LONGHORN ARMY AMMUNITION PLANT

KARNACK, TEXAS

ADMINISTRATIVE RECORD

VOLUME 2 of 5

1996

Bate Stamp Numbers
017278 - 017850

Prepared for:

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

1996

VOLUME 2 of 5

1996

A. Title: Letter - Subject: Longhorn Army Ammunition Plant, Management of Investigation Derived Waste
Group(s): All
Site(s): All
Location: Longhorn Army Ammunition Plant
Agency: Texas Natural Resource Conservation Commission
Author(s): Ms. Diane R. Poteet, Project Mgr., RI/FS II Unit, Superfund Investigation Section, Pollution Cleanup Division
Recipient: Mr. James A. McPherson, Commander's Representative, Longhorn Army Ammunition Plant
Date: March 5, 1996
Bate Stamp: 017278-017279

B. Title: Letter - Subject: Longhorn Army Ammunition Plant, Interim Remedial Action at Landfill Sites 12 & 16, Draft Project Work Plans
Group(s) 2
Site(s): 12 & 16
Location: Longhorn Army Ammunition Plant
Agency: Texas Natural Resource Conservation Commission
Author(s): Ms. Diane R. Poteet, Project Mgr., RI/FS II Unit, Superfund Investigation Section, Pollution Cleanup Division
Recipient: Mr. James A. McPherson, Commander's Representative, Longhorn Army Ammunition Plant
Date: March 13, 1996
Bate Stamp: 017280

C. Title: Memorandum - Subject: Review of the Draft Group Four Baseline Risk Assessment Work Plan, Longhorn Army Ammunition Plant, Karnack, Texas, 26 January 1996
Group(s): 4
Site(s): 35 (Sumps)
Location: Longhorn Army Ammunition Plant
Agency: Department of The Army, U. S. Army Center for health Promotion and Preventive Medicine
Author(s): Arthur P. Lee, P.E., MAJ, MS, Program Manager, Health Risk Assessment and Risk Communication
Recipient: Ms. Jonna Polk, U. S. Army Engineering District, Tulsa
Date: March 19, 1996
Bate Stamp: 017281

D. Title: Letter - Subject: EPA's Draft Comments on the Draft Project Work Plans, Interim Remedial Action (Landfills 12 & 16) (w/enclosures)
Group(s): 2
Site(s): Landfill Caps (12 & 16)
Location: Longhorn Army Ammunition Plant
Agency: U. S. Environmental Protection Agency
Author(s): Mr. Chris G. Villarreal, Remedial Project Manager
Recipient: Mr. David Tolbert, Project Mgr.
Date: March 22, 1996

Bate Stamp: 017282-017284

E. Title: Memorandum - Subject: Review of the Draft Project Work Plans for the Interim Remedial Action for Landfills 12 & 16 Caps, for Longhorn Army Ammunition Plant, Karnack, Texas, 30 January 1996
Group(s): 2
Site(s): Landfill Caps (12 & 16)
Location: Longhorn Army Ammunition Plant
Agency: Department of The Army, U.S. Army Center for Health Promotion & Preventive Medicine
Author(s): Arthur P. Lee, P.O. MAJ, MS, Program Mgr., Health Risk Assessment & Risk Communication
Recipient: District Engineer, U.S. Army Engineering District, Tulsa, ATTN: CESWT-PP-EA/Ms. Jonna Polk
Date: March 25, 1996
Bate Stamp: 017285

F. Title: Letter - Subject: Longhorn Army Ammunition Plant, Interim Remedial Action at Landfill Sites 12 & 16, Draft Project Work Plans (w/enclosures)
Group(s): 2
Site(s): 12 & 16 (Landfills)
Location: Longhorn Army Ammunition Plant
Agency: Texas Natural Resource Conservation Commission
Author(s): Ms. Diane R. Poteet, Project Mgr., RI/FS II Unit, Superfund Investigation Section, Pollution Cleanup Division
Recipient: Mr. James A. McPherson, Commander's Representative, Longhorn Army Ammunition Plant
Date: March 25, 1996
Bate Stamp: 017286-017288

G. Title: Letter - Subject: Air Monitoring Plan, Interim Remedial Action for Burning Ground No. 3, Longhorn Army Ammunition Plant
Group(s): 2
Site(s): Burning Ground No. 3 (Sites 18/24)
Location: Longhorn Army Ammunition Plant
Agency: United States Environmental Protection Agency
Author(s): Mr. Chris G. Villarreal, Remedial Project Mgr.
Recipient: Mr. David Tolbert, Project Mgr.
Date: March 25, 1996
Bate Stamp: 017289

H. Title: FACT SHEET - Subject: Restoration Advisory Board
Site(s): General
Location: Longhorn Army Ammunition Plant
Agency: U. S. Army Industrial Operations Command
Author(s): External Affairs Office, Rock Island, IL 61299
Recipient: Public - Local Area Residents
Date: March 29, 1996
Bate Stamp: 017290-017291

I. Title: Minutes - Subject: Technical Review Committee Meeting
Group(s): All
Site(s): All

Location: Longhorn Army Ammunition Plant
Date: April 2, 1996
Bate Stamp: 017292-017293

J. Title: Letter - Subject: Longhorn Army Ammunition Plant, Group 2, Phase 2, RI. Sampling & Data Results Report & Laboratory Data Validation Report
Group(s): 2
Site(s): 12, 17, 18, 24, 29 & 32
Location: Longhorn Army Ammunition Plant
Agency: Texas Natural Resource Conservation Commission
Author(s): Ms. Diane R. Poteet, Project Mgr., RI/FS II Unit, Superfund Investigation Section, Pollution Cleanup Division
Recipient: Mr. James A. McPherson, Commander's Representative
Date: April 8, 1996
Bate Stamp: 017294

