conforming to applicable OSHA and COE safety requirements along with worker experience and good judgement. Activity hazard analysis for drilling and water sampling operations are presented in Appendix D. Standard Operating Procedures for temperature stress, confined space entry, and severe weather are included in Appendix B.

9.2.1 Noise

Noise level surveys have shown to be in excess of 85 dB(A) when drilling at increased RPM levels. Auguring operations have not shown to produce noise levels in excess of 85 dB(A). Random noise level measurements will be taken during drilling operations to determine if hearing protection is required. Hearing protection is not required during auguring operations, however, it is recommended in order to reduce long term cumulative hearing loss.

Purging operations using portable generators and QED driver units have shown to produce noise levels well in excess of 85 dB(A), therefore, hearing protection is mandatory for all personnel. Hearing protection will not be necessary when purging with disposable bailers.

10.0 PERSONAL PROTECTIVE EQUIPMENT

In order to minimize bodily contact with hazardous substances identified at the site, during drilling, soil sampling and water sampling activities, the following personal protective equipment requirements shall be used by all site personnel entering the exclusion zone. If site conditions change or action levels are exceeded, levels of protection will be upgraded to ensure worker protection.

Drilling and Soil Sampling

- Tyvek disposable or cotton coveralls
- Disposable cotton work gloves (outer)
- Disposable chemical resistant gloves (inner)
- Steel toe safety work boots
- Chemical resistant neoprene work boots or boot covers (as necessary)
- Hard hat
- Hearing protection (as necessary)
- Safety glasses

Water Sampling

- Disposable chemical resistant gloves
- Steel toe safety work boots
- Safety glasses
- Hearing protection
- Full face shield of protective goggles (preservation activities)

10.1 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.

Respiratory use is not authorized without prior consent of the Project Industrial Hygienist or the Safety and Occupational Health Office.

11.0 AIR MONITORING

11.1 Drilling and Soil Sampling Operations

(a) A photoionization detector (PID) will be used to monitor employee exposure (breathing zone) to ionizable compounds at intervals not to exceed 30 minutes. Soil cuttings will be screened randomly to access the amount of contamination present.

(b) A combustible gas/oxygen meter will be used to monitor concentrations of combustible gases and oxygen continuously during drilling operations.

(c) 3M 3500 organic vapor monitors will be used randomly throughout the project, as determined by the project industrial hygienist, to quantify worker exposure to organic compounds. Analysis will be specifically performed for methylene chloride.

(d) Integrated air pump sampling will be performed randomly throughout the project, as determined by the project industrial hygienist, to determine exposure to isocyante compounds. Analysis will be performed for isophorone diisocyante.

11.2 Water Sampling Operations

Air monitoring requirements for water sampling operations will be determined by the project industrial hygienist based upon air monitoring results generated during drilling operations.

12.0 ACTION LEVELS

A summary of breathing zone action levels for potential site contaminants is listed in Table 12-1.

(a) A value of 10 PID units above background in the workers breathing zone will require the site to be evacuated and termination of work operations. After 15-30 minutes the SSHO will take additional readings. If a value of 5-10 PID units above background is still present in the workers breathing zone the SSHO shall contact the Project Industrial Hygienist for recommended actions and necessary personal protective equipment upgrades.

(b) Combustible gas/oxygen. Alarms on the combustible gas/oxygen meter will be set at 10% of the lower explosive limit (LEL) and <19.5% and >23% oxygen. Should the alarms activate,

006370

work operations will be terminated and the SSHO shall notify the Project Industrial Hygienist for recommended actions.

(c) Action levels for specific chemicals will be set at one half of the OSHA PEL or ACGIH TLV, whichever is lower. Workers will be notified of industrial hygiene sampling results as available.

TABLE 12-1
ACTION LEVELS BASED ON BREATHING ZONE MEASUREMENTS

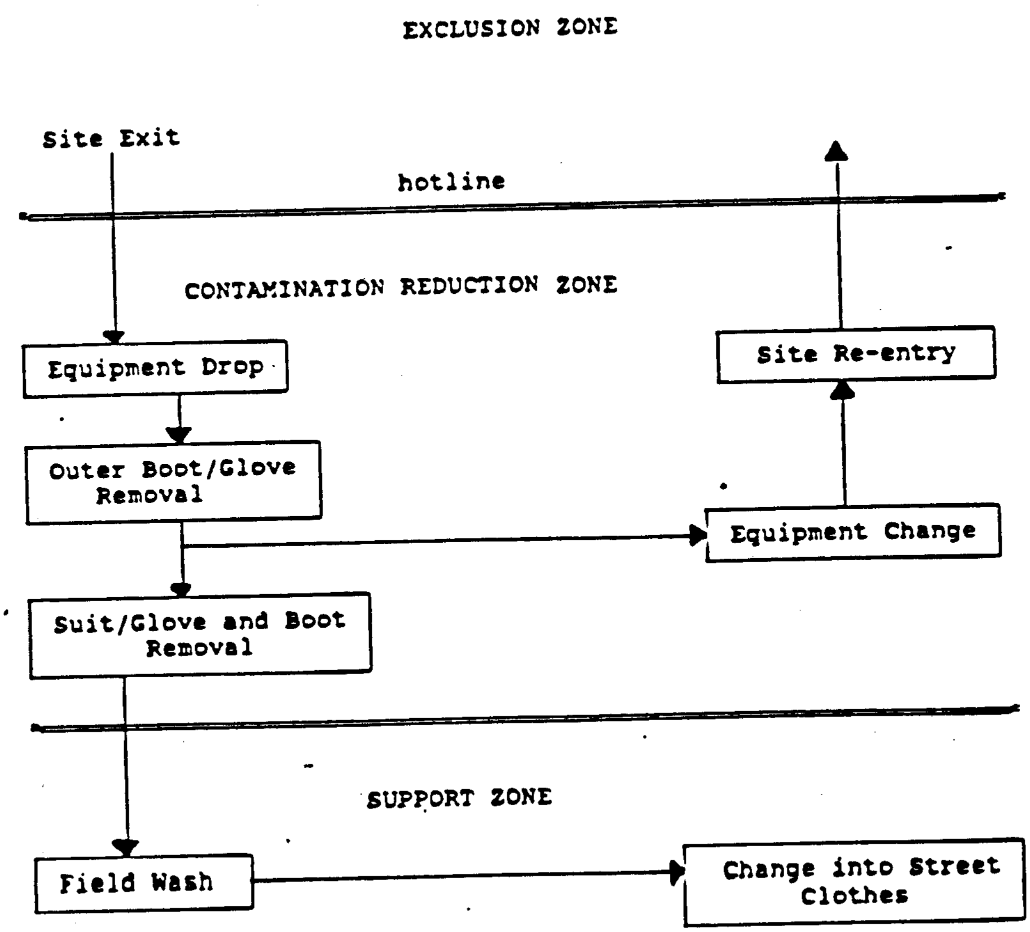
CONTAMINANT	INSTRUMENT	ACTION LEVEL	ACTION
Organic Vapors	HNU PI-101	0-5 PID	Continue work.
		5-10 PID	Monitor worker breathing zone with detector tubes.
		>10 PID	Evacuate exclusion zone, terminate work operations, notify Project Industrial Hygienist.
Combustible Gases	Industrial Scientific HMX-271	<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.

13.0 DECONTAMINATION

(a) Personnel. Decontamination activities for personnel will consist of disposal of Tyvek coveralls and gloves into trash bags, and placing cotton coveralls in laundry bags, upon exit of the exclusion zone. If grossly contaminated liquids are present at the site requiring the use of chemical resistant boots or boot covers, each individual exiting the exclusion zone must go through formal decontamination station boot wash procedures as outlined in Figure 13-1.

(b) Equipment. All equipment contacting contaminated soils or groundwater will be thoroughly steam cleaned upon exit of the exclusion zone. If authorization is obtained from base and regulatory personnel, equipment decontamination may take place at a central decontamination facility.

FIGURE 13-1
LEVEL D DECONTAMINATION PROCEDURES



14.0 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. The Tulsa District Medical Surveillance Program is managed by the Safety and Occupational Health Office.

15.0 EMERGENCY RESPONSE

Phone numbers for emergency response are listed below. An emergency response plan is included in Appendix A. An emergency medical evacuation route map to Marshall, TX Memorial Hospital is provided as Figure 15-1.

- Marshall Memorial Hospital	(903) 935-8745
- Ambulance Service	(903) 938-6711
- Marshall Police	(903) 935-7831
- Marshall Fire Department	(903) 938-6711
- LAAP Fire Department	(903) 679-2315
- LAAP Ambulance	(903) 679-2315
- LAAP Security	(903) 679-2327
- Poison Control Center	1-800-822-9761

COE SAFETY AND OCCUPATIONAL HEALTH OFFICE

Bob Vandegriff (918) 581-7316

COE QUALITY ASSURANCE AND INDUSTRIAL HYGIENE

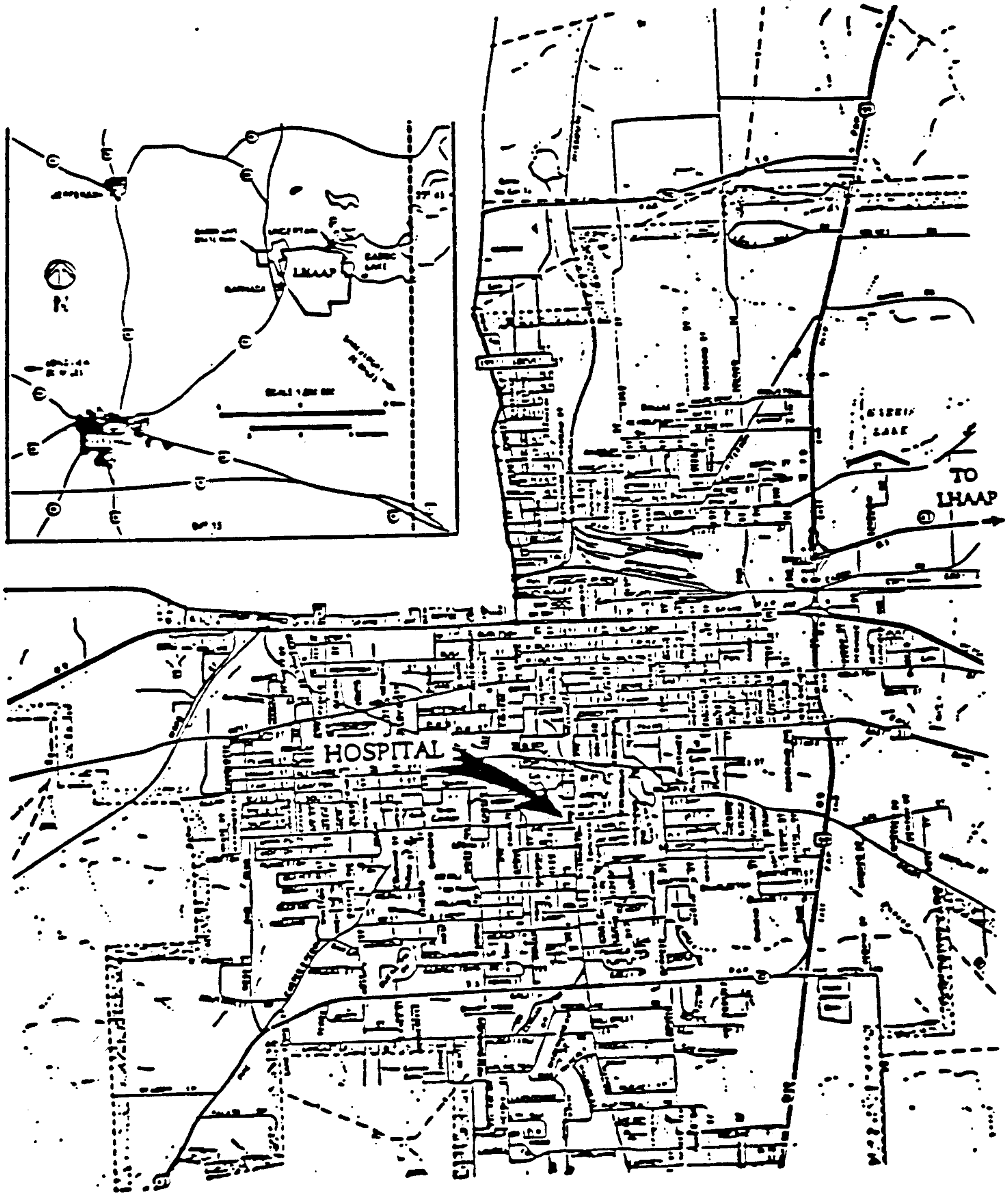
Greg Snider (918) 581-6101

COE INVESTIGATIONS SECTION

Buddy Collins (918) 581-7382

006373

FIGURE 15-1
EMERGENCY MEDICAL EVACUATION ROUTE MAP



006374

16.0 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 unrestricted 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) 581-6742
Greg Snider Tracey Jordan	COE Industrial Hygienist	(918) 581-6101

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

APPENDIX B

STANDARD OPERATING PROCEDURES

STANDARD OPERATING PROCEDURE 1 - CONFINED SPACE ENTRY PROGRAM 006379

1.0 Purpose. To establish specific requirements for practices and procedures to protect employees from the hazards of entry into and work within confined spaces.

2.0 Applicability. The policy and procedures prescribed herein are applicable to all employees of the Tulsa District and apply to all missions of the District, both military and civil. Contract personnel working for the Tulsa District will be required to develop and implement a confined space entry program which at a minimum meets the requirements described within this program.

3.0 References.

(a) EM 385-1-1, Engineers Safety and Health Requirements Manual, April 1981, Revised October 1987.

(b) 29 CFR 1926.21, Occupational Safety and Health Administration, Safety Training and Education.

(c) 29 CFR 1910.146, Occupational Safety and Health Administration, Proposed Rule (5 June 1989), Permit Required Confined Spaces.

(d) 29 CFR 1910.1200, Occupational Safety and Health Administration, Hazard Communication.

(e) ANSI Z117.1-1989, American National Standard, Safety Requirements for Confined Spaces.

4.0 Definitions.

(a) Attendant/Competent Person - An individual stationed outside the confined space who is trained to monitor and observe the authorized entrants working inside the confined space.

(b) Authorized Entrant - An employee who is authorized by the employer to enter a confined space.

(c) Blanking or Blinding - The absolute closure of a pipe, line or duct, by fastening across its bore a solid plate or cap which completely covers the bore; which extends at least to the outer edge of the flange at which it is attached; and which is capable of withstanding the maximum upstream pressure.

(d) Permit Required Confined Space - Any space which is large enough and so configured that an employee can bodily enter and perform work. Confined spaces usually have limited or restricted means for entry or exit, and are not designed nor intended to be occupied by employees. A confined space has one or more of the following characteristics:

(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 All 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

006385

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

006386

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) 581-7316

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.

006391

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.

006394

APPENDIX C

SITE SPECIFIC TRAINING FORMS

SITE SPECIFIC TRAINING RECORD FORM

006395

Project: Longhorn AAP Waste Process Sump Investigations

Location: Marshall, Texas

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

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: Longhorn AAP Waste Process Sump Investigations

NAME	ORGANIZATION	SIGNATURE	DATE

006397

APPENDIX D

ACTIVITY HAZARD ANALYSIS

DRILLING ACTIVITY HAZARD ANALYSIS

Prior to the start of work, the Drill Rig Operator will inspect all drilling equipment and ensure equipment is in proper working condition and that all safety features and kill switches are functioning as designed and clearly labeled. The Drill Rig Operator is responsible for safety in all aspects involving the drilling rig and other drilling equipment.

(a) Protective Equipment. All personnel in the vicinity of the drilling rig shall, as a minimum, wear the protective equipment listed below. Additional protective equipment as described in the SSHP will be required when exposure to chemical hazards is possible.

- Hard hat
- Steel toe safety boots
- Safety glasses
- Back support belts (when lifting 15 lbs or more)
- * Hearing protection (foam inserts)

* Sound level surveys have not shown noise levels in excess of 85 dB(A) during general drilling and auguring operations. If it is necessary to shout in order to communicate, then sound levels are in excess of 85 dB(A) and hearing protection shall be used.

Activity	Hazard	Control
Rig Transport/ Setup	(1) Struck By	- All augers and pipe sections shall be secured in racks during transport. - Never move the rig with the mast upright. - Set hydraulic leveling jacks before raising the mast.
	(2) Backing	- A ground guide is required in addition to a functioning audible backup alarm during all equipment backing.
	(3) Electrical/ Utility	- Inspect for buried and overhead utilities in the vicinity of the rig. - A drilling clearance shall be obtained from base authorities or OKIE-1 before initiating drilling activities.
Pipe Handling	(1) Struck By	- Pipe stored in racks, on trailers or on flatbed trucks should be blocked to prevent shifting.

Activity	Hazard	Control
		- Pipe should be loaded and unloaded, layer by layer, with the bottom layer blocked securely at all four corners. - Be prepared for sudden movement when tailing pipe sections.
	(2) Back Strain	- Use proper lifting techniques and a back support device when manually handling pipe sections.
Hoisting Operations	(1) Struck By	- Never engage the rotary clutch until all personnel and equipment are clear. - Never leave the brake unattended when engaged. - Drill pipe or auger sections should not be picked up or dropped suddenly. - Test the brakes daily.
Catline Operations	(1) Struck By	- Do not use more wraps than necessary to pick up the load. More than one layer of wrapping is not allowed. - Personnel should not stand near, step over, or go under a cable under tension. - The cathead must be kept clear of obstructions and entanglements.
Derrick Operations	(1) Fall	- The mast should be lowered, if possible, to make repairs or to free up entangled wire rope or obstructions. - If the mast must be ascended, a proper ladder safety climbing device must be used.
	(2) Weather	- The Drill Rig Operator must be aware of weather conditions (wind, rain, lightning, etc.) and terminate drilling operations in the event of unsafe conditions.
Maintenance	(1) Equipment	- The drilling rig must be maintained in a proper functioning manner.

Activity	Hazard	Control
		- All motors must be shut off and electrical and mechanical components locked out of service when making repairs.
	(2) Fire	- All motors must be shut off during re-fueling. - Smoking in the vicinity of the drilling rig is not permitted. - A fire extinguisher must be maintained on the drilling rig at all times. - Fuel containers will not be stored within 10′ of operating equipment. - Approved safety cans will be used for all fuel storage. - A welding permit must be obtained from proper base authorities when making repairs.

WATER SAMPLING ACTIVITY HAZARD ANALYSIS

Prior to the start of work, the water sampling Team Leader will inspect all purging and sampling equipment and ensure the equipment is in a proper operating condition. The Team Leader is responsible for safety in all aspects of water sampling.

(a) Protective Equipment. All personnel engaged in water sampling activities shall, as a minimum, wear the following protective equipment.

- Steel toe safety boots
- Chemical splash goggles or face shield during sample preservation
- Chemical resistant gloves during sample preservation and sampling
- Back support belt (when lifting 15 lbs or more)
- * Hearing protection

* Sound level surveys conducted during purging operations using portable generators, compressors, and QED driver units have shown noise levels to be in excess of 85 dB(A), therefore hearing protection is required.

Activity	Hazard	Control
Mobilization/ Site Setup	(1) Struck By	- All equipment will be properly secured in trucks and on trailers during transport. - Nitrogen cylinders will be properly stored and secured in an upright position with protective caps in place.
	(2) Backing	- Ground guides will be used when backing trucks and trailers up to the well casing.
	(3) Back Strain	- Portable generators, compressors, air cylinders and the Bennett System will be loaded, and unloaded, by a minimum of two crew members. - Proper lifting techniques and back support devices will be used when lifting equipment.
Sample Preservation	(1) Fire	- Sample preservation chemicals will not be stored within 10' of operating equipment. - Sample preservation chemicals will be stored in

Activity	Hazard	Control
		containers designed and approved for this purpose.
	(2) Burns	- Proper gloves, eye and face protection will be worn during sample preservation. - Sample preservation will only be performed in a well ventilated area.
Maintenance	(1) Equipment	- All purging and sampling equipment must be maintained in a proper functioning condition. - All motors must be shut off or unplugged when making repairs.
	(2) Fire	- All motors must be shut off during re-fueling. - Smoking at the site is not permitted. - A fire extinguisher must be maintained at the site at all times. - Fuel containers will not be stored within 10′ of operating equipment. - Approved safety cans will be used for all fuel storage.

DEPARTMENT OF THE ARMY
LONGHORN/LOUISIANA ARMY AMMUNITION PLANTS
MARSHALL, TEXAS 75671-1059

006403

REPLY TO ATTENTION OF

EPA received 6/4/93

SMCLO-EV (200-1a)

Subject: Summary Data Report - Unlined Evaporation Pond and Burning Ground No. 3

MEMORANDUM FOR DISTRIBUTION:

Enclosed is subject report for your review and use. The interim risk assessment is planned to be done based on this report if acceptable.

If you have any questions, regarding this report, please provide them to Mr. Lynn Muckelrath, SMCLO-EV, (903)679-2980.

ROBERT W. BRINGMAN
LTC, OD
Commanding

DISTRIBUTION:

Lisa Price - EPA Region VI
Michael Moore - Texas Water Commission
Cyril Onewokae - AMSMC-EQE
Karen Wilson - U.S. AEC

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

006404

JUN 14 1993

CERTIFIED MAIL: RETURN RECEIPT REQUESTED

Lynn Muckelrath, Project Manager
Longhorn Army Ammunition Plant
Attn: SMCLO-EN
Marshall, Texas 75671-1059

Re: Draft Work Plan for Phase I Investigations of 125 Waste Process Sumps and 20 Waste Rack Sumps, May 1993

Dear Lynn,

Pursuant to the Federal Facilities Agreement (FFA) for the Longhorn Army Ammunition Plant, Section VIII., G., Paragraph 2., EPA is submitting comments on the Draft Work Plan for Phase I Investigations of 125 Waste Process Sumps and 20 Waste Rack Sumps date May 1993. EPA's comments are included in an enclosure to this letter. Pursuant to the FFA, a revised document should be submitted to EPA and the Texas Water Commission within 30 days.