K. Title: Report - Subject: Final Air Monitoring Plan, Interim Remedial Action, Burning Ground No. 3
Group(s): 2
Site(s): Burning Ground No. 3 (Sites 18/24)
Location: Longhorn Army Ammunition Plant
Agency: Dow Environmental, Inc.
Author(s): Dow Environmental
Recipient: United States Corps of Engineers, Tulsa & Ft. Worth Districts
Date: April 16, 1996
Bate Stamp: 017295-017422

L. Title: Memorandum - Subject: Review of the Laboratory Data Validation Report for the Phase 2, Group 2 Sites, Remedial Investigation at the Longhorn Army Ammunition Plant (LHAAP), Karnack, TX, March 1996 (w/enclosure)
Group(s): 2
Site(s): 12, 16, 17, 18, 24, 29, 32
Location: Longhorn Army Ammunition Plant
Agency: Department of The Army, U.S. Army Center for Health Promotion and Preventive Medicine
Author(s): Arthur P. Lee, P.E., MAJ, MS, Program Mgr.
Recipient: Ms. Jonna Polk, U.S. Army Corps of Engineers, Tulsa District
Date: April 22, 1996
Bate Stamp: 017423-017424

M. Title: Letter - Subject: Longhorn Army Ammunition Plant, Group 4, Wastewater Sumps
Group(s): 4
Site(s): Wastewater Sumps (Site 35)
Location: Longhorn Army Ammunition Plant
Agency: Texas Natural Resource Conservation Commission
Author(s): Mr. Michael Moore, Assistant Project Mgr., RI/FS Unit, Superfund Investigation Section, Pollution Cleanup Section
Recipient: Mr. James A. McPherson, Commander's Representative
Date: April 29, 1996
Bate Stamp: 017425-017427

N. Title: Minutes - Subject: Monthly Manager's Meeting
Group(s): All

Site(s): All
Location: Longhorn Army Ammunition Plant
Date: May 7, 1996
Bate Stamp: 017428-017429

O. Title: Letter - Subject: Longhorn Army Ammunition Plant, Future Land Use Determination
Group(s): All
Site(s): All
Location: Longhorn Army Ammunition
Agency: Texas Natural Resource Conservation Commission
Author(s): Ms. Diane R. Poteet, Project Mgr., RI/FS II Unit, Superfund Investigation Section, Pollution Cleanup Division
Recipient: Mr. James A. McPherson, Commander's Representative
Date: May 13, 1996
Bate Stamp: 017430-017431

P. Title: Letter - Subject: Longhorn Army Ammunition Plant, Interim Remedial Action - Landfills 12 & 16 Caps, Draft Final Project Work Plans and Interim Remedial Action, Burning Ground No. 3, Final Air Monitoring Plan
Group(s): 2, 3
Site(s): Landfill Caps, Burning Ground (12 & 16 - 18 & 24)
Location: Longhorn Army Ammunition Plan
Agency: United States Environmental Protection Agency
Author(s): Mr. Chris G. Villarreal, Remedial Project Mgr., Superfund Division
Recipient: Mr. James A. McPherson, Commander's Representative
Date: May 15, 1996
Bate Stamp: 017432-017433

Q. Title: Letter - Subject: Longhorn Army Ammunition Plant, Group 1 Sites, Draft Final Remedial Investigation Report (w/enclosure)
Group(s): 1
Site(s): Remedial Investigation (1, 11, XX, 27)
Location: Longhorn Army Ammunition Plant
Agency: Texas Natural Resource Conservation Commission
Author(s): Ms. Diane R. Poteet, Project Mgr., RI/FS II Unit, Superfund Investigation Section, Pollution Cleanup Division
Recipient: Mr. James A. McPherson, Commander's Representative
Date: May 16, 1996
Bate Stamp: 017434-017435

R. Title: Letter - Subject: Longhorn Army Ammunition Plant, Group 2 - Interim Remedial Action at Landfill Sites 12 & 16 (w/enclosure)
Group(s): 2
Site(s): 12 & 16 (Landfills)
Location: Longhorn Army Ammunition Plant
Agency: Texas Natural Resource Conservation Commission
Author(s): Ms. Diane R. Poteet, Project Mgr., RI/FS II Unit, Superfund Investigation Section, Pollution Cleanup Division
Recipient: Mr. James A. McPherson, Commander's Representative
Date: May 17, 1996
Bate Stamp: 017436-017439

S. Title: Report - Subject: Final Project Work Plans Removal and Closure of Wastewater Sumps
Group(s): 4
Site(s): 35 (Wastewater Sumps)
Location: Longhorn Army Ammunition Plant
Agency: OHM Remediation Services Corporation
Author: OHM
Recipient: U.S. Army Corps of Engineers
Date: May 20, 1996
Bate Stamp: 017440-017828

T. Title: Letter - Subject: Longhorn Army Ammunition Plant, Draft Final Group 4 Baseline Risk Assessment Work Plan and Draft Final Remedial Investigation Report Group 1 Sites
Group(s): 1 & 4
Site(s): 1, 11, XX, 27
35 (Wastewater Sumps)
Location: Longhorn Army Ammunition Plant
Agency: United States Environmental Protection Agency
Author(s): Mr. Chris G. Villarreal, Remedial Project Mgr., Superfund Division
Recipient: Mr. James A. McPherson, Commander's Representative
Date: May 20, 1996
Bate Stamp: 017829-017830