If you have any questions this or any other matter, please contact me at (214) 655-6744.

Sincerely,

Lisa Marie Price

Lisa Marie Price
Remedial Project Manager
Superfund Texas Enforcement

Enclosure

cc: Tulsa District Corps of Engineers
P.O. Box 61
Attn: Hunter Davidson
CESWT-EC-GP
Tulsa, OK 74121-0061

Mike Moore, Superfund
Texas Water Commission
P.O. Box 13087
Capital Station
1700 N. Congress Avenue
Austin, TX 78711-3087

OPTIONAL FORM 99 (7-90)

FAX TRANSMITTAL	# of pages ▸ 2
To Hunter Davidson	From Lisa Price
Dept./Agency	Phone # 214 655 6744
Fax # 918 669 7235	Fax #

NSN 7540-01-317-7368 5099-101 GENERAL SERVICES ADMINISTRATION

June 14, 1993

006405

EPA COMMENTS ON WORK PLAN FOR PHASE I INVESTIGATIONS OF 125 WASTE PROCESS SUMPS AND 20 WASTE RACK SUMPS

Section 2.1, page 2: "*The depth of the borings will be site dependent and will be drilled to a total depth of 5 feet below the bottom of the sump or until ground water in encountered.*" My interpretation of this statement is that the boring will be drilled to a maximum of 5 below the sump, or if ground water is encountered before 5 feet below the sump, the boring will be terminated. If this is not correct, please clarify the text.

"*Two soil samples, based on field screening, will be collected from each soil boring adjacent to the sump.*" Identify what field screening techniques will be used and what will determine whether a sample is collected for analysis? At what interval(s) will the samples be taken?

"*Selected soil samples will be analyzed for high explosives in areas where sumps and drain lines...*" How many samples will be collected? Is there a minimum per sump/drain line?

Section 2.1, page 3: "*Background samples will be tested for 18 total metals and cyanide.*" Why are samples not being analyzed for organics? EPA requests that these background samples also be analyzed for volatile and semi-volatile organics.

Section 2.1.6, page 7: State that between each sump investigation, all of the equipment used will be decontaminated.

006406

TEXAS WATER COMMISSION

PROTECTING TEXANS' HEALTH AND SAFETY BY PREVENTING AND REDUCING POLLUTION

June 15, 1993

CERTIFIED MAIL

RETURN RECEIPT REQUESTED

Lynn Muckelrath, Project Manager
Longhorn Army Ammunition Plant
Attn: SMCLO-EN
Marshall, Texas 75671-1059

Re: Longhorn Army Ammunition Plant
Remedial Investigation/Feasibility Study (RI/FS) Work Plan for Sumps

Dear Mr. Muckelrath:

Texas Water Commission (TWC) staff have completed its review of the Army's work plan entitled "Phase I Investigations of 125 Waste Process Sumps and 20 Waste Rack Sumps", which we received on May 14, 1993. Our comments are enclosed.

The TWC hereby approves the work plan, providing that the recommended modifications discussed in the enclosure to this letter are incorporated in the plan. If you have any questions or comments, please contact me at (512) 908-2483.

Sincerely yours,

Michael A. Moore
RI/FS II Unit
Superfund Investigation Section
Pollution Cleanup Division

MM:

Enclosure

cc: Hunter Davidson, COE Tulsa District
Lisa Price (6H-ET), EPA Region VI
Michael Brashear, LEGAL/FO - District 5/Tyler
Mark Weegar, WASTE/IHW - Corrective Action

TWC Comments on Draft Work Plan for Longhorn Army Ammunition Plant Phase I Investigations of 125 Waste Process Sumps and 20 Waste Rack Sumps

1. It is stated in Section 2.1, Description of Field Work, that two (2) shallow borings will be completed at sump sites where the volume is greater than 1,000 gallons, and that one (1) boring will be completed at sumps with a volume that is less than 1,000 gallons. The borings will be advanced to a depth that is either five (5) feet below the bottom of the sump or until ground water is encountered. Two (2) soil samples will be collected from each boring based upon field screening and analyzed for volatile organics, semi-volatile organics and metals.

   It is recommended that the proposed procedure be modified so that samples are collected from each soil boring by compositing a sample from two (2) foot intervals that are centered on five (5) foot depth increments (i.e., 0-2 ft., 5-7 ft., 10-12 ft. etc.). Samples should also be collected at changes in lithology as well as from the zones of contamination as indicated by the field screening activities. A sample should also be collected from immediately above the saturated zone or at the total depth of the boring if ground water is not encountered; however, due to the shallow depth of ground water at LHAAP, all borings probably ought to be advanced until ground water is encountered. During drilling operations, all borings should be advanced until the vertical extent of contamination has been defined. It should be pointed out that while the use of field screening (PID meter) techniques are valid for organics, this screening tool will not detect the presence of metals or explosives. The Longhorn AAP Waste Sump Inventory, dated April 1993, indicates that many of the sumps at Longhorn may have received waste contaminated with metals.

2. The workplan states that a total of twelve (12) background borings will be drilled and sampled in uncontaminated areas across the plant. Samples will be collected from a depth of five (5) feet and ten (10) feet. Samples will be analyzed for metals and cyanide.

   In order to collect samples capable of producing data that are statistically representative of background metals, Longhorn should modify the proposed procedure so that similar lithologies are sampled at similar depths instead of simply collecting samples from an arbitrary depth interval. Upon completion of the data analysis phase, Longhorn AAP should be prepared to provide data that supports not only how background was established, but what statistical method was used to determine that the metals present do not exhibit a statistically significant increase over background. The TWC Federal Facilities Team routinely references the EPA's Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities. Interim Final Guidance document, dated April 1989, for use in making statistical determinations of background. The procedures outlined in this document are applicable to both ground water and soil.

006409

Thiokol CORPORATION
.ANCE OPERATIONS

9 June 1993

TO: Safety Manager
Environmental/Steve Flowers

FROM: Senior Facilities Projects Engineer

SUBJECT: Active Sumps

The sumps listed below are needed for current production requirements:

SUMP	BLDG	SUMP	BLDG	SUMP	BLDG
01	P-1	35	212-18	65	45-E
02	P-3	38	212-32	70	50-G
03	P-3	40	212-33	73	54-G
07	P-116	41	212-35	74	54-G
10	P-118	42	212-37	75	54-G
11	P-118	[redacted]	25-C	76	54-H
12	P-118	[redacted]	25-C	77	54-F
13	P-118	[redacted]	25-D	78	68
20	✓B-11 Afternoon	48	26-E	79	68-C
22	✓B-13	49	26-E	106	✓401
24	✓B-15	50	26-E	111	✓722-P
27	✓P-9	51	26-E	112	✓722-P
29	P-123	[redacted]	29-D	114	25-X
30	✓212-12	54	31-G	115	33-X
32	✓212-14	55	31-G	118	813 ✓
34	212-16	61	42-H	122	401-C ✓

Selected sumps are to support production of MJU-7, MJU-8, Trip Flare and Base Burner items. Cleaning and closure or disposal of other sumps is to be through a transition to care taker project at a later date (proposed for FY94 funding).

Lonnie Spunaugle

Lonnie Spunaugle

cc: Engineering Services Director
Environmental Director
Environmental/Braswell
SMCLO-EN
SMCLO-EN-EV ✓

P.O. Box 1029, Marshall, TX 75671 (903) 679-3181

TOTAL

006410

TEXAS WATER COMMISSION

PROTECTING TEXANS' HEALTH AND SAFETY BY PREVENTING AND REDUCING POLLUTION

June 17, 1993

CERTIFIED MAIL

RETURN RECEIPT REQUESTED

Lynn Muckelrath, Project Manager
Longhorn Army Ammunition Plant
Attn: SMCLO-EN
Marshall, Texas 75671-1059

Re: Longhorn Army Ammunition Plant
Remedial Investigation/Feasibility Study (RI/FS) Work Plan for Sumps

Dear Mr. Muckelrath:

In accordance with the agreement reached during our telephone conference this morning, the Texas Water Commission (TWC) hereby approves the following amended modifications to the subject work plan:

1. Borings will be drilled into the uppermost saturated zone or to five (5) feet below the bottom of each sump, whichever is greater.

2. Discrete samples, versus composited samples, will be collected from each sampling point.

3. Minimum sampling requirements for each boring are:

   a. If the uppermost saturated zone is encountered less than five (<5) feet below the bottom of the sump (including situations in which the uppermost saturated zone is encountered above the bottom of the sump), samples will be collected from six (6) inches beneath the ground surface and from the top of the uppermost saturated zone.

   b. If the uppermost saturated zone is encountered greater that five (>5) feet below the bottom of the sump, samples will be collected from six (6) inches beneath the ground surface, from a point even with the bottom of the sump, and from the top of the uppermost saturated zone.

c. If an area of obvious contamination is encountered as determined by any of the field screening methods (*e.g.*, PID reading, odor, color, major change in lithology, etc.), a sample of the contaminated soil shall be collected. If the area of obvious contamination is within five (5) feet of a sample interval as described in 3. a. or 3. b. above, then this sample may be substituted for the sampling point as described in 3. a. or 3. b.

During our teleconference, we also discussed the possibility of revising the overall scope of work regarding the sumps to the effect that any sump which is not identified by Thiokol Corp. to be retrofitted for future use will be removed, and additional remediation requirements will be determined from the results of verification samples collected from the excavations. Since this approach would probably be considered remediation under CERCLA (which would require issuance of a ROD), it was agreed that the subject would be brought up at next week's project managers' meeting so that the EPA project manager could be involved in the discussion. If you have any additional questions or comments, please contact me at (512) 908-2483.

Sincerely yours,

Michael A. Moore

Michael A. Moore
RI/FS II Unit
Superfund Investigation Section
Pollution Cleanup Division

MM:

cc: Hunter Davidson, COE Tulsa District
Lisa Price (6H-ET), EPA Region VI
Michael Brashear, LEGAL/FO - District 5/Tyler
Mark Weegar, WASTE/IHW - Corrective Action

LONGHORN ARMY AMMUNITION PLANT
MEETING AGENDA

MEETING: TECHNICAL REVIEW COMMITTEE (TRC) & PROGRAM MANAGERS

LOCATION: LONGHORN ARMY AMMUNITION PLANT
MARSHALL , TEXAS BLDG. 703

DATE / TIME: JUNE 22, 1993 9:00 AM - LHAAP

SIGN IN: AT ENTRANCE OF LHAAP THERE IS A GATE HOUSE WHERE YOU SIGN IN. THE GUARD WILL ISSUE A TEMPORARY BADGE. IF YOU BRING A CAMERA PLEASE REQUEST A CAMERA PERMIT.

AGENDA

I. COMMENTS & STATUS.- R. I.
   A. STATUS OF CURRENT FIELD INVESTIGATIONS.
   B. STATUS OF SUMP PROJECT.

II. INTERIM REMEDIAL ACTION - STATUS

006413

TRC Meeting
22 June 1993

Bill Sniffen	Thiokol Corp	(318) 459-5633
JERALD BROUGHTON	ENAEC/CEWES	601-634-3328
Clinton Word	Corps of Eng	918-669-7044
Chris Roddam	Thiokol Corp.	(903) 679-2219
Scott Weber	Corps/Southwestern Div, Dallas	214/767-2406
Hunter Davidson	Corps of Engrs/Tulsa Dist.	918-669-7553
IRA NATHAN	ACO	903-679-2613
Lisa Marie Price	EPA	214 655 67~~44~~
Pamela Jones	Metcalf & Eddy	713-690-2585
Michael Moore	TWC-Superfund	512-908-2483
Doyle Williams	ARMY-ENVIRONMENTAL LA. ARMY AMMO. PLANT	(318) 459-5708
Karen Wilson	Army Environmental Center	(410) 671-1542
Jim MARTELL	CORPS OF ENGINEERS/TULSA	(918) 669-7171
George Hall	" " "	918-669-7169
LYNN MUCKELRATH	ACO - LHAAP-EN/EV	903-679-2980
Mark A. Weegar	TWC-Federal Facilities	(512) 908-2366

006414

LONGHORN ARMY AMMUNITION PLANT
145 WASTE PROCESS/WASTE RACK SUMPS
PHASE I INVESTIGATIONS

SCHEDULE

ITEM	SCHEDULED DATE
Start Drilling and Soil Sampling	23 June 1993
Finish Drilling	24 August 1993
Start Sampling Inactive Sump Contents	23 August 1993
Finish Sampling Inactive Sump Contents	13 September 1993
Draft Report Complete	18 October 1993
Final Report Complete	5 November 1993

07-08-1993 11:23AM FRO' TO 50942712146556460 P.01

TELEFAX HEADING SHEET

006415

TO: NAME: LISA M. PRICE

ORGANIZATION: EPA

VOICE TELEPHONE: 214-655-6744 TELECOPIER#: 6460

DTG: 8 July 93 CLASSIFICATION: u

NOTES: ① RI on sumps by C.O.E. - current schedule 7-13 July
DRILLING RESUMES ON 20 July THRU 27 July

② TRC minutes on meeting at LONGHORN on 22 June 93

FROM: **LONGHORN/LOUISIANA ARMY AMMUNITION PLANTS**
MARSHALL, TEXAS 75671-1059

NAME: LYNN MUCKELRATH

ORGANIZATION: SMCLO-EN/EV TELEPHONE: DSN 566-2980
903-679-2980

2 PAGES ARE BEING TRANSMITTED (NOT INCLUDING THIS COVER PAGE).
FAX EXT. 2089

TECHNICAL REVIEW COMMITTEE

for

LONGHORN ARMY AMMUNITION PLANT (LHAAP)

JUNE 22, 1993

Lynn Muckelrath called the meeting to order at 9:00 AM and welcomed everyone. He summarized the RI/FS efforts to date. Ebasco and Sverdrup have both completed their field work at LHAAP. Weston will do the work on the addendum work at site one (1) this fall. Weston will also do the screening of alternatives for all sites.

RI SUMPS

Jim Martell of the Corps of Engineers will mobilize this week to start the sump investigation at LHAAP. The sumps that may be needed for production will be investigated first. Until the operating contractor (Thiokol Corp.) obtains actual contacts for production the specific sumps needed for production cannot be determined. The current plans are to close all sumps as RCRA or hazardous waste units. Inactive sumps will be removed if their disposal can be carried out within the regulations. If this is done them the sump will be pulled, the hole sampled , and filled in with soil until the analysis is available for a final decision.

There is money available to upgrade the sumps that will remain in production. No actual work will be done on the sumps until they are investigated, to prevent upgrading a sump and then having to remove it.

Burning Ground No. 3 and UEP

Hunter Davis explained that a cost plus contract is being negotiated with AWD to evaluated alternatives for the Interim Remedial Action at BG-3/UEP.

The Tulsa Corps of Engineers is preparing a list of all sites that have been investigated at Longhorn ARMY AMMUNITION PLANT as requested by the EPA.

The next TRC Project Coordinators meeting will be a telephone conference on July 7, 1993. A meeting is scheduled for August 17, 1993 in Dallas.

006417

TECHNICAL REVIEW COMMITTEE

PROJECT COORDINATORS MEETING

ATTENDEES

JUNE 22, 1993

Lisa Marie Price	EPA
Lynn Muckelrath	ACO/LHAAP
Ira Nathan	ACO/LHAAP
Doyle Williams	ACO/LAAP
Pamela Jones	Metcalf & Eddy/EPA
Michael Moore	TWC
Mark Weegar	TWC-Federal Facilities
Karen Wilson	USAEC
Jerald Broughton	USAEC/CEWES
Scott Weber	Corps of Engineers
Jim Martell	Corps of Engineers
Hunter Davidson	Corps of Engineers
George Hall	Corps of Engineers
Clinton Word	Corps of Engineers
Chris Roddam	Thiokol Corporation
Bill Sniffen	Thiokol Corporation

006418

AUG 18 1993

CERTIFIED MAIL: RETURN RECEIPT REQUESTED

P104 195 179

Lynn Muckelrath, Project Manager
Longhorn Army Ammunition Plant
ATTN: SMCLO-EN
Marshall, Texas 75671-1059

Dear Lynn,

Pursuant to the Federal Facility Agreement (FFA) for the Longhorn Army Ammunition Plant (AAP), EPA and the Texas Water Commission approve of the Remedial Investigation/Feasibility Study Work Plan Addendum for Area LHAAP-1A for the Longhorn Army Ammunition Plant.

If you have any questions regarding this matter, please call me at (214) 655-6744.

Sincerely,

Lisa Marie Price
Remedial Project Manager
Texas Superfund Enforcement

DEPARTMENT OF THE ARMY
LONGHORN/LOUISIANA ARMY AMMUNITION PLANTS
MARSHALL, TEXAS 75671-1059

RECEIVED
EPA REGION VI

REPLY TO
ATTENTION OF

1993 SEP -1 PM 12:45

SUPERFUND BRANCH

006419

August 31, 1993

SMCLO-EV (200-1a)

Subject: Draft RI/RS Study, Work Plan Addendum Phase I for Site LHAAP 18 & 24 Burning Ground #3 & Unlined Evaporation Pond, Longhorn AAP

Environmental Protection Agency
ATTN: Lisa M. Price (6H-ET)
1445 Ross Avenue
Dallas, Texas 75202-3087

Dear Ms. Price:

Forwarded August 26, 1993, were two copies of subject workplan for your review.

Please submit your comments to Lynn Muckelrath within 14 days of receipt of this document, or contact him at (903)679-2980.

Sincerely,

Lawrence J. Sowa

Lawrence J. Sowa
Lieutenant Colonel, U. S. Army
Commanding Officer

006420

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

REMEDIAL INVESTIGATION/FEASIBILITY STUDY

FINAL
WORK PLAN ADDENDUM PHASE I

FOR SITE LHAAP-18 & 24
BURNING GROUND 3 &
THE UNLINED EVAPORATION POND

September 1993

Prepared by

TULSA DISTRICT
U.S. ARMY CORPS OF ENGINEERS

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

EXECUTIVE SUMMARY

This Work Plan Addendum has been prepared by the U.S. Army Corps of Engineers, Tulsa District for Longhorn Army Ammunition Plant (LHAAP). It is intended as an addendum to the Longhorn Army Ammunition Plant (LHAAP) Remedial Investigation/Feasibility (RI/FS) Work Plan (June 1992), which describes remedial investigations at 13 Solid Waste Management Units (SWMUs) at LHAAP. This Work Plan Addendum describes additional investigations to be conducted at site No. LHAAP-18 & 24, the Active Burning Grounds (Burning Ground 3) and the Unlined Evaporation Pond (UEP). The description of investigations presented in this addendum is given in the same format as in the final RI/FS Work Plan, Volume I - General, with additional information added as necessary. Pertinent sections from the RI/FS Work Plan have been included by reference where possible to avoid unnecessary duplication. Proposed sampling locations were selected based on site history, physical characteristics, and field reconnaissance. A total of 8 soil borings with soil sampling, installation of 4 monitoring wells, collection and testing of 50 groundwater samples, and a small scale trench into the contaminated buried soil/debris with a small bucket backhoe for collection of samples for bench scale tests are proposed for the RI/FS Addendum Phase I Investigations.

SECTION 1.0
INTRODUCTION

Under a Federal Facilities Agreement (FFA) between the U.S. Environmental Protection Agency (EPA), the Texas Water Commission (TWC) and the Department of the Army, a Remedial Investigation/Feasibility Study (RI/FS) is underway at Longhorn Army Ammunition Plant (LHAAP) in Marshall, Texas. The FFA requires an RI/FS under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) to characterize the nature and extent of contamination at 13 Solid Waste Management Units (SWMUs) at LHAAP and to develop a remedy for remediation of each area. The U.S. Army Corps of Engineers (USACE) prepared a comprehensive RI/FS Work Plan to address remedial activities required at the 13 SWMUs following CERCLA guidelines. During the RI Work Plan development for the Active Burning Grounds #3, SWMU No. LHAAP-18 & 24, additional investigations were identified as required to evaluate the Interim Remedial Action (IRA) at the site for source control.

This Work Plan Addendum is intended as a supplement to the final Longhorn Army Ammunition Plant RI/FS Work Plan, Volume I - General, dated June 1992, which contains detailed information about the facility background and history; each area to be investigated; previous investigations; potential contaminants; migration pathways; potential receptors; sampling rationale; number and type of samples; analytical parameters; feasibility study and risk assessment activities. The purpose of this Work Plan Addendum is to present a description of the additional investigations to be conducted, a map showing proposed sample locations, and an estimate of the volume of investigation-derived waste to be generated. This document follows the same format as the final RI/FS Work Plan Volume I - General, with additional information added as needed to describe investigations to be conducted at the site. Pertinent sections from the RI/FS Work Plan have been included by reference where possible to avoid unnecessary duplication. Since the investigation-derived waste will increase with the additional field work at LHAAP-18 & 24, the waste descriptions and quantity estimates are provided as Appendix A.

All procedures described in the final RI/FS Work Plan Volume II - Chemical Data Acquisition Plan (CDAP), and Volume III - Site Safety and Health Plan (SSHP) will remain applicable for the investigation at LHAAP-18 & 24. The CDAP discusses the data quality procedures and techniques used to insure that all data obtained are of acceptable quality and the Investigation-Derived Waste (IDW) Management Plan. The SSHP establishes procedures to protect personnel during the field activities at LHAAP-18 & 24.