U. Title: Letter - Subject: Longhorn Army Ammunition Plant, Group 2 - Time Critical Removal Action at Landfill Site 16, Draft Design Analysis Report (w/enclosure)
Group(s): 2
Site(s): 16 (Old Landfill)
Location: Longhorn Army Ammunition Plant
Agency: Texas Natural Resource Conservation Commission
Author(s): Ms. Diane R. Poteet, Project Mgr., RI/FS II Unit, Superfund Investigation Section, Pollution Cleanup Division
Recipient: Mr. James A. McPherson, Commander's Representative
Date: May 22, 1996
Bate Stamp: 017831-017832

V. Title: Letter - Subject: Final Project Work Plans, Removal and Closure of Wastewater Sumps
Group(s): 4
Site(s): Wastewater Sumps (35)
Location: Longhorn Army Ammunition Plant
Agency: Department of The Army, Marshall, TX
Author(s): Mr. James McPherson, Commander's Representative
Recipient: Mr. H. L. Jones, Texas Natural Resource Conservation Commission
Date: May 22, 1996
Bate Stamp: 017833

W. Title: Memorandum - Subject: Review of the Draft Comprehensive Chemical Data Acquisition Plan for the Remedial Investigation/Feasibility Study at the Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas, April, 1996 (w/enclosure)
Group(s): 1
Site(s)(s): 1, 11, XX and 27
Location: Longhorn Army Ammunition Plant

Agency: Department of The Army, U. S. Center for Health Promotion & Preventive Medicine
Author(s): Arthur P. Lee, P.E., MAJ, MS, Program Mgr., Environmental Health Risk Assessment and Risk Communication
Recipient: District Engineer, U.S. Army Engineering District, Tulsa. ATTN: CESWT-PP-EA/Ms. Jonna Polk
Date: May 22, 1996
Bate Stamp: 017834-017835

X. Title: Memorandum - Subject: Review of Final Air Monitoring Plan, Interim Remedial Action at Burning Ground No. 3, Longhorn Army Ammunition Plant, Karnack, TX, Prepared by Dow Environmental, Inc., 16 April 1996 (w/enclosures)
Group(s): 2
Site(s): Burning Ground #3 (Sites 18/24)
Location: Longhorn Army Ammunition Plant
Agency: Department of The Army, U.S. Army Center for Health Promotion & Preventive Medicine
Author(s): Arthur P. Lee, P.E., MAJ, MS, Program Mgr., Environmental Health Risk Assessment and Risk Communication
Recipient: District Engineer, U.S. Army Engineering District, Tulsa, ATTN: CESWT-PP-EA/Ms. Jonna Polk
Date: May 22, 1996
Bate Stamp: 017836-017838

Y. Title: Letter - Subject: Longhorn Army Ammunition Plant, Group 4 sites - Baseline Risk Assessment Work Plan (w/enclosure)
Group(s): 4
Site(s): 35 (Wastewater Sumps)
Location: Longhorn Army Ammunition Plant
Agency: Texas Natural Resource Conservation Commission
Author(s): Ms. Diane R. Poteet, Project Mgr., RI/FS II Unit, Superfund Investigation Section, Pollution Cleanup Division
Recipient: Mr. James A. McPherson, Commander's Representative
Date: May 23, 1996
Bate Stamp: 017839-017843

Z. Title: Letter - Subject: Longhorn Army Ammunition Plant, EPA's Comments on the Draft Design Analysis Report for the Site 16 (Old Landfill) Time Critical Removal Action (w/enclosure)
Group(s): 2
Site(s): 16 (Old Landfill)
Location: Longhorn Army Ammunition Plant
Agency: United States Environmental Protection Agency
Author(s): Mr. Chris G. Villarreal, Remedial Project Manager
Recipient: Mr. James A. McPherson, Commander's Representative
Date: May 23, 1996
Bate Stamp: 017844-017850

Barry R. McBee, *Chairman*
R. B. "Ralph" Marquez, *Commissioner*
John M. Baker, *Commissioner*
Dan Pearson, *Executive Director*

D1

017278

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

March 5, 1996

CERTIFIED MAIL
P 836 901 725
RETURN RECEIPT REQUESTED

James A. McPherson, Commander's Representative
Longhorn Army Ammunition Plant
Attn: SIOLH-OR
Marshall, TX 75671-1059

Re: Longhorn Army Ammunition Plant
Management of Investigation Derived Waste

Dear Mr. McPherson:

This letter is in response to the Army's request, which was made at the Monthly Project Manager's meeting held on February 29, 1996, regarding the Texas Natural Resource Conservation Commission (TNRCC) Superfund Investigation Section's policy regarding management of investigation derived waste at Superfund sites. In general, our policy is to use a management approach which will not increase risk to human health or the environment, or allow the spread of contaminants off-site or to other media (*e.g.*, from soil to ground water or surface water, or from ground water to surface water, etc.). Additionally, applicable or relevant and appropriate requirements (ARAR's) must be met for the management of solid waste, as specified in Title 30 Texas Administrative Code Chapter 335 and EPA's Management of Investigation-Derived Wastes During Site Inspections (EPA/540/G-91/009).

Our specific recommendations are as follows:

1) If investigation derived environmental media (*i.e.*, soil, surface water or ground water) are determined to be "uncontaminated" (*i.e.*, laboratory analysis results of representative samples of the media have concentrations of organic constituents below appropriate detection limits and metals concentrations are not greater than background concentrations), these media may be spread out on the ground in the vicinity from which they were collected. Water and saturated soil should be spread out in such a manner that they do not enter a surface water body or otherwise cause siltation or erosion problems. This can usually be accomplished using a spray irrigation system, existing vegetation, and/or silt fences.

2) Any investigation derived wastes which do not meet the requirements of number 1, above, should be stored in appropriate containers (or tanks) at the site and treated with other wastes at the site during the remedial action phase of the project. Containers should be labeled and dated, placed on skids or pallets, and kept covered or otherwise protected from the weather to prevent deterioration of the container materials. If the responsible party does not feel that the waste can be safely stored at the site (*e.g.*, the site is subject to flooding, or is easily accessible to the public) the TNRCC and/or U. S. Environmental Protection Agency remediation project manager(s) should be contacted for further

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guidance as to what alternate management approach should be used (*e.g.*, construction of a more permanent storage facility; or off-site storage, treatment or disposal).

If you have any further questions regarding this matter, please call me at (512) 239-2502.

Sincerely,

Diane R. Poteet

Diane R. Poteet, Project Manager
RI/FS II Unit
Superfund Investigation Section
Pollution Cleanup Division

cc: Chris Villarreal, EPA Region 6 (6SF-AT)
Jonna Polk , COE Tulsa District (CESWT-PP-EA)

Barry R. McBee, *Chairman*
R. B. "Ralph" Marquez, *Commissioner*
John M. Baker, *Commissioner*
Dan Pearson, *Executive Director*

DJ

017280

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

March 13, 1996

CERTIFIED MAIL
P 836 901 726
RETURN RECEIPT REQUESTED

James A. McPherson, Commander's Representative
Longhorn Army Ammunition Plant
Attn: SIOLH-OR
Marshall, TX 75671-1059

Re: Longhorn Army Ammunition Plant
Interim Remedial Action at Landfill Sites 12 & 16
Draft Project Work Plans

Dear Mr. McPherson:

In accordance with Section XVII of the Federal Facility Agreement, the TNRCC requests a two week extension in order to provide a more thorough review and comment of the above referenced project. As I discussed with Mr. David Tolbert in a telephone conversation today, the deadline would be changed from March 18, 1996 to April 1, 1996. If you have any further questions regarding this matter, please call me at (512) 239-2502.

Sincerely,

Diane R. Poteet

Diane R. Poteet, Project Manager (MC-143)
RI/FS II Unit
Superfund Investigation Section
Pollution Cleanup Division

cc: Chris Villarreal, EPA Region 6 (6SF-AT)
Jonna Polk , COE Tulsa District (CESWT-PP-EA)

DEPARTMENT OF THE ARMY
U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE
ABERDEEN PROVING GROUND, MARYLAND 21010-5422

MAR 29 1996

REPLY TO ATTENTION OF

017281 19 MAR 1996

MCHB-DE-HR (40)

MEMORANDUM FOR District Engineer, U.S. Army Engineering District - Tulsa, ATTN: CESWT-PP-EA/Ms. Jonna Polk, Post Office Box 61, Tulsa, OK 74121-0061

SUBJECT: Review of the Draft Group Four Baseline Risk Assessment Work Plan, Longhorn Army Ammunition Plant, Karnack, Texas, 26 January 1996

1. The U.S. Army Center for Health Promotion and Preventive Medicine reviewed the subject document on behalf of the Office of The Surgeon General. The subject document adequately addresses current baseline risk assessment methodology; therefore, no comments are enclosed.

2. The scientist reviewing this document and our point of contact is Mr. Mark A. Dossey, Health Risk Assessment and Risk Communication Program, DSN 584-7282 or commercial (410) 612-7282.

FOR THE COMMANDER:

Arthur P. Lee

ARTHUR P. LEE, P.E.
MAJ, MS
Program Manager, Health Risk Assessment and Risk Communication

CF:
HQDA (DASG-HS-PE)
CDR, USAMEDCOM, ATTN: MCHO-CL-P
CDR, CEMRD, ATTN: CEMRD-ET-EH
CDR, USAEC, ATTN: SFIM-AEC-IRP
CDR, LHAAP, ATTN: SMCLO-EN

Readiness thru Health

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

017282

March 22, 1996

Sent via facsimile

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

Re: EPA's Draft Comments on the Draft Project Work Plans
Interim Remedial Action (Landfills 12 & 16)

Dear Mr. Tolbert:

In order to facilitate discussion on the above-mentioned project plan during the March 26, 1996, Project Managers Meeting, the Environmental Protection Agency's draft comments (copy enclosed) have been provided to the Tulsa District Corps of Engineers and the Texas Natural Resource Conservation Commission. If you have questions about this or any other matter, please contact me at (214) 665-6758.

Sincerely,

Chris G. Villarreal

Chris G. Villarreal
Remedial Project Manager

Enclosure

cc: Jonna Polk
Tulsa District Corps of Engineers

Alvie Nichols
Texas Natural Resource Conservation Commission

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DRAFT 017283

EPA'S COMMENTS ON THE DRAFT PROJECT WORK PLANS INTERIM REMEDIAL ACTION LONGHORN ARMY AMMUNITION PLANT (JANUARY 30, 1996)

Draft comments provided to facilitate discussion during March 26, 1996, Monthly Managers Meeting.

#1 Page 5, Section 3.2 Landfill Cap Design, 3rd paragraph:

Text states:

"The exact quantity of treated contaminated soils has not been determined at this time, so the total design capacity of the two landfills has been maximized to the extent practical. The two landfills will accommodate a reasonable overage in the anticipated volume of treated materials plus a buffer volume of clean soils which will be taken from the LHAAP borrow source".

EPA Questions:

a. What is the total design capacity of each landfill?
b. What is the anticipated volume of treated materials to be placed in the landfills?

EPA Comment:

While it is important to have adequate landfill capacity to receive the treated materials plus cap system, efforts should be made to ensure that the amount of clean material (borrow source) brought in to bring the landfills to final grade, is minimized. It may not be necessary to "maximize" the capacity of both landfills.