SECTION 2.0

FACILITY BACKGROUND

General information about Longhorn Army Ammunition Plant including location, boundary features, facility background, and environmental conditions is described in Section 2.0, Facility Background, of the final RI/FS Work Plan, Volume I - General.

SECTION 3.0

SITE NATURE AND EXTENT OF CONTAMINATION

3.1 LHAAP-18 & 24 - BURNING GROUNDS 3 AND UNLINED EVAPORATION POND.

3.1.1 Site History. Historical use of this site is assumed to be the same as that described in Section 3.6.1 of the final RI/FS Work Plan, Volume I - General.

3.1.2 Site Description. The site description is the same as that described in Section 3.6.1 of the final RI/FS Work Plan, Volume I - General.

3.1.3 Previous Investigations. Previous investigations in the area have been described for this site in Section 3.6.3 of the final RI/FS Work Plan, Volume I - General.

3.1.4 Assessment of Existing Data and Historic Records. Assessment of existing data in the area have been described for this site in Section 3.6.4 of the final RI/FS Work Plan, Volume I - General.

3.1.5 Potential Contaminants and Migration Pathways. The potential contaminants and migration pathways will be the same as those described in Section 3.6.5 of the final RI/FS Work Plan, Volume I - General.

3.1.6 Identification of Potential Receptors. The identification of potential receptors will be the same as those described in Section 3.6.6 of the final RI/FS Work Plan, Volume I - General.

3.1.7 Initial Remedial Action. The initial remedial action will be the same as described in Section 3.6.7 of the final RI/FS Work Plan, Volume I - General.

The interim remedial action (IRA) will include source material and groundwater removal and treatment. The need for an IRA is shown by the increase in concentrations of volatile organics detected in the groundwater. In the shallow aquifer zone, monitoring well (MW) 2 went from a methylene chloride (MEC) concentration of 2,900,000 ug/l in June 1988 to 9,080,000 ug/l in November 1992 and a trichloroethylene (TCE) concentration of 60,000 ug/l in June 1988 to 199,000 ug/l in November of 1992, several other wells in this zone had concentrations over DNAPL indicator limits. In the deeper zone at the site, MW-15 went from a MEC concentration of 37 ug/l in June 1988 to 68,000 ug/l in November 1992 and a TCE concentration of 54 ug/l in June 1988 to 9,390 ug/l in November of 1992, this is particarly alarming since it indicates an increased vertical migration rate.

SECTION 4.0
PLAN OF INVESTIGATION

The plan of investigation described below is designed to obtain site-specific data about both the physical and chemical characteristics of the Burning Ground 3 & UEP site. Table 4.0 presents the parameters will be analyzed for all soil and groundwater samples. Additionally, six bench scale test will be performed on samples from the trench soil/debris and six bench scale test will be performed on samples of groundwater that will be obtained from the most heavily known contaminated areas, the planned bench scale test are also listed in Table 4.0.

TABLE 4.0
SAMPLING PARAMETERS FOR
BURNING GROUND 3 & UEP
PHASE I ADDITIONAL INVESTIGATION

Sampling Matrix	Chemical Parameters	Physical Parameters
SOIL from borings & monitoring wells	pH; volatile organic compounds (VOCs); semi-volatile organic compounds (SVOCs); explosives; antimony; arsenic; barium; cadmium; chromium; lead; mercury; nickel; selenium; silver; thallium; nitrate; sulfate; and chloride	visual classification, moisture content, gradation, plastic limit, and liquid limit tests
GROUND WATER	pH; specific conductance; volatile organic compounds (VOCs); semi-volatile organic compounds (SVOCs); explosives; antimony; arsenic; barium; cadmium; chromium; lead; mercury; nickel; selenium; silver; thallium; nitrate; sulfate; and chloride	
Soil Bench Scale Test (BST)	Incineration, Thermal Desorption, Aeration, Bio-remediation, Stabilization, Chemical Extraction (samples will also be tested before and after BST for the chemical parameters to show effectiveness of the procedure)	
Water Bench Scale Test (BST)	Air stripping, Activated Carbon, Ultraviolet Photolysis, Ion exchange, Reverse Osmosis, Precipitation (samples will also be tested before and after BST for the chemical parameters to show effectiveness of the procedure)	

Note: For more detail see the CDAP in the RI/FS Work Plan.

All sampling and analyses will be performed in accordance with the procedures outlined in Volume II - Chemical Data Acquisition Plan (CDAP) and Volume III - Site Safety and Health Plan (SSHP) of the final RI/FS Work Plan. A preliminary list of alternatives to be evaluated for the IRA at Burning Ground 3 & the UEP site is given on Table 4.1. Field investigations for the site will consist of multiple phases. The first phase of investigations, RI Phase I, will be performed to obtain the data requirements to complete the site characterization to proceed with the IRA on the near surface source material. The estimated number and types of samples to be taken during the RI Phase I Additional investigations are shown on Table 4.2. After completing the first phase field efforts, starting the IRA, and evaluating the existing data needs, the total site RI will continue to more fully assess the deeper groundwater at the site. Additional groundwater monitoring wells and soil borings may be drilled to determine the full extent of soil and groundwater contamination, if necessary.

Table 4.1.
PRELIMINARY LIST OF TREATMENT ALTERNATIVES
FOR THE IRA

Matrix	IN-SITU/ EX-SITU	CONTAMINANT/ PROCEDURE TYPE	TECHNOLOGY
GROUNDWATER	IN-SITU	VOC	Bioremediation Vapor Extraction Note:(Low permeability of soils limits effectiveness of in-situ treatment.)
		METALS	
	EX-SITU	VOC	Air stripping Activated Carbon Ultraviolet Photolysis
		METALS	Ion exchange Reverse Osmosis Precipitation
		COLLECTION	Well-point System Interceptor/Collection Trenches I/C Trenches with Vacuum Enhanced Extraction
SOIL/WASTE	IN-SITU	VOC	stabilization Vitrification Soil Vapor Extraction Note:(Low permeability of soils limits effectiveness of in-situ treatment.)
		METALS	stabilization Vitrification
	EX-SITU	VOC	Incineration Thermal Desorption Aeration Bio-remediation
		METALS	Stabilization Chemical Extraction
		EXCAVATION/ PRETREATMENT	Staging area Dewatering unit Soil shredding Soil screening
AIR/ VAPOR EMISSIONS		VOC	Activated Carbon Flaring
		DUST	Water Spray Baghouse Scrubber

4.1 LHAAP 18 & 24 - Burning Grounds 3 and UEP.

4.1.1 Data Requirements for Site Characterization. Additional data is needed to more fully characterize the site before proceeding with the IRA. A list of additional investigations for this phase with a description, specific purpose, and type of sampling to be performed are provided in Table 4.2.

4.1.2 General Plan for Site Investigation - RI Phase I. The overall A field investigation plan for area LHAAP-18 & 24 was developed and approved in Section 4.6 of the final RI/FS Work Plan, Volume I - General. The field investigation (listed in Section 4.6.2 of the final RI/FS Work Plan, Volume I - General) for area LHAAP-18 & 24 includes the following:

8 - surface water/sediment sampling
41 - monitoring well sampling
7 - monitoring wells to be plugged

The changes from this plan are to include installation and sampling of 8 borings, install 4 wells, sample all wells at the site that can yield a water sample, collect soil/waste & water samples for bench scale tests. Well abandonmnet scheduled under the RI/FS Work Plan will take place as part of the IRA.

The objectives in performing the first phase of additional field investigations for the RI at the Burning Ground 3, LHAAP-18 & 24 are to determine if low density compounds are floating on the near surface groundwater, delineate the TCE plume north of the UEP, investigate areas of suspected contamination (including the UEP) that have not previously been samples, and to collect samples for bench scale tests.

4.1.2.1 Soil Borings Eight additional soil borings will be drilled at the locations shown on Figure 4-1-1. The objective of the additional soil borings is to gather analytical and stratigraphic data from the suspected source areas. Two of the borings are located in the center of the suspected burn trench next to borings 935-937. Three of the borings are in the UEP, one near the truck ramp in the southern corner, one in the north corner near the rocket motor washout, and one near the east corner near the well MW-2. The last three are in 3 separate suspect areas that have never been investigated near 908 and operating burn cages.

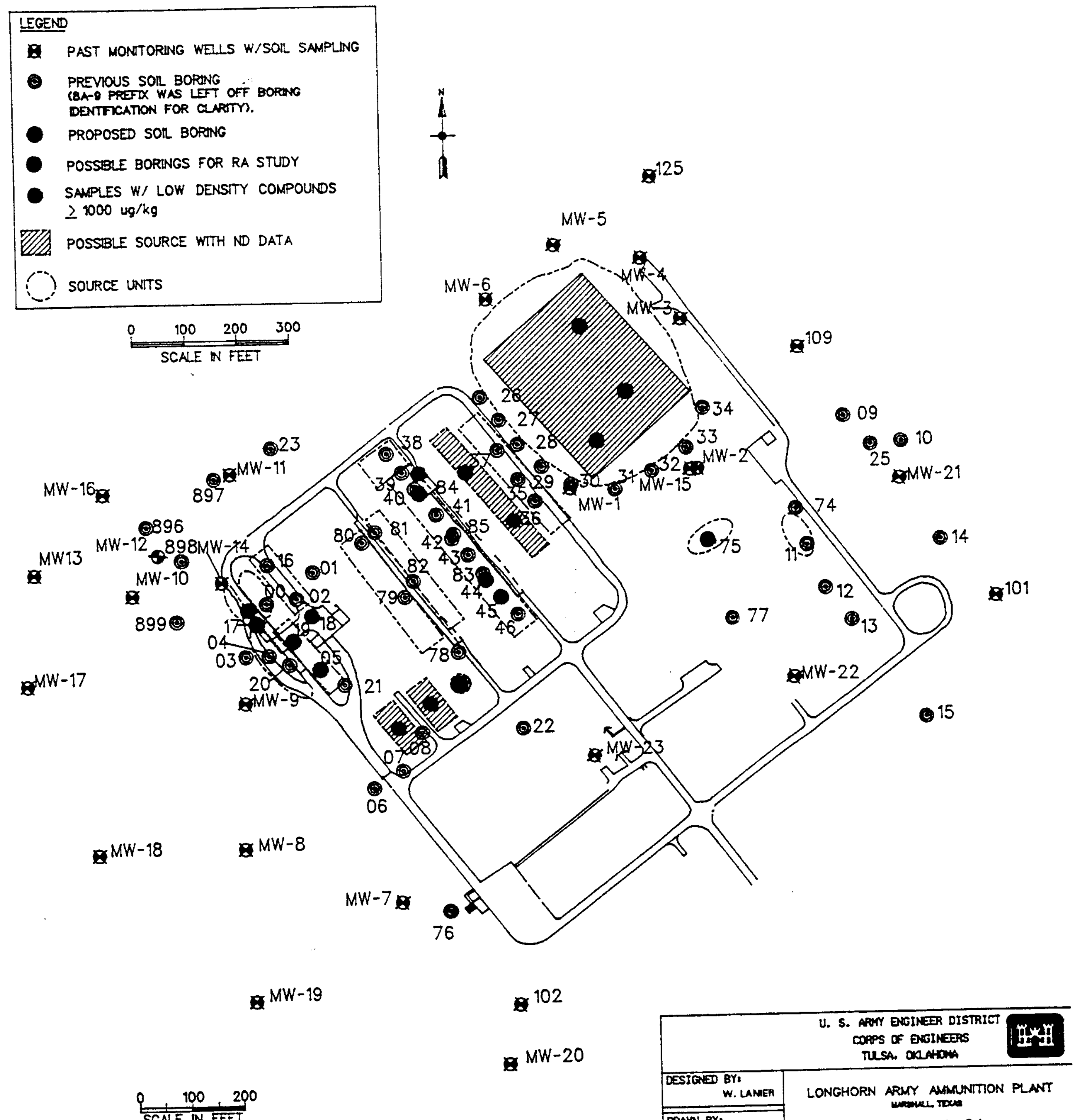
Boring depths are estimated based on an anticipated depth of contamination. Actual depths may vary depending on the subsurface conditions encountered during investigations.

TABLE 4.2.
PROPOSED INVESTIGATIONS FOR PHASE 1 ADDITIONAL INVESTIGATIONS FOR IRA OF SOURCE MATERIAL
AT BURNING GROUND 3 & UEP

WORK ITEM	NUMBER/LOCATION	PURPOSE	DEPTH	SAMPLING
1. Install shallow wells	3 down gradient from areas where soil samples had low density compounds at concentration over 1,000 ug/l (near ACD and burn pits see map of past soil investigations with proposed borings)	To detect LNAPL plume and collect hydrogeologic characteristics for developing fate and transport models to address remediation measures, should they be necessary.	Fifteen feet below water table with a 20 foot screen 5 feet above the water table .	Sample all 3 wells for LNAPL and full range of sampling.
2. Perform soil borings and collect soil samples	3 - in UEP 2 - in suspected burn trench next to borings 935-937 3 - in 3 separate areas near 908 (see map of past soil investigations with proposed borings)	To confirm suspect source areas of presence of buried waste	At least 15 feet, or till no indication of disturbed material is encountered whichever comes first	Sample every 5 feet and collect sample at noticeably high contamination in the field.
3. Install monitoring well	1 - downgradient (northwest) of MW-5 & MW-6	To close tce plume north west of mw-5 & mw-6	Twenty foot screen at approximately 15 to 35 feet below land surface	Sample with the other monitoring wells for voc's. Semi-vo's, explosives, and metals.
4. Sample all existing monitoring wells including 123, 125, BH-11, and BH-22	50 - wells	To provide a "snap shot" of contaminant plume before interim remedial action and monitor the migration since november 1992	NA	Sample for voc's. Semi-vo's, explosives, and metals
5. Trenching with a small back hoe to collect soil samples for bench scale test	Approximately 6 samples from two "hot areas" near acd and north end of middle burn pit	To test effectiveness of remedial technology and to gather site condition information for implementation of the ira (such as inflow seepage & side slope stability in waste material)	Approximately 10 feet deep	Samples for bench scale test
6. Collect water samples from most contaminated wells for water treatment bench scale test	As needed to perform test	To test effectiveness of remedial technology	NA	Samples for bench scale test

FIGURE 4-1-1

PROPOSED SOIL BORING FOR PHASE I SITE INVESTIGATIONS



NOTE: LOCATIONS OF SITE FEATURES AND SAMPLING LOCATIONS HAVE BEEN ASSEMBLED FROM REFERENCED DOCUMENTS PREPARED BY VARIOUS AGENCIES.

U. S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
TULSA, OKLAHOMA

DESIGNED BY: W. LANIER	LONGHORN ARMY AMMUNITION PLANT MARSHALL, TEXAS
DRAWN BY: C. STAUDENMAIER	LHAAP 18 & 24 INTERIM REMEDIAL ACTION PAST SOIL INVESTIGATIONS WITH PROPOSED SOIL BORINGS
CHECKED BY:	
SUBMITTED BY:	SCALE: AS SHOWN
CHIEF, ___ C. WORD ENVIRO. DESIGN	DATE: AUGUST 1993 DWG CODE:
	FIGURE 4-1-1
DIGITAL FILE: PPINSOIL.DGN	

4.1.2.2 Monitoring Wells and Groundwater Samples Four groundwater monitoring wells will be installed at the site to determine the presence of a Low density non-aqueous phase liquid (LNAPL) plume and define TCE migration northwest of the UEP in the upper saturated zone. The wells will also provide groundwater depth and flow direction. Sampling of all of the wells will monitor the migration and changes in concentration of contamination present in the groundwater and variations of the groundwater elevation at the site .

4.1.2.2.1 Monitoring Well Installation The proposed well locations for the site are shown on Figure 4-1-2 and are as follows:

- TO DETECT A POSSIBLE LNAPL PLUME

  Three monitoring wells are to be installed hydraulically down gradient from areas with the highest concentration of low density volatile organic compounds in the soil samples

- TO DETERMINE THE TCE CONCENTRATION DOWNGRADIENT OF MW-5 AND MW-6 WELLS

  One monitoring well will be located northwest of the UEP to determine

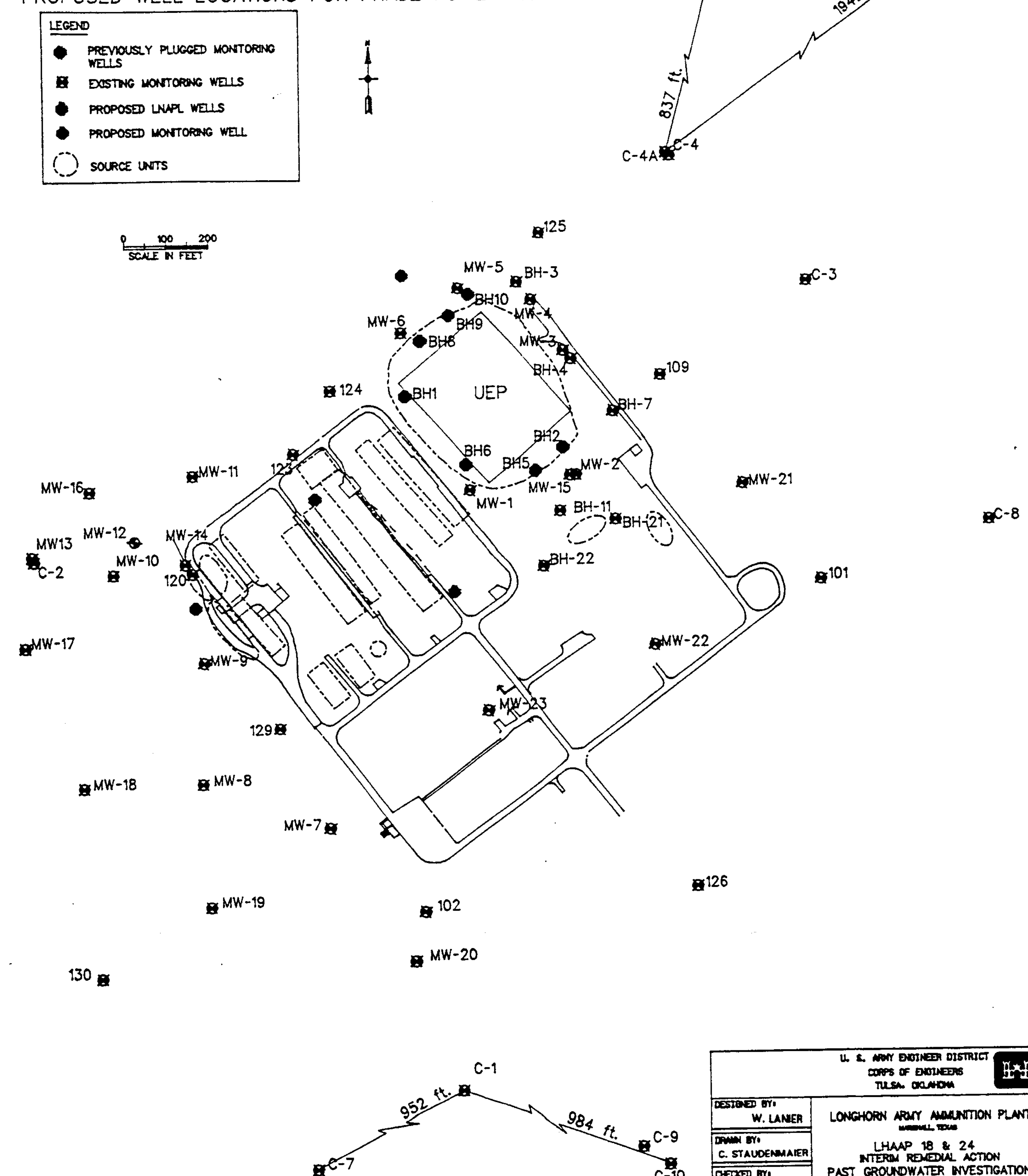
The wells will be installed based on observation in the field, the approximate depth of the well screens are shown on Table 4.2.

All sampling and analyses will be performed in accordance with the procedures outlined in Volume II - Chemical Data Acquisition Plan (CDAP) and Volume III - Site Safety and Health Plan (SSHP) of the final RI/FS Work Plan. Soil sampling for both physical and chemical analyses will be performed following the same procedures described for sampling the soil borings to be drilled at the site, with the exception that soil samples for chemical analyses will be taken only from the unsaturated zone. Analytical parameters will be the same as listed in Table 4.0 and the RI/FS Work Plan.

4.1.2.2.2 Groundwater Sampling The newly installed monitoring wells will be slug tested and sampled for analytical and physical parameters listed in Table 4.0 of this document and section 4.6.2 of the final RI/FS Work Plan, Volume I - General.

006435

FIGURE 4-1-2
PROPOSED WELL LOCATIONS FOR PHASE I SITE INVESTIGATIONS



NOTE: LOCATIONS OF SITE FEATURES AND SAMPLING LOCATIONS HAVE BEEN ASSEMBLED FROM REFERENCED DOCUMENTS PREPARED BY VARIOUS AGENCIES.

U. S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS TULSA, OKLAHOMA	
DESIGNED BY: W. LANIER	LONGHORN ARMY AMMUNITION PLANT MARSHALL, TEXAS
DRAWN BY: C. STAUDENMAIER	LHAAP 18 & 24 INTERIM REMEDIAL ACTION PAST GROUNDWATER INVESTIGATIONS WITH PROPOSFD MONITORING WELLS
CHECKED BY:	
SUBMITTED BY:	SCALE: AS SHOWN
CHIEF, C. WORD ENVIRO. DESIGN	DATE: AUGUST 1993 DWG CODE: — FIGURE 4-1-2
DIGITAL FILE NUMBER:	

SECTION 5.0
FEASIBILITY STUDY ACTIVITIES

The feasibility study activities are described in Section 5.0 of the final RI/FS Work Plan, Volume I - General. The preliminary list of alternatives as provided in Table 4.1 will be evaluated for the IRA.

SECTION 6.0
RISK ASSESSMENT

The Baseline Risk Assessment will consist of two basic assessments - a Health Risk Assessment and an Ecological Risk Assessment.

The Health Risk Assessment for LHAAP-1 is described in Section 6.2.10 of the final RI/FS Work Plan, Volume I - General and the Ecological Risk Assessment is described in Section 6.4 of the final RI/FS Work Plan, Volume I - General.

SECTION 7.0

PRELIMINARY IDENTIFICATION OF APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

The identification of ARARs is described in Section 7.0 of the final RI/FS Work Plan, Volume I - General.

SECTION 8.0
BUDGET AND SCHEDULE

8.1 BUDGET. All remedial activities at LHAAP will be funded with the Defense Environmental Restoration Account (DERA) whicnh is managed by the U.S. Army Environmental Center (AEC). DERA funds are appropriated by Congress annually. Funding requiremnt for this effort shall be identified in a timely manner through the chain of command to AEC.

Funding for 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 for Phase I Investigations for LHAAP-18 & 24 has been received in fiscal year 1993.

8.2 SCHEDULE. A schedule of 87 months was proposed for remedial activities at LHAAP as outlined in Section 8.0, Budget and Schedule, of the final RI/FS Work Plan, Volume I - General. The schedule includes all activities from project planning through the completion of the remedial design.

006440

APPENDIX A
INVESTIGATION DERIVED WASTE
MANAGEMENT PLAN

WASTE DESCRIPTION

WASTE DESCRIPTION

1.1 Types and Estimated Quantities of Investigation Derived Waste (IDW). The estimated waste quantities for LHAAP-18 & 24 and the description and total amount for each type are provided in the following table. Please refer to Appendix C of the RI/FS Work Plan, Volume II -Chemical Data Acquisition Plan, Investigation-Derived Waste Management Plan for additional detail.

IDW ESTIMATED QUANTITIES AND TYPE										
INVESTIGATIONS							ESTIMATED WASTE QUANTITIES			
PHASE	MONITORING WELLS (depth)	BORINGS (depth)	SAMPLES				SOIL CUTTINGS (cf)	PURGE WATER (gal)	DECON. FLUIDS (gal)	PPE & DISP. EQUIPMENT (20 gal bags)
			SEDIMENT	SOIL	GROUNDWATER	Surface water				
Original	0	0	8	0	39	8	0	16,365.	219	28
New	3 @ 25' 1 @ 35'	8 @ 15' 2 trenches @ 10'	0	32 6 FOR TREATABILITY TESTING	11 6+ FOR TREATABILITY TESTING	0	102	5,220.	100	10
Total	4	8 borings 2 trenches	8	38	55	8	102	21,585.	319	38

006442

LONGHORN ARMY AMMUNITION PLANT

RI/FS

WORK PLAN

VOLUME 2
CHEMICAL DATA ACQUISITION PLAN

PREPARED FOR:
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

PREPARED BY:
U.S. ARMY CORPS OF ENGINEERS

JUNE 1992

TABLE OF CONTENTS

APPENDICES

006445

LIST OF ACRONYMS

ASTM	American Society of Testing Materials
CDAP	Chemical Data Acquisition Plan
COC	chain of custody form
DQO	data quality objective
EPA	U. S. Environmental Protection Agency
HTW	hazardous and toxic waste
HTW QA&IH	HTW Quality Assurance and Industrial Hygiene Section
QA	quality assurance
QC	quality control
MRD Lab	Corps of Engineers Missouri River Division Laboratory
NIOSH	National Institute of Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
RCRA	Resource Conservation and Recovery Act
RPD	relative percent difference
SSHP	Site Specific Health and Safety Plan
SWD Lab	Corps of Engineers Southwestern Division Laboratory
TAC	Texas Administrative Code

SECTION 1.0

INTRODUCTION

1.1 General. The purpose of this Chemical Data Acquisition Plan (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).

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. 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. 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, groundwater, and the installation of monitoring wells. 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.

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 Ebasco under contract to Tulsa District. This organizational structure is shown in Figure 1. Both contractors will submit a CDAP addendum which will address their organizational structure, subcontractors, laboratories, and any proposed deviations from this document.

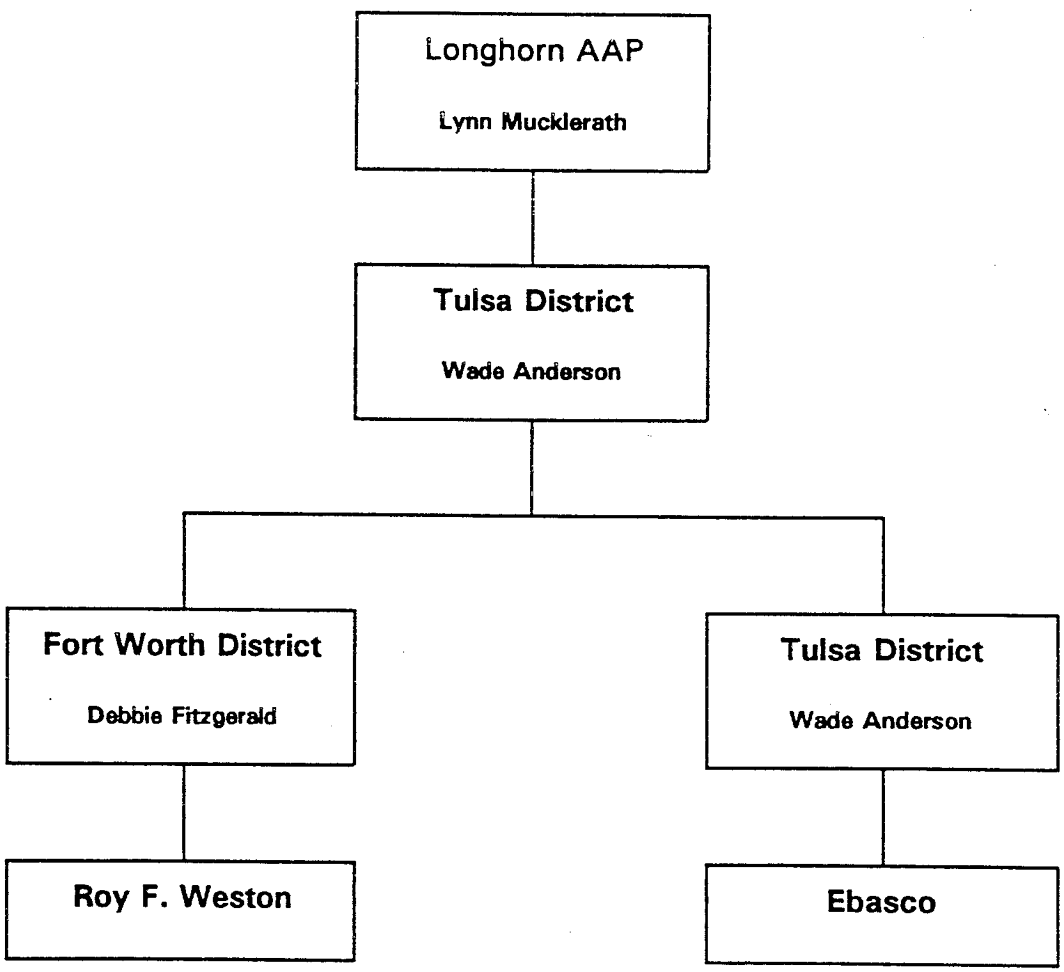


Figure 2.1. Organizational structure of the Longhorn remediation project.

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.

2.3 **Quality Assurance Personnel**. Quality assurance will be performed by the Tulsa District, Geotechnical Branch, HTW Quality Assurance and Industrial Hygiene Section (HTW QA&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 laboratories selected by each contractor. Their labs will be identified in their CDAP addendum. 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:

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

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 <u>**Precision**</u>. 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.

3.3 <u>Completeness</u>. 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:

$$C = \frac{P_1}{P_0} \times 100\%$$

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 **<u>Representativeness</u>**. 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 **Comparability**. 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 represent 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.

THIS PAGE BLANK

SECTION 4.0

FIELD OPERATIONS

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

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 split spoon, 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 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 than drilled into the ground at a high rotation rate. Samples for chemical tests will not be taken from the auger.

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. Surface casings will be installed to a depth of five feet in all cases where the water table is greaer than five feet in depth. Surface casings will also be installed through any obviously contaminated zones. Continuous flight augers, which act as casing, will reduce the potential for contaminated soil into aquifers beneath a contaminated zone.

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 **Borehole Abandonment**. 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 **Monitoring Wells**.

4.2.1 **Drilling and Installation**. 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 4.1. 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.

4.2.1.1 **Well Casing**. Four-inch nominal diameter, flush-threaded, schedule 40 PVC casing will be installed from the screen to approximately three feet above the surface. Centralizers may be used near the well screen to keep the casing centered in the well bore.

4.2.1.2 **Riser and Cap**. 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.

Figure 4-1. Typical well schematic.

4.2.1.3 __Screen__. Wells will be screened with 4-inch diameter 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 20 feet in length. The entire saturated thickness of the aquifer will be screened to a maximum of 20 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 sand will be either bagged or purchased from a batch plant and will have a 40-60 gradation. The sand will be tested chemically for the same parameters as in the monitoring wells before placement.

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 installed via a tremie pipe or by dropping them directly into the annulus. Bentonite pellets will be hydrated with reagent-free water.

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 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 4.1. 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. The number of samples taken from each medium are given in Table B.9. Each of these media are discussed below.

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 teflon 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°, pH is ± 0.5 units, and conductivity is ± 10%. 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 teflon bailer, which will be slowly lowered into the well. Each sample container will be filled directly from 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. Quality assured containers will be used. 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 Teflon bailer. Presence of the immiscible layer will be confirmed visually.

4.5.1.2 <u>Sampling from an Open Bore Hole</u>. All soil borings will be made into the 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 <u>Surface Water and Sediment Sampling</u>. 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 glass jars with teflon-lined lids for chemical testing. 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. Samples taken for volatile analysis, however, will not be composites, but discrete samples with as little disturbance as possible.

4.5.3.1 **Physical Testing**. 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. Testing for friable asbestos will be performed on sites where there is the potential for contact with asbestos. The laboratory analyst should be certified through NIOSH for asbestos identification. Methods for physical tests are given in Table B.3.

4.5.3.2 **Chemical Testing**. Samples will be placed in pre-cleaned glass jars with teflon-lined caps. Each sample shall consists of 2 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 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 microlaterlogs. 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 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.

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**.

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 at each drillsite. 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.

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, 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.

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 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 samples and are analyzed for the same constituents as the associated soil or water samples.

4.9.1.3 **Replicate Samples**. 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 **Samples for Physical Testing**. QA/QC on samples for physical testing consists of replicate samples as described in Section 4.9.1.3.

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-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 are shipped on the day they are sampled if possible.

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 required. 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 **Cooler Receipt Form**. 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 **Sample Tracking and Identification**. Other than the items listed in 6.2, there is additional documentation which demonstrate sample integrity. These are listed as follows:

6.3.1 **Field Log Book**. 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 **Field Data Form**. 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 **Sample Labels**. 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;
- QA validation report;
- ASCII or DBASE format data files.

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.

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 <u>Systems Audits</u>. 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 <u>Performance Audits</u>. 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
laboratory 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 whenever 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.
- 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.

9. U. S. Department of Health and Human Services, 1985, "NIOSH/OSHA Pocket Guide to Chemical Hazards".

APPENDIX A

FORMS USED IN FIELD SAMPLING ACTIVITIES

MIPR#	SWD LAB#	Chest#	Temp.

GROUNDWATER MONITORING WELL
CHAIN OF CUSTODY

U.S. Army Corps of Engineers
Tulsa District, Tulsa, Okla.

Location: Longhorn AAP Date:__________ Time:__________

Site: __________________ Well #: __________________

Proj. Engineer: __________________________ Ext#: __________

CONTAINERS

Glass	Plastic	Vial	Chest#	C/Seal#

VOA	Chest#

Int:

PARAMETERS SAMPLED

		EPA Method	(0)
	pH, Conductivity & Temperature	EPA Method	(0)
	Semi-Volatiles	8270	(2)
	Explosives	8330	(2)
	Herbicides/Pesticides & PCB's (2,4-D & 2,4,5-TP)	8150/8080	(2)
	Nitrate	353.1	(1)
	Total Metals (Ag, As, Ba, Cd, Cr, Hg, Ni, Pb, Sb, Se & Tl)	6010/7041 7060/7470 7740/7841	[1]
	Volatile Organics	8240	{3}

* Containers: () = Amber Glass [] = Plastic {} = Vials

CUSTODY RECORD

Relinquished by	Received by	Date	Time

LHAAP/GW/FM1/27JAN92

006482

MIPR#	SWD LAB# 1	Chest#	Temp.

CHAIN OF CUSTODY
for
VOLATILE ORGANICS

U.S. Army Corps of Engineers
Tulsa District, Tulsa, Okla.

Location: **Longhorn AAP** Site:

TRAVEL BLANK DATA

Sample#: ______________ Date: ________ Time: ________

Water Source: ______________

Analysis Requested: **Volatile Organics**

Date Mfg: ________ Bottle#: ________ C/Seal#: ________

pH: ________ Meter#: ________ Condt: ________ Meter#: ________

Signature of Sampler: ______________

SAMPLES CONTAINED IN THIS SHIPMENT

Sample ID Code Number	VOA	Alt#	X-Chest#	SWD Lab #
LHAAP - - 100 - TB				1
- - -				
- - -				
- - -				
- - -				
- - -				
Total Samples Shipped				

CUSTODY RECORD

Relinquished by:	Date	Time
Chest#:	C/Seal#:	Bus Bill#:
Received by:	Date	Time

LHAAP/FM2/15JAN92

MIRP #	SWD LAB #				Chest #	C/Seal	Temp.
						[Y] [N]	
						[Y] [N]	

SOIL SAMPLE
CHAIN OF CUSTODY

U.S. Army Corps of Engineers
Tulsa District, Tulsa, Okla.

Project: Longhorn AAP Proj/Engr: ____________ Ext: ______

Site: ____________ Boring # ____________

Sample depths: ____________ to ____________ FDF# ______

Start: ____________ / ____________ to ____________ / ____________
(Date) (Time) (Date) (Time)

CONTAINERS

Jars (2) each	Sample No.(s)				Total #	Chest #	C/Seal #

PARAMETERS SAMPLED

	Semi-Volatiles	8270
	Explosives	8330
	Nitrate	353.1
	Herbicides, Pesticides & PCB's (2,4-D & 2,4,5-TP)	8150/8080
	Total Metals (Ag, As, Ba, Cd, Cr, Hg, Ni, Pb, Sb, Se & Tl)	6010/7041 7060/7470 7740/7841
	Volatile Organics	8240

* Containers: () = Wide Mouth Glass Jars w/Teflon liner.

CUSTODY RECORD

Relinquished by	Received by	Date	Time

LHAAP/SS/FM1/27JAN92

MIPR#	SWD LAB#	Chest#	Temp.

SURFACE WATER SAMPLE
CHAIN OF CUSTODY

U.S. Army Corps of Engineers
Tulsa District, Tulsa, Okla.

Location: Longhorn AAP Date: ________ Time: ________

Site: ________ Location #: ________

Proj. Engineer: ________ Ext#: ________

CONTAINERS

Glass	Plastic	Vial	Chest#	C/Seal#

VOA	Chest#

Int:

PARAMETERS SAMPLED

		EPA Method	(0)
	pH, Conductivity & Temperature		
	Semi-Volatiles	8270	(2)
	Explosives	8330	(2)
	Herbicides/Pesticides & PCB's (2,4-D & 2,4,5-TP)	8150/8080	(2)
	Nitrate	353.1	(1)
	Total Metals (Ag, As, Ba, Cd, Cr, Hg, Ni, Pb, Sb, Se & Tl)	6010/7041 7060/7470 7740/7841	[1]
	Volatile Organics	8240	{3}

* Containers: () = Amber Glass [] = Plastic {} = Vials

CUSTODY RECORD

Relinquished by	Received by	Date	Time

LHAAP/SW/FM1/27JAN92

MIPR#	SWD LAB#	Chest#	Temp.

RINSATE WATER SAMPLE CHAIN OF CUSTODY

U.S. Army Corps of Engineers
Tulsa District, Tulsa, Okla.

Location: Longhorn AAP Date: __________ Time: __________

Site: __________ Blank #: __________

Proj. Engineer: __________ Ext#: __________

CONTAINERS

Glass	Plastic	Vial	Chest#	C/Seal#

VOA	Chest#

Int:

PARAMETERS SAMPLED

		EPA Method	(0)
	pH,Conductivity & Temperature	8270	(2)
	Semi-Volatiles	8330	(2)
	Explosives	8150/8080	(2)
	Herbicides/Pesticides & PCB's (2,4-D & 2,4,5-TP)	353.1	(1)
	Nitrate	6010/7041 7060/7470 7740/7841	[1]
	Total Metals (Ag, As, Ba, Cd, Cr, Hg, Ni, Pb, Sb, Se & Tl)	8240	{3}
	Volatile Organics		

* Containers: () = Amber Glass [] = Plastic {} = Vials

CUSTODY RECORD

Relinquished by	Received by	Date	Time

LHAAP/RB/FM1/27JAN92

WATER SAMPLES FIELD DATA FORM

PROJECT: ______________________ DATE: ___/___/___

SITE: ______________________ TYPE OF SAMPLE: WATER

WELL NO: __________ LOCATION: __________

CSG DIAMETER: __________ CSG TYPE: __________

RISER ELEVATION: ______________________

DEPTH TO WATER FROM TOP OF CASING: __________ TIME: ___:___

RATE OF RECHARGE: ______________________

DEPTH TO WATER AT TIME OF SAMPLING: __________ TIME: ___:___

WATER TABLE: __________ MEASURING DEVICE: __________

PH: ______ ______ TIME: ___:___ TYPE: __________

PH: ______ ______

CONDUCTIVITY,umhos/cm TIME: ___:___ TYPE: __________

TEMPERATURE: __________

______ ______

TURBIDITY: __________

______ ______

CHEST# __________ C/SEAL# __________ BUS BILL# __________

CHEST# __________ C/SEAL# __________ BUS BILL# __________

NOTES CONCERNING CONDITION OF WELL, ODOR, COLOR, AND PROBLEMS

____

____

____

____

____

____

____

SAMPLE COLLECTOR: ______________________

006487

SOIL SAMPLE
FIELD DATA FORM
No:______

Project: **Longhorn AAP** Proj/Engr: ______________ Ext: ______

Site: ____________________ Boring #: ____________________

Sample depths: ______ to ______ Total Samples: ______

Start: ____________ (Date) / ____________ (Time) to ____________ (Date) / ____________ (Time)

Top of Hole Elev: ____________ Water Table: ____________

Depth	Description	Jar No.
to		A & B
to		A & B
to		A & B
to		A & B
to		A & B
to		A & B
to		A & B
to		A & B
Page of	Total samples on this form	

Chest #	No/Jars	C/Seal #	Bus bill #

Remarks:

LHAAP/SS/FM2/17JAN92

Sample Collector: ____________________

LONGHORN AAP
RINSATE WATER SAMPLES
PARAMETER SHEET
FY - 92

CONTAINERS NO.	CONTAINERS SIZE	PARAMETERS	EPA METHOD NO./SHIP	PRESERVATIVES
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. 006489

DRILLING LOG	DIVISION	INSTALLATION	SHEET OF SHEETS

1. PROJECT	10. SIZE AND TYPE OF BIT
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
	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.