#2 Page 10, Section 6.1, Schedule:

017284

Text states:

"OHM will normally work 10 hours per day, 4 days per week".

EPA Comment:

It is not cost effective to run a construction project four days a week. For example, for a two year construction project, increasing from a four day to a five day work week will reduce the project duration approximately four months. Increased project duration equates to increased project costs for equipment rental, project management costs, site facility costs, etc.

#3 Page 11 - 13, Figure 6-1:

Activity ID # 0103030, Strip Borrow Source:

Timeline indicates that the entire anticipated volume of borrow source will be stripped prior to placement.

EPA Comment:

According to Section 3.1.1.3 (Reduction of Exposure of Unprotected Erodible Soils) of the Project Specifications (Appendix G), "All earthwork shall be planned and conducted to minimize the duration of exposure of unprotected soils. . . . areas should not be cleared in total. Clearing of such areas shall progress in reasonably sized increments as needed to use the areas developed as approved by the Contracting Officer."

Given that the required volume of barrow material needed for the landfills is unknown (Comment #1), why strip all this material up-front?

According to the timeline, the barrow materials will be stripped, presumably stockpiled, and then placed on the landfills after the placement of treated soils. To the extent practicable, all material handling should be minimized (take material straight to the landfill rather than to stockpile).

DEPARTMENT OF THE ARMY
U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE
ABERDEEN PROVING GROUND, MARYLAND 21010-5422

MAR 29 1996
017285

REPLY TO
ATTENTION OF

MCHB-DC-EHR (40)

25 MAR 1996

MEMORANDUM FOR District Engineer, U.S. Army Engineering District, Tulsa, ATTN: CESWT-PP-EA/Ms. Jonna Polk, Post Office Box 61, Tulsa, OK 74121-0061

SUBJECT: Review of the Draft Project Work Plans for the Interim Remedial Action for Landfills 12 & 16 Caps, for Longhorn Army Ammunition Plant, Karnack, Texas, 30 January 1996

1. The U.S. Army Center for Health Promotion and Preventive Medicine reviewed the subject document, without comment, on behalf of the Office of The Surgeon General. The scientist reviewing this document and our point of contact is Mr. Mark A. Dossey, Environmental Health Risk Assessment and Risk Communication Program, at DSN 584-7282 or commercial (410) 612-7282.

FOR THE COMMANDER:

Dennis E. Druck
for ARTHUR P. LEE, P.E.
MAJ, MS
Program Manager, Health Risk
Assessment and Risk Communication

CF:
HQDA (DASG-HS-PE)
CDR, USAMEDCOM, ATTN: MCHO-CL-P
CDR, CEMRD, ATTN: CEMRD-ET-EH
CDR, USAEC, ATTN: SFIM-AEC-IRP
CDR, LHAAP, ATTN: SMCLO-EN

Barry R. McBee, *Chairman*
R. B. "Ralph" Marquez, *Commissioner*
John M. Baker, *Commissioner*
Dan Pearson, *Executive Director*

017286

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

March 25, 1996

CERTIFIED MAIL
P 836 901 703
RETURN RECEIPT REQUESTED

James A. McPherson, Commander's Representative
Longhorn Army Ammunition Plant
Attn: SIOLH-OR
Marshall, TX 75671-1059

Re: Longhorn Army Ammunition Plant
Interim Remedial Action at Landfill Sites 12 & 16
Draft Project Work Plans

Dear Mr. McPherson:

The Texas Natural Resource Conservation Commission (TNRCC) staff has completed its review of the above referenced work plan, which was received on February 21, 1996. Our comments are attached. If you have any further questions regarding this matter, please call me at (512) 239-2502.

Sincerely,

Diane R. Poteet

Diane R. Poteet
Project Manager (MC-143)
RI/FS II Unit
Superfund Investigation Section
Pollution Cleanup Division

enclosures

cc: Chris Villarreal, EPA Region 6 (6SF-AT)
Jonna Polk , COE Tulsa District (CESWT-PP-EA)

017287

Draft Project Work Plan
Interim Remedial Action - Landfills 12 & 16 Caps
Longhorn Army Ammunition Plant Superfund Site

Superfund Engineering Section's Comments (Alvie L. Nichols)

No.	Section / Page	Comment
1	Section 3.2/ Page 5	Who will decide which configuration will be used?
2	Fig 3-1/ Page 7	Clayey coversoil?
3	Section 6.4.1/ Page 10	Plans to dispose of PPE in the landfills conflicts with instructions in Waste Management Plan.
4	Section 6.4.2/Page 14	"Storm water that fall within the exclusion zones will be contained within the bermed areas and allowed to evaporate". Discuss in more detail. Where are these exclusion zones?
5	Landfill Drawings	All Final Plans require Professional Engineer's seal and signature. Refer to Professional Engineers Act for specific requirements.
6	Landfill Drawings	Will we receive any design drawings to review that have additional details?
7	Landfill Drawings	Please show the perimeter drainage around the new landfills and the drainage route to Central Creek and Harrison Bayou. etc. Show locations/dimensions of Storm water berms. Also show plans for drainage, drain swales, etc.
8	Landfill Drawings	Need to show 100 year floodplain boundary. What are the contingency plans for the 100 year flood? {Ref: 40 CFR 264.18(b)}
9	Landfill Drawings	For ease of comparison, recommend you reconfigure Landfill 12 drawings (Fig 7-7 and 7-10) with North arrow pointing the same direction.
10	Section 7.6.3/Page 24	Will soils be temporarily stockpiled before being placed on landfills? If so, where on the drawings? Where are the details? How long do you anticipate soils will be temporarily stockpiled? How will this project be coordinated with the BG#3 IRA.
11	Section 7.6.3/Page 24	If "others" deliver treated contaminated soil and OHM decontaminates OHM equipment. Who will decontaminate "others" equipment?