006490

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

006491

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)	To (feet)

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

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

U.S. ARMY CORPS OF ENGINEERS
TULSA DISTRICT, TULSA, OKLAHOMA

PANTEX PLANT (DOE)

MONITOR WELLS
BURNING GROUND WELL #_____________

DATE:______________TIME:___________

SEMI-VOLATILES

METHOD: 8250/8270
REFRIGERATED @ 4'C BRIM FULL

CHECKED FOR BUBBLES? [Y] [N]

SIGNATURE:____________

U.S. ARMY CORPS OF ENGINEERS
TULSA DISTRICT, TULSA, OKLAHOMA

PANTEX PLANT (DOE)

BURNING GROUND WELL #

DATE:______________TIME:___________

NITRATES

4'C

SIGNATURE:__________________________

006493

ORIGINAL

QC REPORT

SOUTHWESTERN DIVISION LABORATORY, CORPS OF ENGINEERS
4815 CASS STREET
DALLAS, TEXAS 75235-8011
(214) 905-9130

CASE NARRATIVE REQUIRED

REQUEST FOR ANALYSES

LABORATORY: NDRC LABORATORY

PROJECT: FORT SILL

DATE RESULTS REQUIRED: 7 APRIL 1992

DATE SAMPLES SENT: 24 MARCH 1992

Must Have Due 4/3/92

2 Ambers ~~Liquid~~ water Per sx
WC

TEST THE FOLLOWING SAMPLES AS INDICATED BELOW:

FIELD ID	SWD NO.	DATE SAMPLED	2858
FS43-01	2- 1018	23 MARCH 1992	-1
FS43-02	2- 1019	23 MARCH 1992	2
FS43-03	2- 1020	23 MARCH 1992	3
FS43-03/EB	2- 1021	23 MARCH 1992	4
FS43-03/QC	2- 1022	23 MARCH 1992	5
	MS		6
	MSD		7
	Method Blank		8
	Blank spike		9

ANALYZE FIVE WATER SAMPLES FOR EXPLOSIVES INCLUDING: HMX, RDX, TNT, TNB, 2-4 DNT, 2-6 DNT) (8330)

**** THESE SAMPLES ARE TWO WEEK TURN AROUND. REQUEST THE HARD COPY REPORT BY DUE DATE. ****

RELINQUISHED BY:	RECEIVED BY	DATE	TIME
Wiley A. Johns	David Miller	3-24-92	1320
David Miller	David Meyer	3/24/92	1:15

COOLER RECEIPT FORM 006494

Date Received ________________ Project ________________

Number of Coolers ____________ Cooler Numbers ____________

Date Checked in ______________ By (sign) ______________

1. Shipping slip.................................Yes.....No

   If yes, carrier and bill number ________________________

2. Custody seals on cooler.......................Yes.....No

   If yes, how many and where ________________________

3. Custody seals intact..........................Yes.....No

4. Chain-of-Custody in plastic...................Yes.....No

5. Chain-of-Custody filled out properly..........Yes.....No

6. SWD signed Chain-of-Custody properly..........Yes.....No

7. Enough ice and packing........................Yes.....No

   Type of packing ________________________

8. All bottles sealed............................Yes.....No

9. Any bottles broken............................Yes.....No

10. Labels in good condition and complete........Yes.....No

11. Labels agree with COC........................Yes.....No

12. Correct containers used......................Yes.....No

13. Preserved properly...........................Yes.....No

14. Sufficient sample............................Yes.....No

15. Bubbles absent from VOA......................Yes.....No

16. Client called................................Yes.....No

    Details________________________

17. Comments ________________________

006495

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 pint glass	1	N	field test
conductivity	½ pint glass	1	N	field test
temperature	½ pint glass	1	N	field test
metals	liter plastic	1	Y	nitric acid to pH <2
volatiles	40 ml glass vial	3	Y	no head space, air bubbles or agitation
semivolatiles	liter amber glass	2	Y	
explosives	liter amber glass	2	Y	
anions	liter glass	1	Y	
pesticides/PCBs	liter amber glass	2	Y	
herbicides	liter amber glass	1	Y	
total organic carbon	liter amber glass	1	Y	sulfuric acid to pH <2
total organic halogen	liter amber glass	1	Y	sulfuric acid to pH <2
phenols	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.

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
asbestos	NIOSH/OSHA

NIOSH/OSHA National Institute of Occupational Safety and Health/ Occupational Safety and Health Administration
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

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

PARAMETER	WATER (ug/l)	LOW-LEVEL SOIL/SEDIMENT (ug/kg)
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		2.2
RDX	0.836	1.0
1,3,5-TNB	0.258	0.25
1,3-DNB	0.108	0.25
Tetryl		0.65
NB		0.26
2,4,6-TNT	0.113	0.25
4-Am-DNT	0.060	
2-Am-DNT	0.035	
2,6-DNT	0.314	0.26
2,4-DNT	0.021	0.25
2-NT		0.25
4-NT		0.25
3-NT		0.25

006504

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	

SITE LHAAP NO.	SURFACE WATER SAMPLE TYPE WATER QTY	QA QTY	QC QTY	GROUND WATER FROM SOIL BORINGS (SB) AND WELLS (MW) SA… ATION MW QTY	SAMPLE TYPE WATER QTY	QA QTY	QC QTY	TRAVEL BLANK TB QTY	EQUIP. BLANK EB QTY
11	2	0	0	0	6	1	1	4	2
13	0	0	0	1	5	1	1	4	2
14	0	0	0	1	3	1	1	3	2
16	5	1	1	12	37	4	4	12	4
17	3	2	0	3	10	1	1	6	3
15 & 24	8	1	1	39	39	4	4	13	3
29	17	2	2	6	21	3	3	10	4
12	3	0	0	9	9	1	1	8	3
32	7	1	1	1	9	1	1	7	3
1	7	1	1	1	9	1	1	7	2
XX	7	1	1	2	6	1	1	6	2
27	4	0	0	2	12	2	2	6	3
TOTALS	63	7	7	77	166	21	21	86	33

- DENOTES NOT APPLICABLE

NOTES:

1. ALL SAMPLES WILL BE
   EXPLOSIVE COMPOUNI
   a. TRIP BLANKS
   b. GROUND WAT
   EXPLOSIVE CC
2. SITES LHAAP 13, 32, ANI
3. BACKGROUND MONITC
   11 SELECTED METALS, N
4. SITE LHAAP 16 ALSO IN
   GROUND-WATER SAMP

APPENDIX C

INVESTIGATION-DERIVED WASTE

MANAGEMENT PLAN

006507

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

006508

TABLE OF CONTENTS

FIGURES

TABLES

1. <u>Introduction.</u> 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. <u>Purpose of Management Plan</u>. 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. <u>IDW Management Approach</u>. The approach will be to utilize the Area of Contamination (AOC) unit concept as outlined in the EPA guidance document, <u>Superfund Management of Investigation-Derived Wastes During Site Inspections</u>, 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. <u>Facility Description Summary</u>. 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. <u>Climate.</u> LHAAP is located in a moist, humid, mild climate and receives an average rainfall of 46 inches.

1.3.2. <u>Terrain</u>. 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. <u>Regional Groundwater</u>. 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.

Figure C-1.

006515

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)
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) VCI (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) VCI (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 3,600.0 890,000.0 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-132) Chloride (MW-131) Sulphate (MW-132)	232.0 1,448.0 2,640.0 850,000.0 337,000.0

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

- Sediment sampling from 63 locations
- Shallow soil/waste sampling from 18 locations

Detailed information about the investigations is provided in Volume 1 and Volume 2, Chemical Data Acquisition Plan (CDAP38) of which this plan is an Appendix. Information about the investigations on an individual site basis is provided in Table C-2.

1.8. <u>Methods of Waste Quantity Minimization</u>. There are many ways in which waste generation will be kept to a minimum. During the investigations personnel are directed to:

- Avoid walking through areas of obvious or known contamination
- Avoid handling or touching materials directly
- Take care to limit the amount of contamination that comes in contact with equipment
- If contaminated tools are to be placed on non-contaminated equipment for transport use plastic to keep non-contaminated surfaces clean to limit decontamination waste

Table C-2
SITE SUMMARY SHEET
LONGHORN RI WASTE MANAGEMENT INFORMATION

LHAAP UNIT NO.	SITE NAME	INVESTIGATIONS						ESTIMATED WASTE QUANTITIES			
		Monitoring wells (depth)	Borings (depth)	samples				SOIL CUTTINGS (cf)	PURGE WATER (gal)	DECON. FLUIDS (gal)	PPE & DISP. EQUIPMENT (20 gal bags)
				Sediment	Soil	Groundwater	Surface water				
11	Suspected TNT Burial Site at Ave.'s P & Q	0	6 (18')	2	30	6 [6(SB) + 0(mw)]	2	25.92	0	363	26
13	Suspected TNT Burial Site Between Old & Active Landfills/Acid Dump	1 (45')	4 (27')	0	30	5 [4(SB) + 1(MW)]	0	49.77	658.24	323.25	23
14	Area 54 Burial Ground	1 (45')	3 (26')	0	18	3 [2(SB) + 1(MW)]	0	42.57	691.16	241.75	15
16	Old Landfill	5 (40') 6 (+40')	3 (150') 4 (21')	5	75	16 [4(SB) + 12(MW)]	5	361.36	11,922.03	1,208.5	69
17	Burning Ground No. 2 /Flashing Area	1 (25')	7 (7')	3	24	10 [7(SB) + 3(MW)]	3	25.01	1,316.48	445.5	28
18 & 24	Burning Ground No. 3 & Unlined Evaporations Pond/ Rocket Motor Washout Lagoon	0	0	8	0	39 [0(SB) + 39(MW)]	8	0	16,365.49	219	28
29	Former TNT Production Area	0	15 (22')	17	75	21 [15(SB) + 6(MW)]	17	79.2	1,777.25	988.5	80
12	Active Landfill	7 (40')	0	3	35	9 [0(SB) + 9(MW)]	3	148.4	6,450.74	474	32

006530

Table C-2
SITE SUMMARY SHEET
LONGHORN RI WASTE MANAGEMENT INFORMATION

LHAAP UNIT NO.	SITE NAME	INVESTIGATIONS						ESTIMATED WASTE QUANTITIES			
		Monitoring wells (depth)	Borings (depth)	samples				SOIL CUTTINGS (cf)	PURGE WATER (gal)	DECON. FLUIDS (gal)	PPE & DISP. EQUIPMENT (20 gal bags)
				Sediment	Soil	Groundwater	Surface water				
32	Former TNT Disposal Plant	0	5 (5') 8 (12')	7	39	9 [8(SB) + 1(MW)]	7	29.04	329.12	694.25	44
1	Inert Burning Grounds	0	8 (7')	6	24	9 [8(SB) + 1(MW)]	6	13.44	164.56	445.0	31
xx	Ground Signal Test Area	0	3 (5') 4 (22')	7	29	6 [4(SB) + 2(MW)]	7	24.72	82.28	414.75	32
27	South Test Area	0	4 (1') 9 (10')	4	30	12 [10(SB) + 2(MW)]	4	22.56	362.03	675.5	38
		21	83	61	409	68 (SB) 77 (MW) 145 TOTAL	61	821.99	40,119.38	6,493.0	446

2. Waste Description.

2.1. Types and Estimated Quantities of IDW.

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. Area of Contamination Description. 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. AOC-A. Figure C-3 shows the AOC-A with the LHAAP 1 investigations.

3.2. AOC-B. Figure C-4 shows the AOC-B with the LHAAP 32 investigations.

3.3. AOC-C. Figure C-5 shows the AOC-C with the LHAAP 29 investigations.

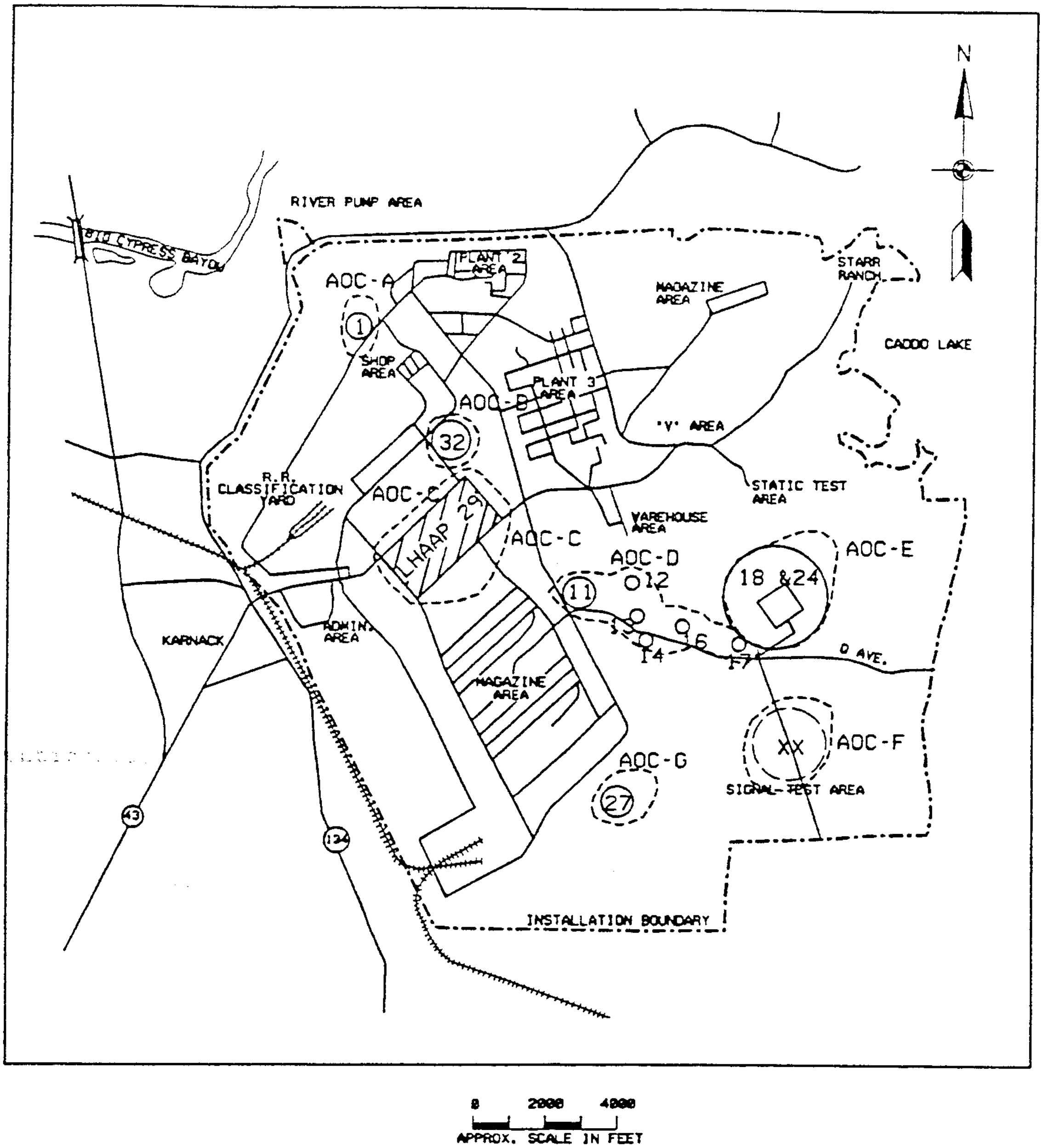
3.4. AOC-D. Because LHAAP 11, 12, 13, 14, 16, and 17 are so physically close together and extent of spread of contamination is unknown, these 6 sites were included in one AOC unit. Figure C-6 shows the AOC-D with the LHAAP 11 investigations. Figure C-7 shows the AOC-D with the LHAAP 12 investigations. 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. AOC-E. Figure C-12 shows the AOC-E with the LHAAP 18 & 24 investigations.

3.6. AOC-F. Figure C-13 shows the AOC-F with the LHAAP XX investigations.

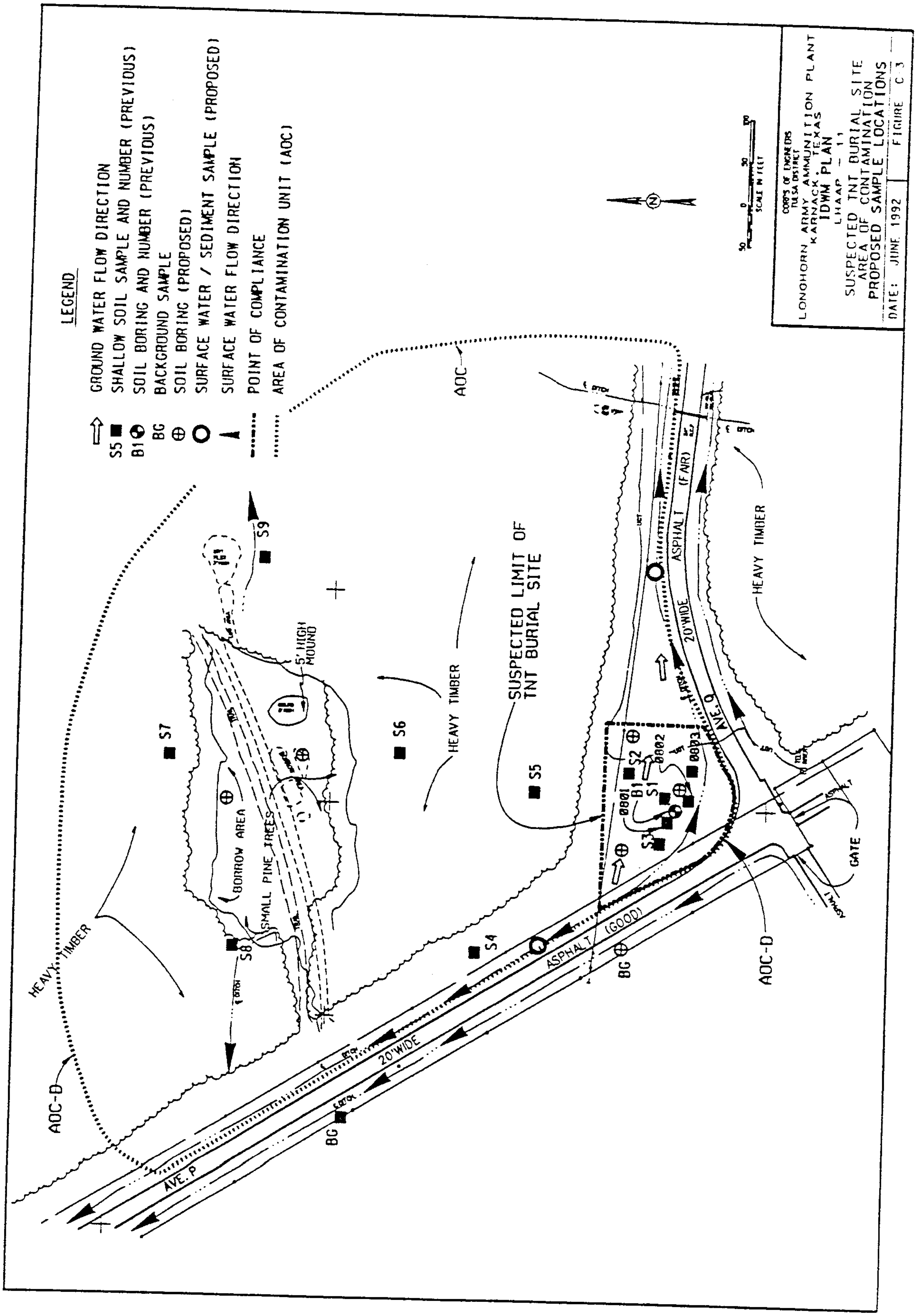
3.7. AOC-G. Figure C-14 shows the AOC-G with the LHAAP 27 investigations.

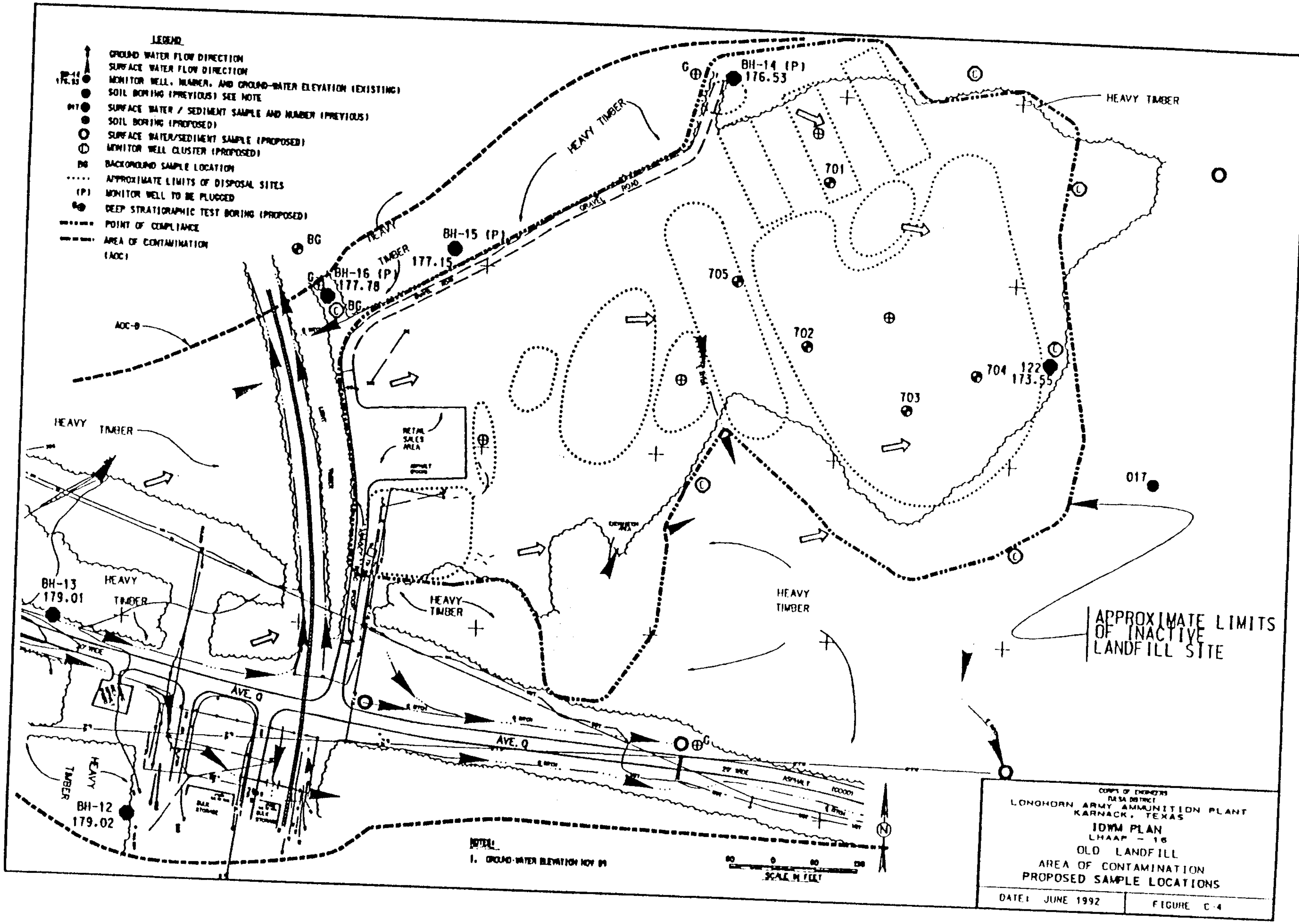
006534

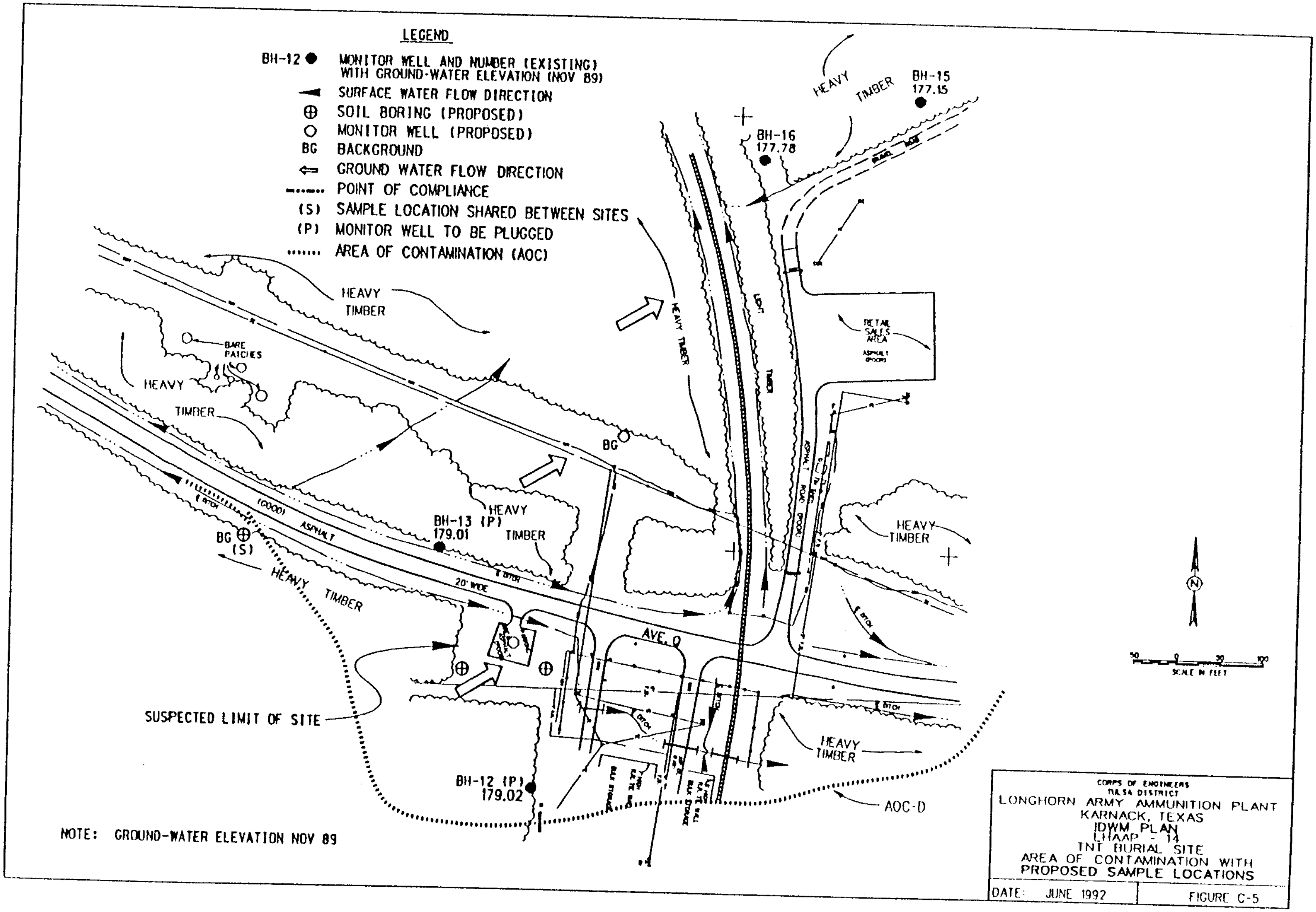


LONGHORN ARMY AMMUNITION PLANT
RI/FS WORK PLAN
LOCATION MAP FOR AREA OF CONTAMINATION UNITS
WITH LHAAP CERCLA SITES
IDW MANAGEMENT PLAN

FIGURE C-2

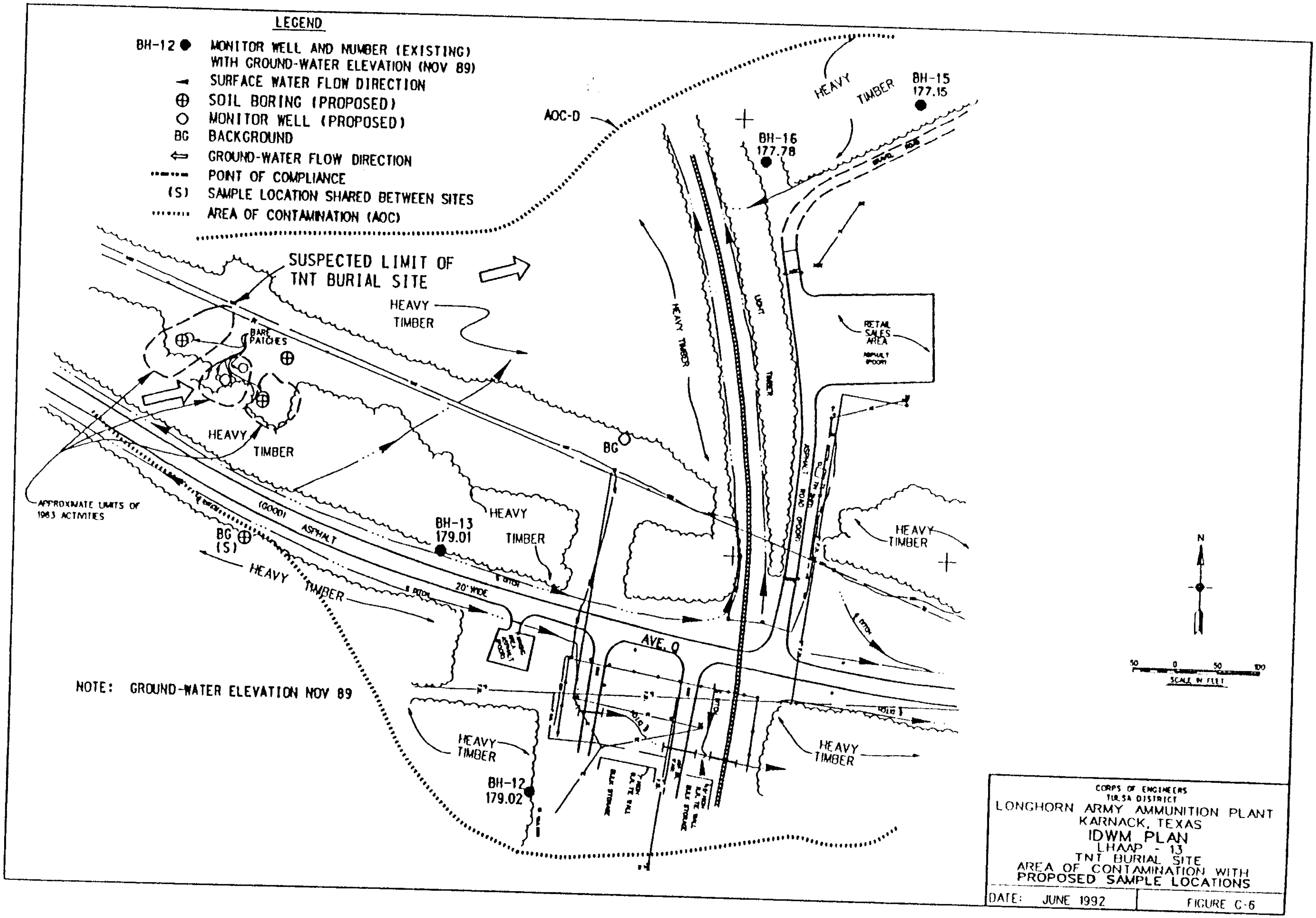

LEGEND
GROUND WATER FLOW DIRECTION
S5 SHALLOW SOIL SAMPLE AND NUMBER (PREVIOUS)
B1 SOIL BORING AND NUMBER (PREVIOUS)
BG BACKGROUND SAMPLE
SOIL BORING (PROPOSED)
SURFACE WATER / SEDIMENT SAMPLE (PROPOSED)
SURFACE WATER FLOW DIRECTION
POINT OF COMPLIANCE
AREA OF CONTAMINATION UNIT (AOC)
CORPS OF ENGINEERS
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 C3
SCALE IN FEET
SUSPECTED LIMIT OF TNT BURIAL SITE
HEAVY TIMBER
HEAVY TIMBER
HEAVY TIMBER
HEAVY TIMBER
5' HIGH MOUND
BORROW AREA
SMALL PINE TREES
AOC
AOC-D
AOC-D
ASPHALT (FAIR)
20' WIDE
AVE. Q
ASPHALT (GOOD)
20' WIDE
AVE. P
GATE
S1
S2
S3
S4
S5
S6
S7
S8
S9
B1
0001
0002
0003
BG
BG

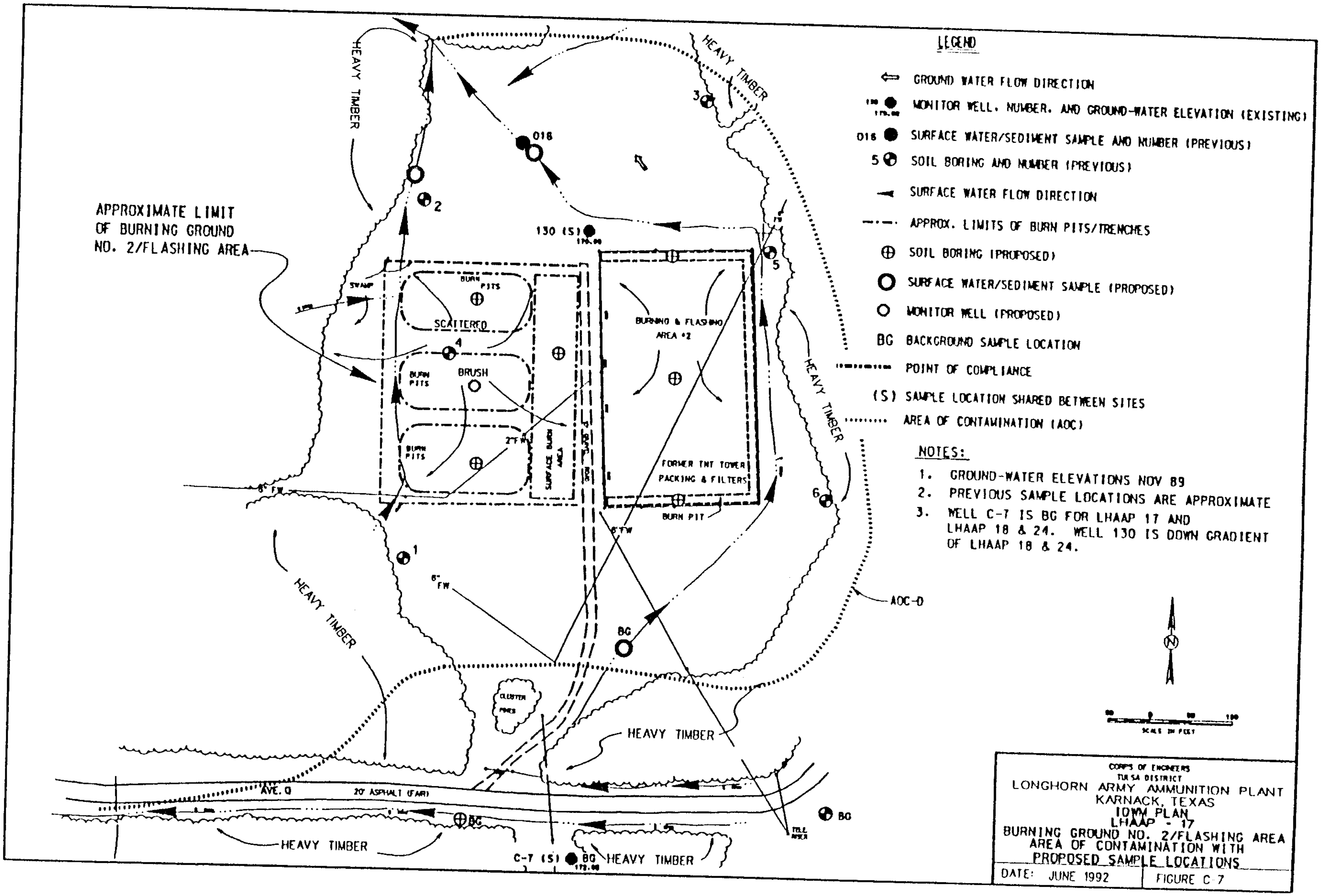

LEGEND
GROUND WATER FLOW DIRECTION
SURFACE WATER FLOW DIRECTION
MONITOR WELL, NUMBER, AND GROUND-WATER ELEVATION (EXISTING)
SOIL BORING (PREVIOUS) SEE NOTE
SURFACE WATER / SEDIMENT SAMPLE AND NUMBER (PREVIOUS)
SOIL BORING (PROPOSED)
SURFACE WATER/SEDIMENT SAMPLE (PROPOSED)
MONITOR WELL CLUSTER (PROPOSED)
BACKGROUND SAMPLE LOCATION
APPROXIMATE LIMITS OF DISPOSAL SITES
MONITOR WELL TO BE PLUGGED
DEEP STRATIGRAPHIC TEST BORING (PROPOSED)
POINT OF COMPLIANCE
AREA OF CONTAMINATION (AOC)
BH-14 (P) 176.53
BH-15 (P) 177.15
BH-16 (P) 177.78
BH-13 179.01
BH-12 179.02
122 173.55
701
702
703
704
705
017
BG
AOC-B
HEAVY TIMBER
GRAVEL ROAD
RETAIL SALES AREA
AVE. Q
APPROXIMATE LIMITS OF INACTIVE LANDFILL SITE
NOTES:
1. GROUND-WATER ELEVATION NOV 89
SCALE IN FEET
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

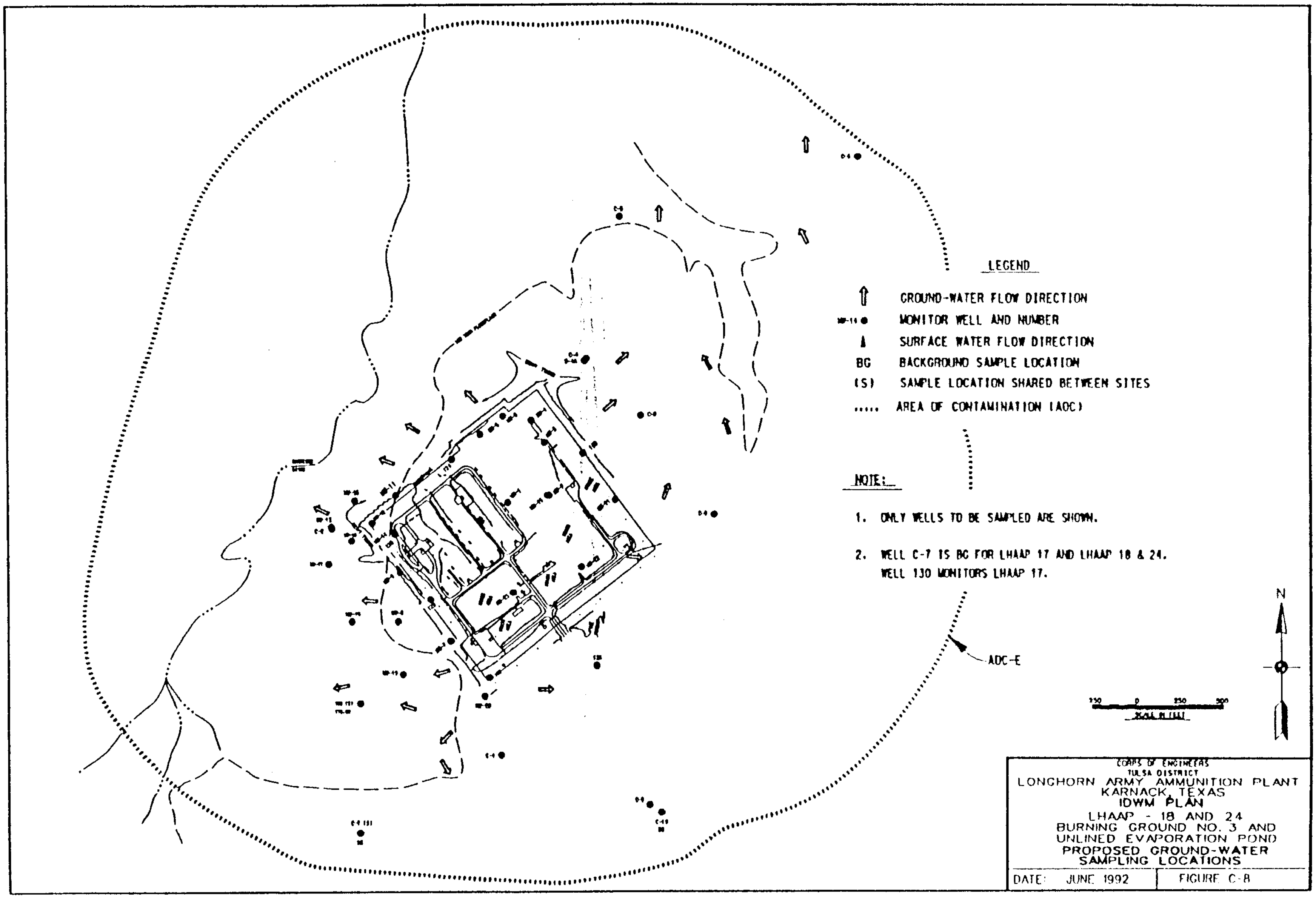


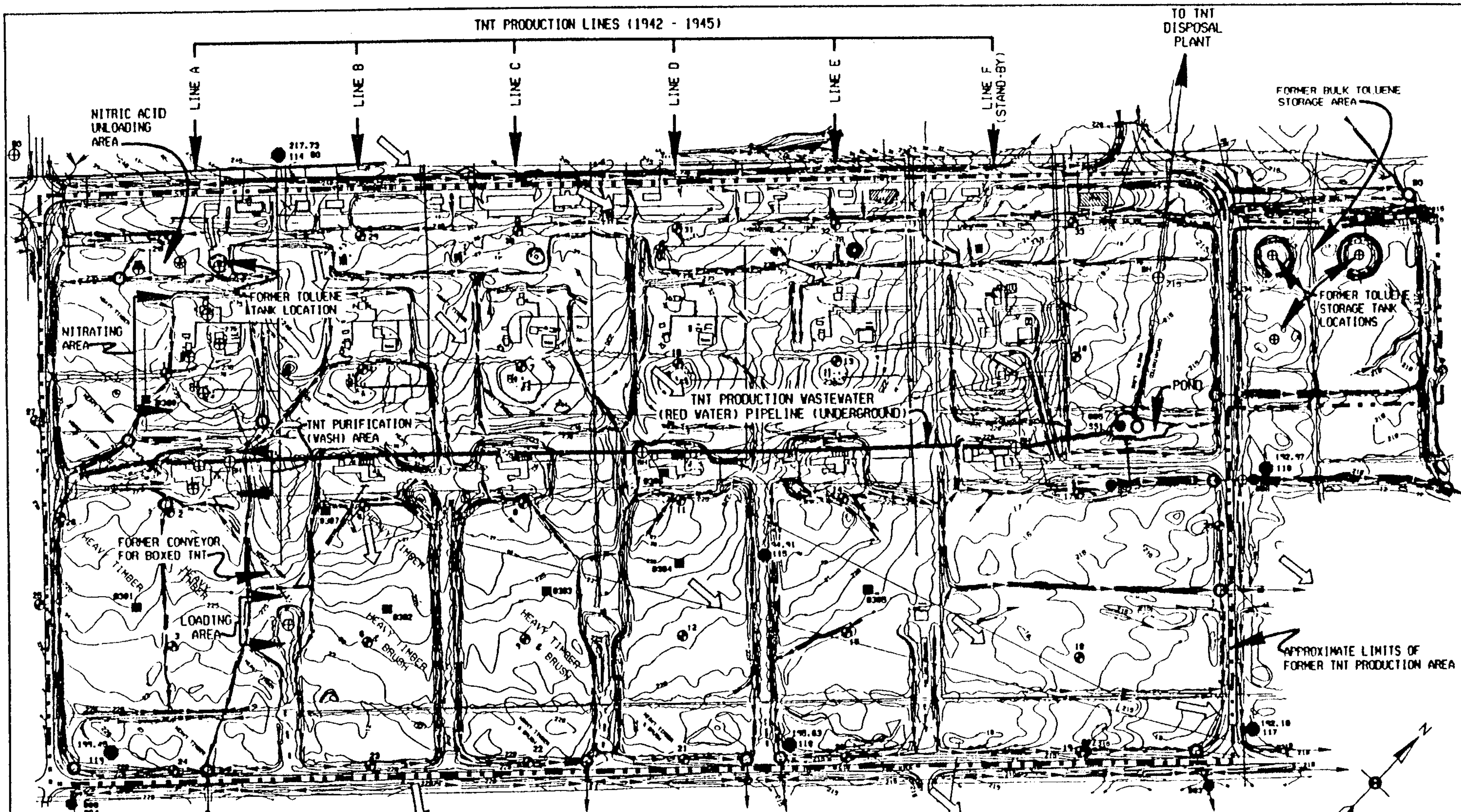
LEGEND
BH-12 MONITOR WELL AND NUMBER (EXISTING) WITH GROUND-WATER ELEVATION (NOV 89)
SURFACE WATER FLOW DIRECTION
SOIL BORING (PROPOSED)
MONITOR WELL (PROPOSED)
BG BACKGROUND
GROUND WATER FLOW DIRECTION
POINT OF COMPLIANCE
(S) SAMPLE LOCATION SHARED BETWEEN SITES
(P) MONITOR WELL TO BE PLUGGED
AREA OF CONTAMINATION (AOC)
HEAVY TIMBER
LIGHT TIMBER
BH-15
177.15
BH-16
177.78
BH-13 (P)
179.01
BH-12 (P)
179.02
BG
BG (S)
BARE PATCHES
RETAIL SALES AREA
20' WIDE
ASPHALT
(GOOD)
AVE. Q
BULK STORAGE
SUSPECTED LIMIT OF SITE
AOC-D
NOTE: GROUND-WATER ELEVATION NOV 89
SCALE IN FEET
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