No.	Section / Page	Comment
12	Section 7.8.3/Page 25	Who will approve the GCL installation?
13	Fig 7-7/Page 28	Between station 7 and 9 there is over 100 ft with 0 slope. All landfills must have some slope throughout to eliminate ponding. Also show additional cross-sections of the landfills to fully describe landfill slopes and show areas of highest slopes with erosion protection.
14	Section 7.14, Page 33	For monitoring wells that will be plugged and abandoned. What will you dispose of well casing, etc. Where is the P&A task identified on the Time line?
15	Section 7.15/Page 33	Provide a specific list of materials, etc. that will be disposed in the landfills. Also what will happen with other waste streams? Power poles/ signage, well casings, etc.
16	Fig 7-10/ Page 34.	Please identify location of monitoring wells that will be plugged and abandoned?
17	Appendix F/Site Waste Management Plan Page 3	Does this plan call for OHM to transport the drums of decon water/PPE to a drum storage facility?. If not, who? Where is this facility and who will be responsible for it?

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

017289

March 25, 1996

HAND DELIVERED: MONTHLY MANAGERS MEETING

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

Re: Air Monitoring Plan
Interim Remedial Action for Burning Ground No. 3
Longhorn Army Ammunition Plant

Dear Mr. Tolbert:

The Environmental Protection Agency (EPA) has reviewed the February 23, 1996, responses to EPA's comments on the draft Air Monitoring Plan (AMP). The responses, once incorporated into the Final AMP, will adequately address EPA's comments. If you have questions about this or any other matter, please contact me at (214) 665-6758.

Sincerely,

Chris G. Villarreal

Chris G. Villarreal
Remedial Project Manager

cc: Captain Darrell W. Chinn
Executive Officer, U.S. Army
Longhorn Army Ammunition Plant
Marshall, Texas 75671-1059

Jonna Polk
Tulsa District Corps of Engineers

Diane Poteet
Texas Natural Resource Conservation Commission

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MAR 2 9 1996

FACT SHEET

017290

U.S. Army Industrial Operations Command

Restoration Advisory Board

Longhorn Army Ammunition Plant is planning to establish a Restoration Advisory Board (RAB) to keep the public informed about its cleanup activities and provide opportunities for public involvement in its environmental restoration program.

What is a RAB?
The RAB will enable the affected community and representatives of government agencies to meet and exchange information about Longhorn's environmental program. It will also provide an opportunity for the community to review progress and participate in dialogue with the decision makers.

Who will serve on the RAB?
The RAB will include the Army, U.S. Environmental Protection Agency (EPA) and state environmental regulatory representatives, and members of the local community. Interested citizens who become RAB members should be willing to attend all RAB meetings and be willing to devote ample time to review technical documents within a prescribed timeframe.

What will RAB members do?

- ☐ Provide advice on environmental restoration issues to Army installations and regulatory agencies;
- ☐ Hold regular meetings, publicly announced and open to the public, at convenient times and locations;
- ☐ Review, evaluate and comment on documents;
- ☐ Identify project requirements;
- ☐ Identify applicable standards and, consistent with Section 121 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), propose cleanup levels consistent with planned land use.

The Army co-chairperson will:

- ☐ Ensure RAB membership reflects diverse interests within the community;
- ☐ Arrange for meeting minutes to be taken and make them available to interested parties;
- ☐ Develop, maintain and use a mailing list of names and addresses of people who wish to receive information on the cleanup program; and,
- ☐ Jointly chair the RAB with a community representative.

How to become a RAB member
A community meeting about the proposed RAB is scheduled for April 2, 7 p.m., at the Karnack High School cafeteria. Restoration Advisory Board Interest Surveys will be distributed at that time and must be returned by April 16.. At the meeting, we will discuss the purpose of the RAB, participation opportunities and member expectations, and hear an update on the status of installation cleanup activities and future plans. For more information, call Capt. Darrell W. Chinn, (903) 679-2200.

External Affairs Office
Rock Island, IL 61299
309/782-5421
Fax: 309/782-5011/4922

Restoration Advisory Board Interest Survey

Name:

Address:

017291

Telephone number: (daytime) _____ (evening) _____

Restoration Advisory Board (RAB) members are expected to serve a two-year term and attend all RAB meetings. Duties and responsibilities will include reviewing and commenting on technical documents and activities associated with the environmental restoration program at Longhorn Army Ammunition Plant. Members will be expected to be available to the community members and groups they represent to facilitate the exchange of information and/or concerns between the community and the RAB. Participation in the RAB is strictly voluntary and members will not be financially compensated. Members will be selected by a selection panel and will be representative of the diverse interests of the community.

Those who do not serve directly on the RAB can still participate in RAB activities. Interested members of the community will be included on the mailing list and invited to attend all RAB meetings, which are open to the public. Technical documents reviewed by the RAB will be made available to the public through the information repositories. The public will be able to comment on the technical documents either in writing to the installation or at the RAB meetings during a time set aside for public comments and input.