006537


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
APPROXIMATE LIMITS OF 1963 ACTIVITIES
BG (S)
BG
BH-15 177.15
BH-16 177.78
BH-13 179.01
BH-12 179.02
LIGHT TIMBER
RETAIL SALES AREA
ASPHALT ROAD (POOR)
(GOOD) ASPHALT
20' WIDE
AVE. Q
BULK STORAGE
NOTE: GROUND-WATER ELEVATION NOV 89
N
50 0 50 100
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
HEAVY TIMBER
HEAVY TIMBER
HEAVY TIMBER
HEAVY TIMBER
HEAVY TIMBER
HEAVY TIMBER
016
130 (S)
SWAMP
BURN PITS
SCATTERED
BRUSH
BURN PITS
BURN PITS
SURFACE BURN AREA
BURNING & FLASHING AREA #2
FORMER TNT TOWER PACKING & FILTERS
BURN PIT
2" FW
6" FW
6" FW
6" FW
BG
AOC-D
CLUSTER PINES
AVE. Q
20' ASPHALT (FAIR)
BG
C-7 (S) BG
BG
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
SCALE IN FEET


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
250 0 250 500
SCALE IN FEET
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



NOTE:

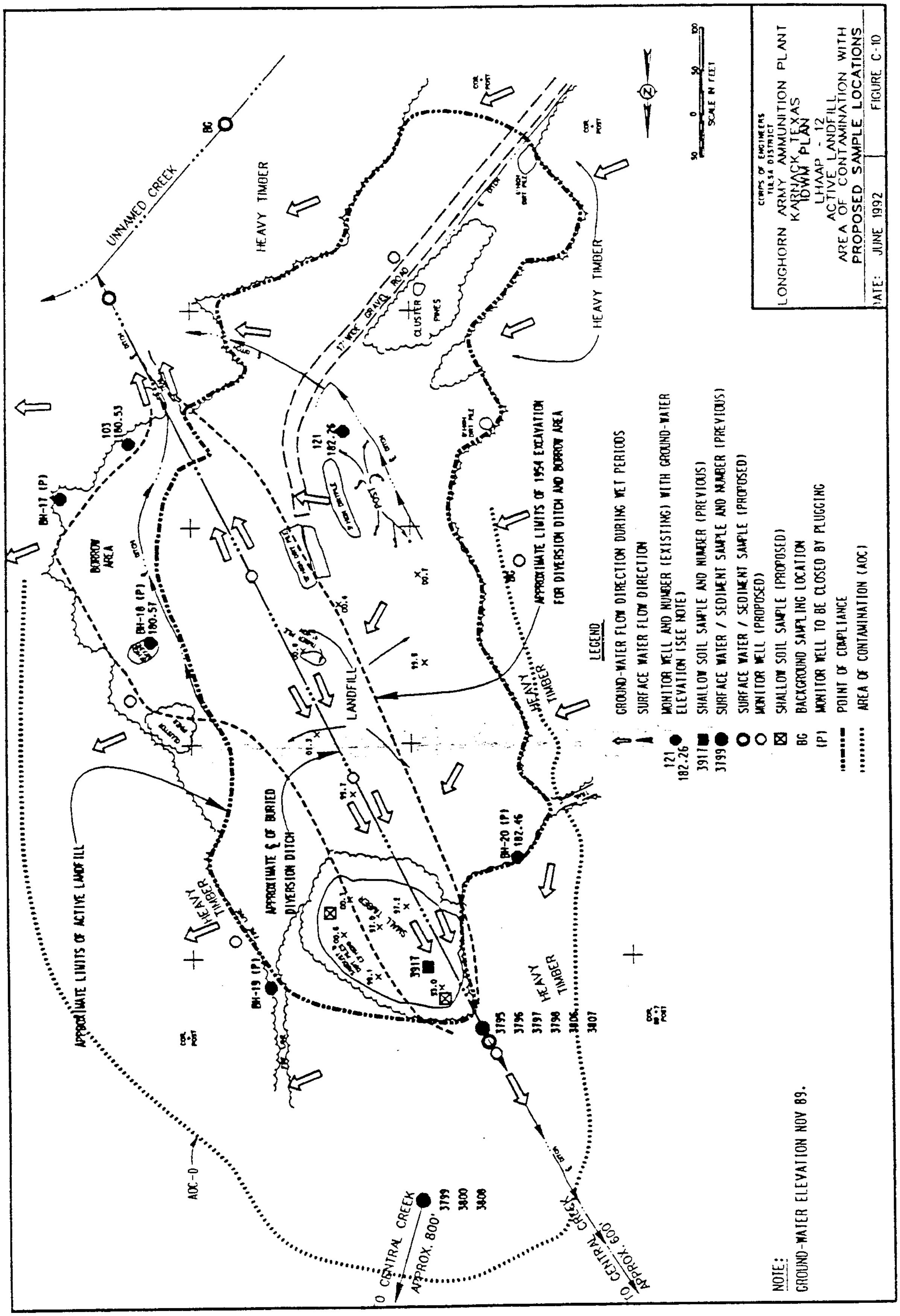
1. GROUND-WATER ELEVATION NOV 89
2. PREVIOUS SAMPLING LOCATIONS ARE APPROXIMATE
3. SEE FIGURE 6-7-2 FOR ADDITIONAL SAMPLE LOCATIONS
4. PRODUCTION LINE A CONSTRUCTED FIRST AND OPERATED FROM OCTOBER 1942 TO AUGUST 1945

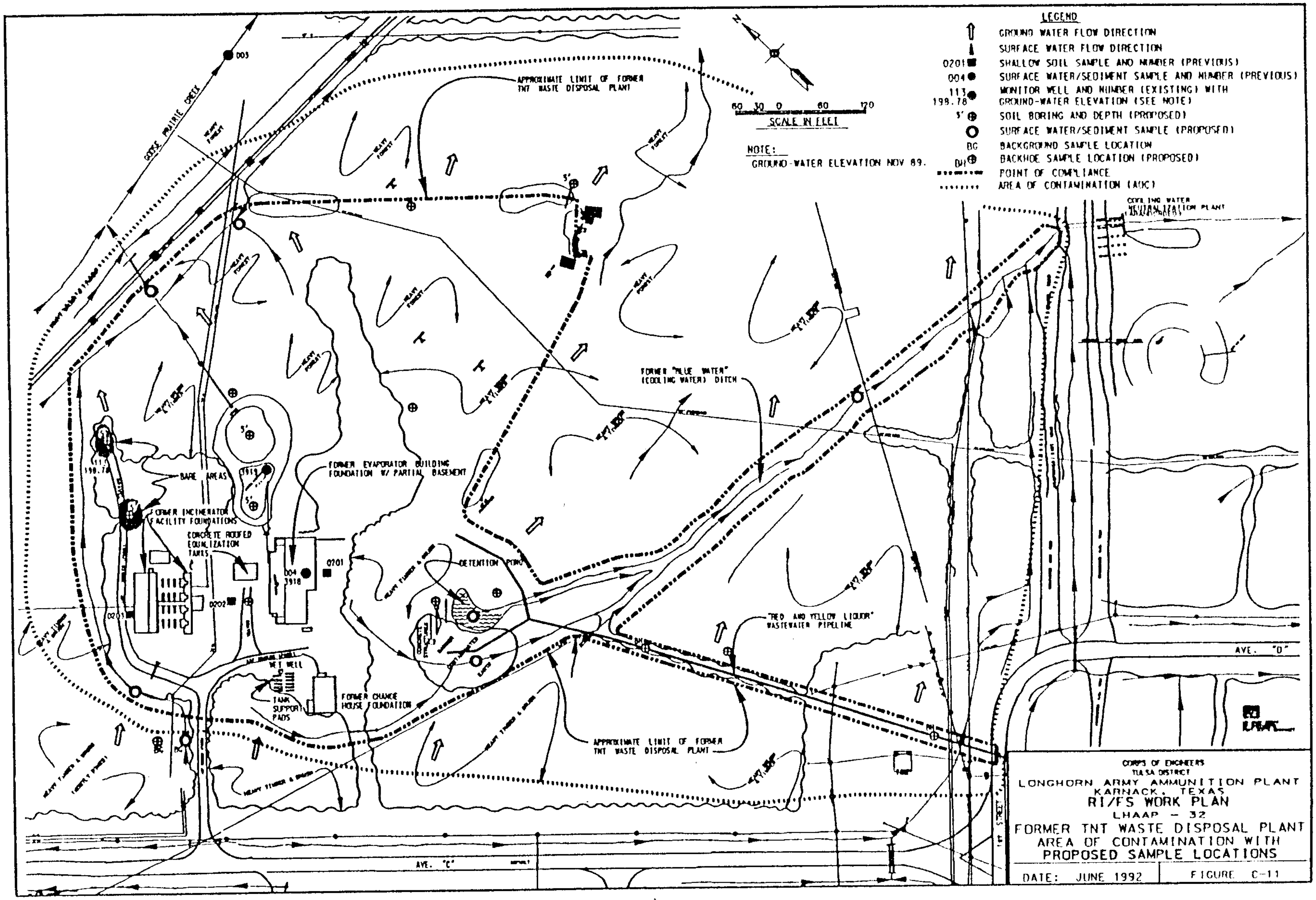
LEGEND

- 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)
- BO BACKGROUND SAMPLE
- BACKHOE SAMPLE (PROPOSED)
- POINT OF COMPLIANCE

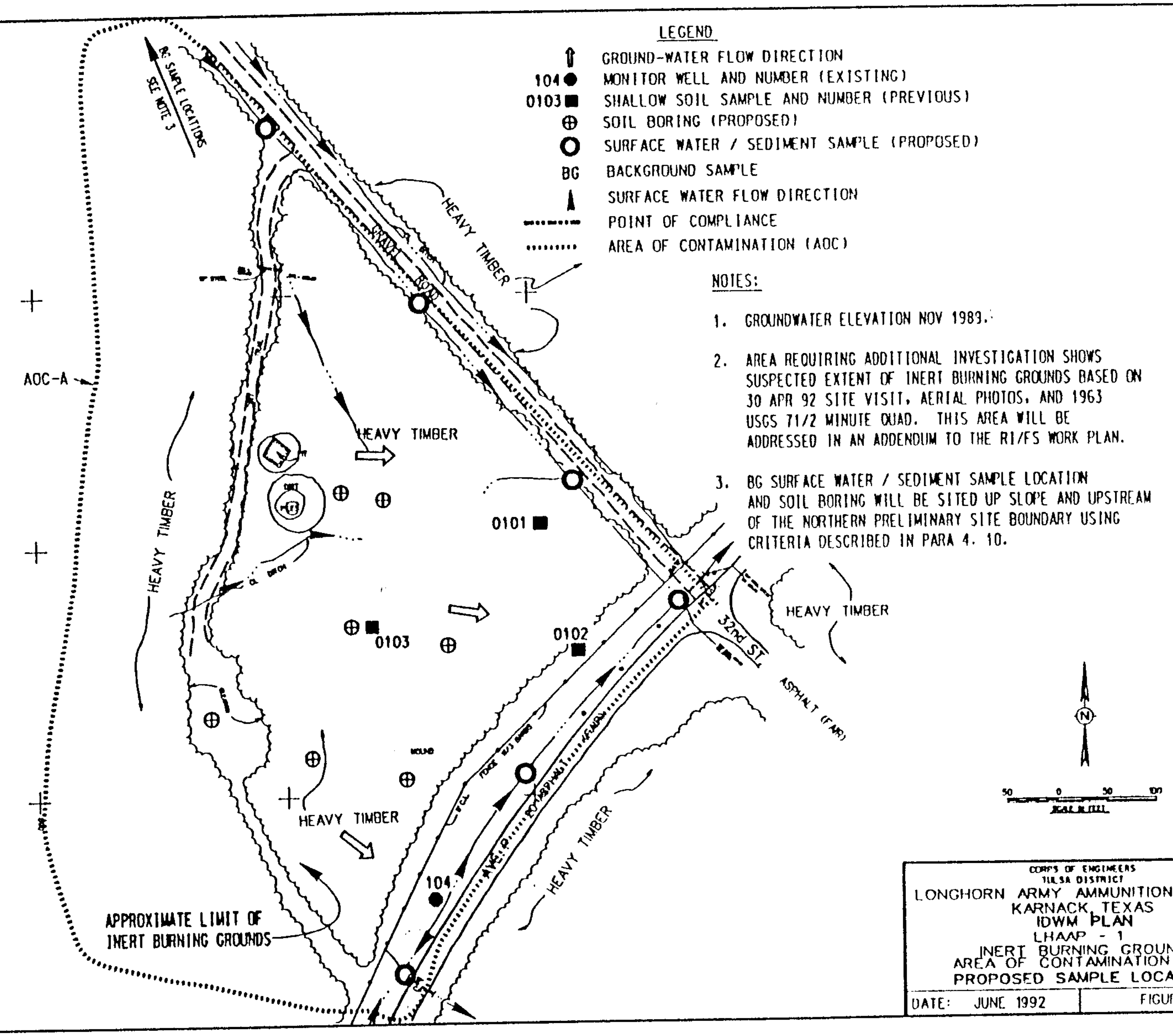
006541

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


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
50 0 50 100
SCALE IN FEET
UNNAMED CREEK
BG
HEAVY TIMBER
HEAVY TIMBER
HEAVY TIMBER
HEAVY TIMBER
HEAVY TIMBER
17' WIDE GRAVEL ROAD
CLUSTER
PINES
103
180.53
121
182.26
BH-17 (P)
BORROW AREA
BH-18 (P)
180.57
LANDFILL
APPROXIMATE LIMITS OF 1954 EXCAVATION FOR DIVERSION DITCH AND BORROW AREA
APPROXIMATE LIMITS OF ACTIVE LANDFILL
APPROXIMATE ℄ OF BURIED DIVERSION DITCH
SMALL TIMBER
3917
BH-19 (P)
BH-20 (P)
182.46
3795
3796
3797
3798
3806
3807
AOC-0
TO CENTRAL CREEK
APPROX. 800'
3799
3800
3808
TO CENTRAL CREEK
APPROX. 600'
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.


LEGEND
GROUND WATER FLOW DIRECTION
SURFACE WATER FLOW DIRECTION
0201 SHALLOW SOIL SAMPLE AND NUMBER (PREVIOUS)
004 SURFACE WATER/SEDIMENT SAMPLE AND NUMBER (PREVIOUS)
113 199.78 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
DH 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.
APPROXIMATE LIMIT OF FORMER TNT WASTE DISPOSAL PLANT
FORMER "BLUE WATER" (COOLING WATER) DITCH
FORMER EVAPORATOR BUILDING FOUNDATION W/ PARTIAL BASEMENT
FORMER INCINERATOR FACILITY FOUNDATIONS
CONCRETE ROOFED EQUALIZATION TANKS
BARE AREAS
DETENTION POND
"RED AND YELLOW LIQUOR" WASTEWATER PIPELINE
FORMER CHANGE HOUSE FOUNDATION
TANK SUPPORT PADS
WET WELL
COOLING WATER NEUTRALIZATION PLANT
GOOSE PRAIRIE CREEK
AVE. "C"
AVE. "D"
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

006542



LEGEND

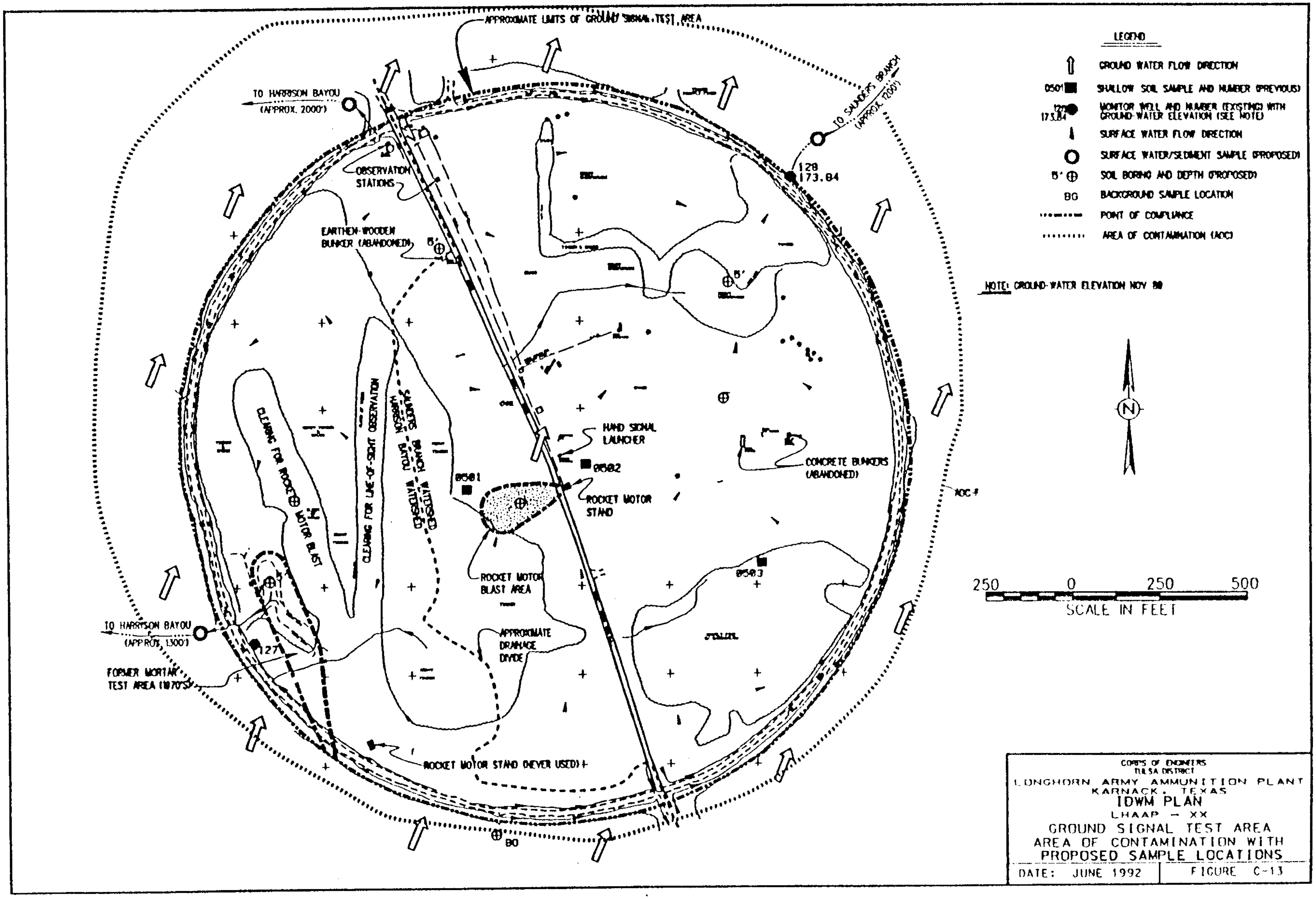
- GROUND-WATER FLOW DIRECTION
- 104 ● MONITOR WELL AND NUMBER (EXISTING)
- 0103 ■ SHALLOW SOIL SAMPLE AND NUMBER (PREVIOUS)
- ⊕ SOIL BORING (PROPOSED)
- O SURFACE WATER / SEDIMENT SAMPLE (PROPOSED)
- BG BACKGROUND SAMPLE
- SURFACE WATER FLOW DIRECTION
- POINT OF COMPLIANCE
- AREA OF CONTAMINATION (AOC)

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.