1. *Do you have any specific environmental interests or concerns about Longhorn Army Ammunition Plant? If so, please describe.*

2. *Why would you like to be considered for RAB membership?*

3. *What has been your experience working as a member of a diverse group with common goals?*

4. *What is your background/experience/education regarding environmental issues?*

017292

TECHNICAL REVIEW COMMITTEE (TRC) MEETING
APRIL 2, 1996

Attendees:

Dorothy Grant
Fred Wright
Ann Montgomery
Ira Nathan
Chris Villarreal
Diane Poteet
Michael Moore
F. Lee Campbell IV
Bud Jones
Wilma Subra
Lydia Boalt
Ruth Culver
Darrell Chinn
Frank Melton
Oscar Linebaugh, Jr.
Linda James
Mary Barrett
David Tolbert
Sherry McAdoo
James McPherson
Jim Carter
Dudley Beene
John Wagner
Jonna Polk

James McPherson, Commander's Representative, Longhorn Army Ammunition Plant, opened the meeting by welcoming those present.

David Tolbert then introduced Jonna Polk, Corps of Engineers Program Manager. The IRP Status Summary was then distributed and Jonna went over each project by Group number. Jonna had listed the names of each project instead of going by numbers in order to more readily identify each project to the visitors. Jonna then discussed each project and the next major milestone the Corps expects to achieve.

The major milestones by Group # are:

Group #1	Draft RI Report to be completed and submitted for EPA and TNRCC review on April 16, 1996.
Group #2	Draft Phase II Field Summary Report to be submitted to EPA and TNRCC in July 1996.
Group #3	None
Group #4	Preliminary Phase II investigation will begin in May 1996.
Group #5	Data Report will be submitted to EPA and TNRCC in July 1996.

Burning Grounds Remedial Action - Groundwater treatment is scheduled to begin in July 1996. Commencement of soil treatment projected for August 96.

Landfill Caps Interim Remedial Action - Field mobilization scheduled to begin in July 1996.

Landfill Site 16 Time Critical Removal Action - Draft Design Analysis scheduled for submission on May 13, 1996.

Sumps - Removal of sumps scheduled to begin in July 1996. All sumps must be removed by December 1997.

Wilma Subra requested that Jonna send her a copy of the draft remedial investigation report currently being prepared.

James explained the ARMS Program to Ruth Culver. He also told her that everything the Army does is dependent upon the availability of money. ARMS money is earmarked for FY96 and the Army will not ask for any more money. He told her of two potential ARMS recipients, a pottery firm and the Caddo Lake Institute; however, these two are under review and not approved to date.

Wilma Subra inquired about things that Thiokol plans to do in the future. She was told that Thiokol will continue to burn inerts. Probably for six months, then they will be finished. R&D will always be burning. Thiokol will generate small amounts to be burned at the burning ground.

Lydia Boalt, Public Affairs Specialist, U.S. Army Environmental Center, then conducted a meeting on the Restoration Advisory Board. She went over information on the DoD policy, What is a Restoration Advisory Board?, Rationale for a Restoration Advisory Board, and Member Responsibilities. Lydia had pertinent questions and their answers - some of the things that people might ask.

Survey forms and Fact Sheets will be on hand at the meeting at the Karnack High School Cafeteria, April 2, 1996. Completed forms will be collected and given to Cpt. Chinn for his review. Linda Boalt stated that at least 15 members are needed to establish the Restoration Advisory Board. Any RAB members should be invited to the TRC meetings.

Wilma Subra asked about information being provided to RAB members and Linda Boalt stated that cost sometimes becomes an issue. She stated that there is no specific requirement to provide each individual RAB member with copies of individual reports.

David Tolbert adjourned the meeting.

Barry R. McBee, *Chairman*
R. B. "Ralph" Marquez, *Commissioner*
John M. Baker, *Commissioner*
Dan Pearson, *Executive Director*

017294

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

April 8, 1996

CERTIFIED MAIL
P 836 901 704
RETURN RECEIPT REQUESTED

James A. McPherson, Commander's Representative
Longhorn Army Ammunition Plant
Attn: SIOLH-OR
Marshall, TX 75671-1059

Re: Longhorn Army Ammunition Plant
Group 2, Phase 2, RI
Sampling and Data Results Report and Laboratory Data Validation Report

Dear Mr. McPherson:

The Texas Natural Resource Conservation Commission (TNRCC) staff has completed its review of the above referenced report, which was received on March 7, 1996. Our comments are as follows:

In the Data Validation Report, in Section 3.6 - Conclusions for the Explosives, one sample was listed as unusable. Also, in 4.6 - Conclusions for the Metals (also in the same report), there were problems listed with regard to quality control and that the values for antimony (and some others) were unusable. Do any of these problems affect your data quality objectives? Will additional sampling be needed?

If you have any further questions regarding this matter, please call me at (512) 239-2502.

Sincerely,

Diane R. Poteet
Project Manager (MC-143)
RI/FS II Unit
Superfund Investigation Section
Pollution Cleanup Division

cc: Chris Villarreal, EPA Region 6 (6SF-AT)
Jonna Polk, COE Tulsa District (CESWT-PP-EA)

017295

FINAL
AIR MONITORING PLAN

INTERIM REMEDIAL ACTION
BURNING GROUND No. 3
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

PREPARED FOR:

UNITED STATES ARMY CORPS OF ENGINEERS
TULSA AND FORT WORTH DISTRICTS

PREPARED BY:

DOW ENVIRONMENTAL INC.
ROCKVILLE, MARYLAND

April 16, 1996

USACE CONTRACT DACA56-93-D-0016

DELIVERY ORDER 0002

DEI PROJECT 2379

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1.0 INTRODUCTION

1.1 Scope of Work

This Air Monitoring Plan (AMP) has been prepared by Dow Environmental, Inc. (DEI) to describe the air monitoring procedures that will be implemented during Phase III of the Interim Remedial Action (IRA) at Burning Ground No. 3, located at Longhorn Army Ammunition Plant (LHAAP) in Karnack, Texas. This AMP program takes into account waste properties and site specific factors such as local terrain and meteorology. Historical data indicates that the Burning Ground at the LHAAP contains groundwater and soil that have been affected with volatile organic compounds (VOCs). The IRA will include soil and source material excavation and treatment and groundwater recovery and treatment. As a result, the potential exists for emissions to the atmosphere during this phase of remedial activity. Air monitoring specified in this plan will be performed to ensure compliance with all applicable regulations and to ensure that no adverse effect on public health and the environment occurs as a result of the IRA.