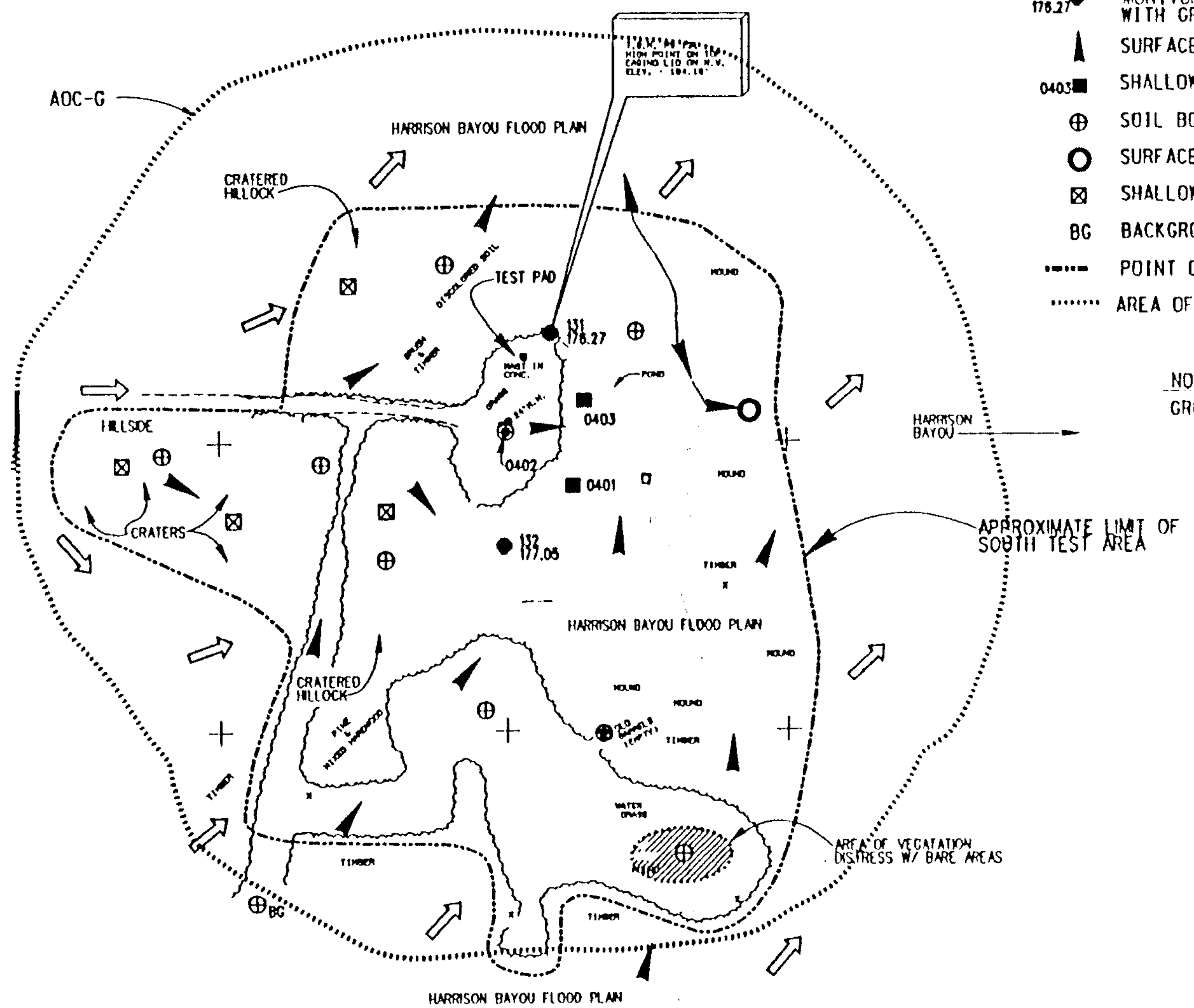
CORPS OF ENGINEERS
TULSA DISTRICT
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
IDWM PLAN
LHAAP - 1
INERT BURNING GROUNDS
AREA OF CONTAMINATION WITH
PROPOSED SAMPLE LOCATIONS

DATE: JUNE 1992 | FIGURE C-12



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



LEGEND

- GROUND WATER FLOW DIRECTION
- 131 176.27 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.

N

50 0 50 100
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. <u>RCRA Hazardous Waste</u>. 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. <u>Contaminated Non-Hazardous</u>. If it is transported off-site the IDW must have a Bill of Lading.

4.5.3. <u>Non-Contaminated</u>. 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.

006554

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

006555

006556

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

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.

006558

TABLE OF CONTENTS (continued)

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.

006561

- 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.

006563

Blank

006564

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[3] ("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[4]) 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[(7)]). 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[2] 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).

006573

Blank

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 <u>ignitability</u> 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 corrosivity 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 reactivity 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 TCLP-toxicity 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[11], 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).

- 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.

Blank

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.

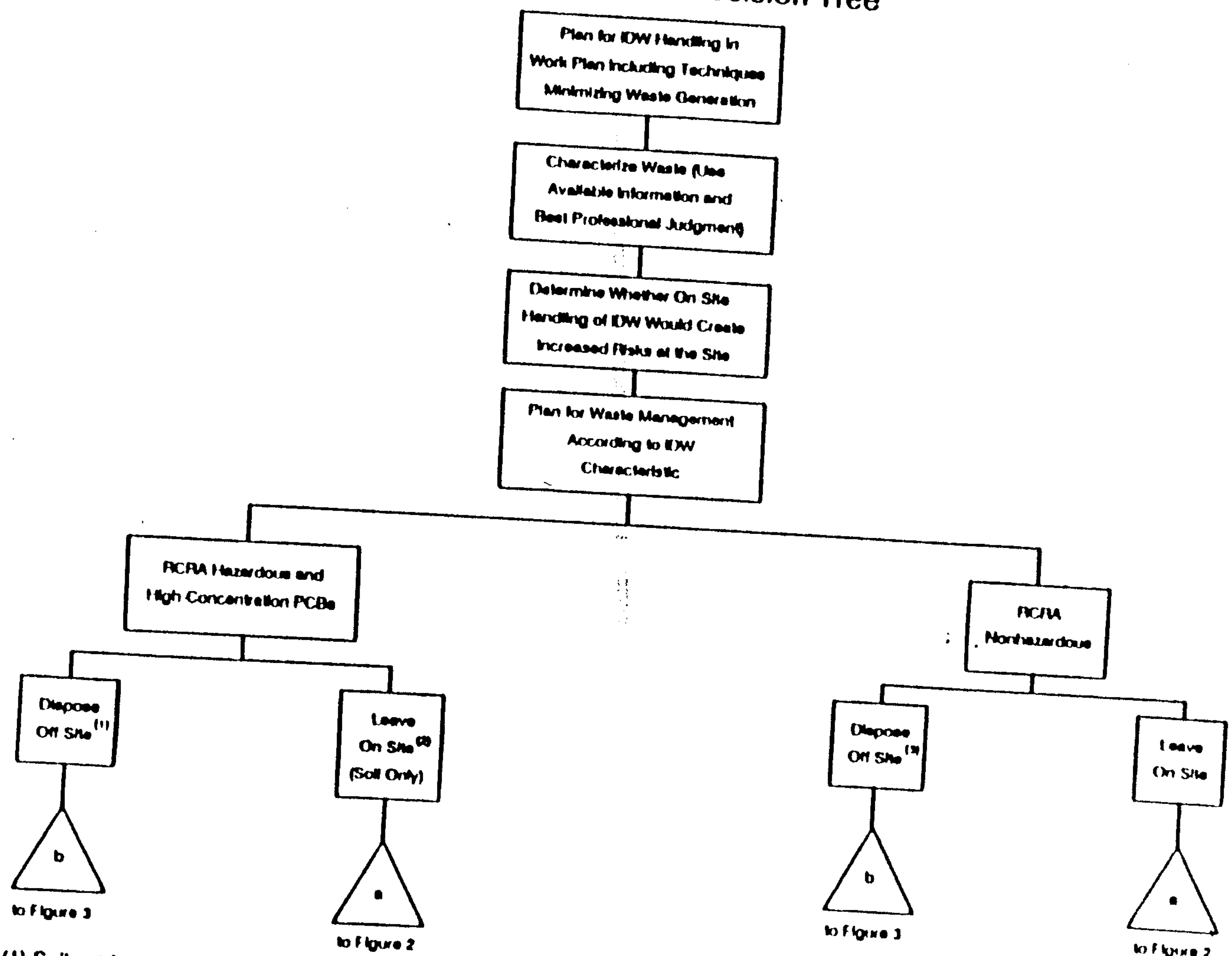
The decision tree points out that when the ground water is RCRA nonhazardous (the most common situation), the water may be managed on-site (Figure 2) using one of a few simple techniques. If decontamination fluids are RCRA nonhazardous, they should be handled similarly. The decision tree indicates (Figure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

006583

Figure

IDW Management Decision Tree



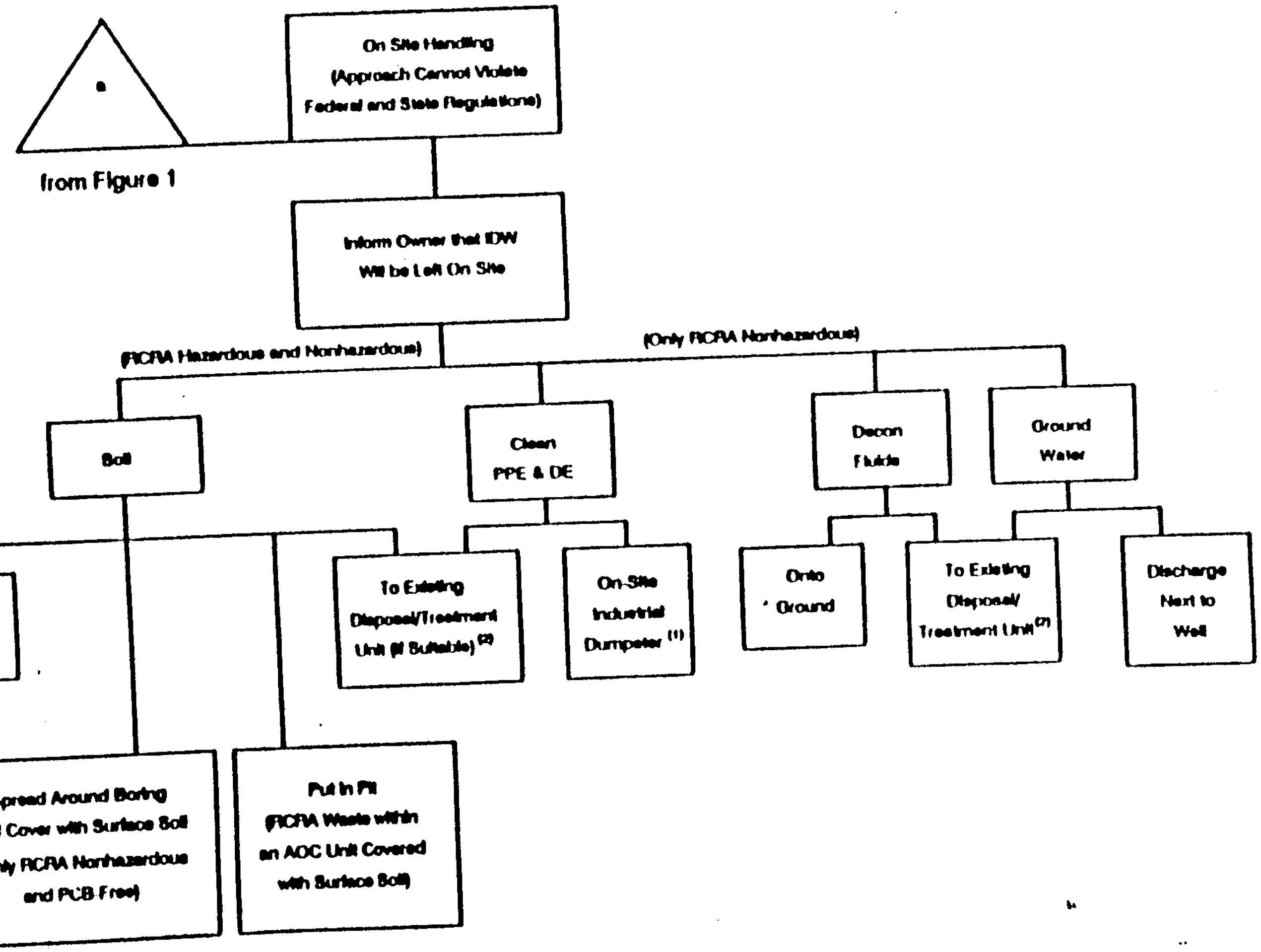
(1) Soil cuttings, ground water, and decontamination fluids creating increased hazards at the site should be disposed off site. Before and after the SI, determine anticipated waste quantity and applicable regulations for waste generators.

(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.

Figure 2

IDW Management Decision Tree



006584

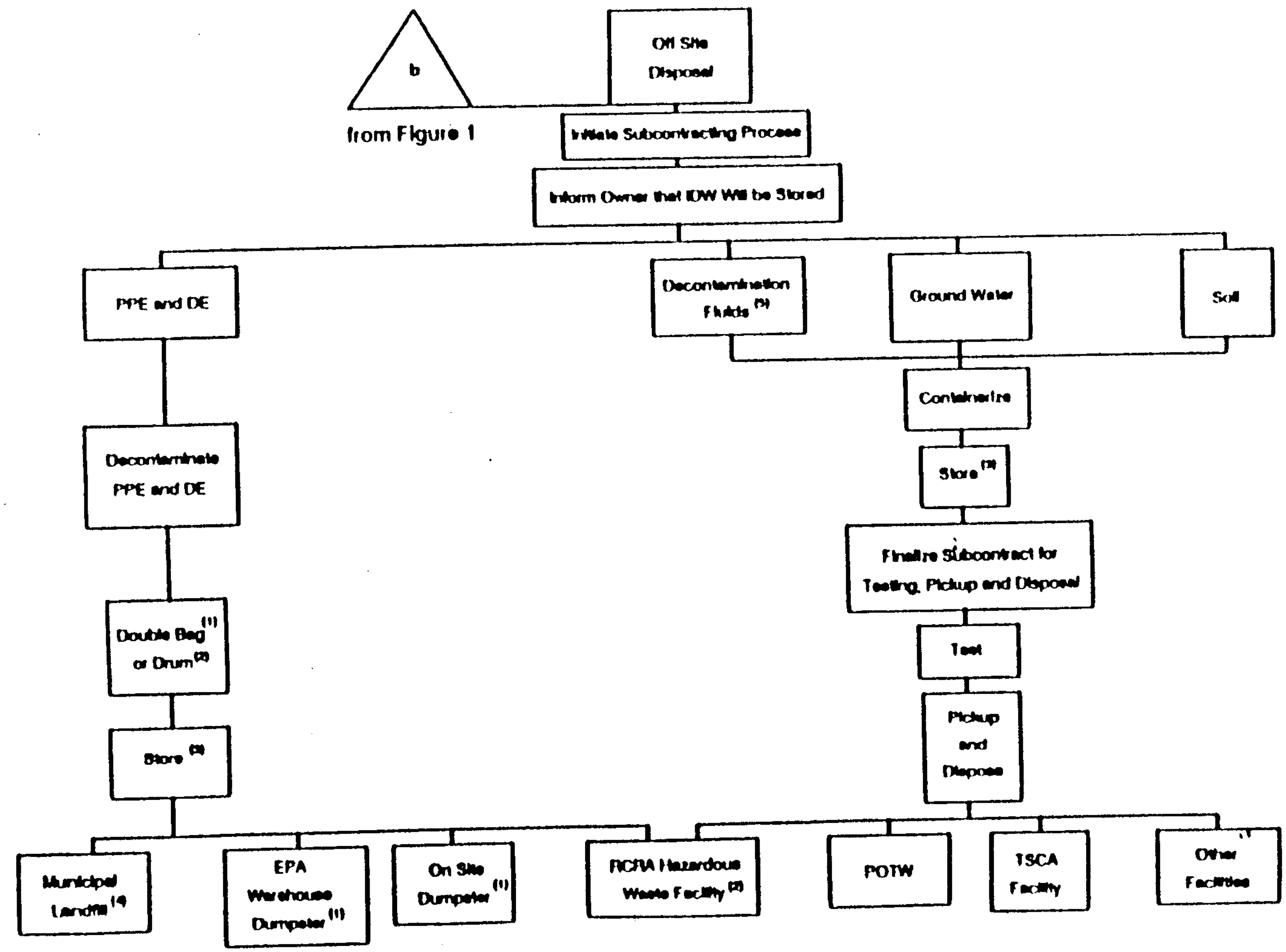
(1) Clean PPE and DE may also go to the nearest landfill or to an EPA warehouse dumpster.

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

006585

Figure 3

IDW Management Decision Tree



(1) Only RCRA nonhazardous waste.

(2) Only RCRA hazardous waste generated in quantities greater then 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.

- 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.

006589

Blank

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 RCRA hazardous soil cuttings, 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.

006595

Blank

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).

006597

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

RELEVANT PARTS OF THE NCP

006598

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

Printed on Recycled Paper

006599

Blank

006600

(SC-74)

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 encompasses 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

Blank

00660

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 8).

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 [illegible]

Blank

Page 77 is continuing page

006604

(8676)

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 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).[9] 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 actions cannot be expected to att 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 water contamination, the removal 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

[9] 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 "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

006608

0008

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 51436). The ARARs preamble described three types of TBCs: health effects information with a high degree of credibility, technical information on how 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

This page intentionally left blank.

006610

(8046)

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

006611

This page intentionally left blank.

006612

(8755

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] relevant and appropriate 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[s to] whether an ARAR represents a fina[l] remediation goal or an interim stan[dard] and it cannot be met during the act[ion,] this waiver could be invoked.

Comments were also received on EPA's discussion of compliance wi[th] ARARs during remedial investigat[ion] in the preamble to the proposed N[CP] (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] 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).[30] 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.

---

[30] 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.[31] 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

[31] 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

006615

Blank

006616

Blank

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^{-2} 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

006618

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. 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 Congress was prospective rather than 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 disposal unit constitute "placement into 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

006620

Blank

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 for clarification on who was responsible 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. Ba[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[illegible]

---

[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.

006622

APPENDIX B to EPA/540/6-91/009

OSWER DIRECTIVE 9347.3-05 FS
SUPERFUND LDR GUIDE #5

006623

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.

006624

Blank

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 <u>does</u> 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 <u>does not</u> 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 <u>RCRA hazardous waste</u> 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 <u>listed</u> or exhibits a hazardous <u>characteristic</u>.

<u>Listed RCRA Hazardous Wastes</u>

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))

<u>Characteristic RCRA Hazardous Wastes</u>

Any waste exhibiting one of the following characteristics, as defined in 40 CFR 261:

- Ignitability
- Corrosivity
- Reactivity
- Extraction Procedure (EP) Toxicity

* 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

006627

APPENDIX C to EPA/540/6-91/009

OSWER DIRECTIVE 9330.2-04

DISCHARGE OF WASTEWATER FROM CERCLA SITES INTO POTWs

Highlight 4: LDR STATUTORY DEADLINES

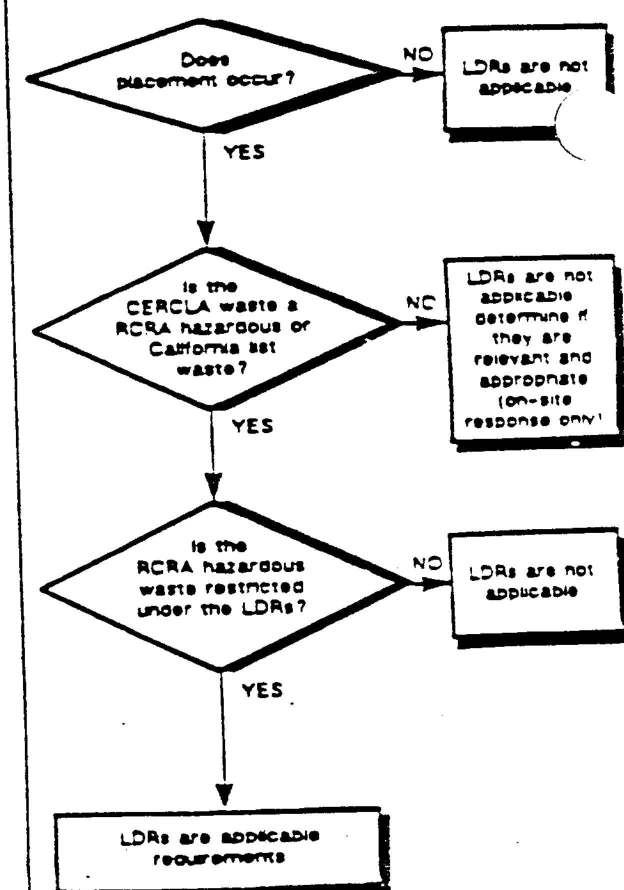
Waste	Statutory Deadline
Spent Solvent and Dioxin-Containing Wastes	November 8, 1986
California List Wastes	July 8, 1987
First Third Wastes	August 8, 1988
Spent Solvent, Dioxin-Containing, and California List Soil and Debris From CERCLA/RCRA Corrective Actions	November 8, 1988
Second Third Wastes	June 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



006629

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

006630

Blank

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 <u>with</u> an approved pretreatment program are required to have the mechanisms necessary to ensure compliance by industrial users with applicable pretreatment standards and requirements.* POTWs <u>without</u> 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.

---

*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 industri effluents, investigate noncompliance, and comply with public p icipation 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:

- 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).

- 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.

- 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.

- The potential for volatilization of the wastewater at the CERCLA site and POTW and its impact upon air quality.

- The potential for groundwater contamination from transport of CERCLA wastewater or impoundment at the POTW, and the need for groundwater monitoring.

- 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

006635

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

TCLP CONSTITUENTS

006636

TOXICITY CHARACTERISTIC CONSTITUENTS AND REGULATORY LEVELS

Constituent	Regulatory level (mg/L)
	5.0
Arsenic	100.0
Barium	0.5
Benzene	1.0
Cadmium	0.5
Carbon tetrachloride	0.03
Chlorodane	100.0
Chlorobenzene	6.0
Chloroform	5.0
Chromium	200.0
o-Cresol	200.0
m-Cresol	200.0
p-Cresol	10.0
2,4-D	7.5
1,4-Dichlorobenzene	0.5
1,2-Dichloroethane	0.7
1,1-Dichloroethylene	0.13
2,4-Dinitrotoluene	0.02
Endrin	0.008
Heptachlor (and its hydroxide)	0.13
Hexachlorobenzene	0.5
Hexachloro-1,3-butadiene	3.0
Hexachlorethane	5.0
Lead	0.4
Lindane	0.2
Mercury	10.0
Methoxychlor	200.0
Methyl ethyl ketone	2.0
Nitrobenzene	

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

006638

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

GLOSSARY OF TERMS

006639

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