1.2 Summary of Activities

The activities associated with the IRA will consist of the construction and maintenance of a groundwater extraction and treatment system, contaminated soils and source material excavation and treatment, and site restoration. The tasks associated with Groundwater Extraction and Treatment System are described, in detail, in Section 2.0 of Volume 1 of the Work Plan and are as follows:

Task 1 - Construction of a total of 5000 feet of Interceptor Collection Trench (ICT) sections.

Task 2 - Installation of up to eight vertical extraction wells as necessary (VEWs).

Task 3 - Installation of a piping network to collect the extracted water and convey it to the groundwater treatment plant.

Task 4 - Construction of a groundwater treatment plant to treat the extracted groundwater.

Task 5 - Installation of a piping system to convey treated groundwater to Harrison Bayou and if necessary Central Creek.

Task 6 - Starting up the groundwater treatment plant.

Task 7 - Operating and maintaining the groundwater treatment plant for one year.

Task 8 - Performing groundwater flow tests on each completed section of ICT and each VEW.

Task 9 - Evaluating the hydraulic effectiveness of the extraction system.

The tasks associated with contaminated soils and source materials excavation, treatment and disposal are described in detail in Section 3.0 of Volume 1 of the Work Plan. They are as follows:

Task 1 - Construction of a dewatering and staging pad for ICT excavated soils and contaminated soils and source material.

Task 2 - Construction of a storage pad for treated soils and source material.

Task 3 - The mobilization, setup, and performance testing of a soil treatment system.

Task 4 - Excavation and Treatment of soils and source material.

Task 5 - Disposal/placement of Treated soils and source material.

Task 6 - Drilling 20 soil borings to investigate the potential presence of other source material.

Task 7- Restoring the site by importing clean fill material and backfilling source material excavations, rebuilding damaged or excavated roadways, building drainage structures, and restoring utility lines.

1.3 Anticipated Increases of Air Emissions

Increases in potential air emissions are expected from three sources during this phase of remedial activities. These are:

- Operation of the Groundwater Treatment Plant (GWTP);
- Operation of the Soil Treatment Plant (STP); and
- Soil and source material excavation and handling.

2.0 REGIONAL SETTING

This section provides an overview of the climatic and topographic conditions at the site that could impact the off-site migration and dispersion of air contaminants. Nearby receptors that may be impacted by air emissions from the remedial activities are identified and existing nearby sources of air emissions that could influence air measurements are discussed.

2.1 Climate and Topography

The LHAAP is located approximately 40 miles west of Shreveport, Louisiana, near the western shore of Caddo Lake. The site is situated on a natural topographic high located west of the crest of a small topographic divide. The topography of the surrounding terrain has been greatly altered by operations conducted over the past 35 years. Ground surface elevations on the site and near the site vary from 174 to 206 feet M.S.L.

Winds in the region are predominantly from the South. The predominant southerly winds may be offset by strong Canadian winter storms that produce northerly flows. The mean monthly wind speeds range from 7 to 10 miles per hour.

The regional climate is transitional between the sub-tropical humid type, prevalent in the South and the continental climates of the Great Plains. During the winter, masses of cold air periodically move through the area. Rainfall is abundant with the normal annual total rainfall near 45 to 50 inches. Precipitation is substantial from late Autumn to Spring. Winter is mild, with cold spells generally of short duration. Freezing temperatures are recorded an average of 34 days a year. The summer months are consistently warm and humid with temperatures exceeding 100 degrees on about 10 days a year.

2.2 Existing Receptors and Sources

Residential properties are located to the Northeast, within one mile of the site. The closest residence is located approximately 4,000 feet or 1200 meters northeast of Burning Ground No. 3. The community of Karnack is located approximately 2 to 3 miles southwest of the site on State Route 43.

The LHAAP is located in a generally rural area, and no known off-site sources of VOC air emissions near the Burning Ground No. 3 site were identified. However, baseline monitoring will be performed as part of the AMP to identify the presence of any such sources.

3.0 REGULATORY REQUIREMENTS

Federal and State air quality standards have been established are applicable or relevant and appropriate to the control of emissions of VOCs during the implementation of the Phase III IRA at Burning Ground No. 3. These standards, in addition to other pertinent guidelines, are discussed below.

3.1 Applicable Federal Standards

Section 121(b) of CERCLA as amended by SARA of 1986 mandates the EPA to select alternatives that are protective of human health and the environment and provides a listing of factors that should be considered in assessing remedial alternatives. 40 CFR 300.430 outlines nine remedy selection criteria that encompass the statutory requirements of Section 121(b). These criteria are divided into three categories: threshold criteria, primary balancing criteria, and modifying criteria. For the purposes of the IRA, the threshold criteria are considered applicable to this site. The threshold criteria are: (1) Overall protection of human health and the environment, and (2) Compliance with applicable or relevant and appropriate requirements (ARARs).

3.2 Applicable State Standards

The Texas Natural Resource Conservation Commission (TNRCC) has established ambient air quality regulations and guidelines for VOCs that are pertinent to this remediation project. The TNRCC regulates emission from sites through the requirement to meet one of the following: 1) obtain a new source review permit; 2) be covered by a Standard Permit; or, 3) fall under one of the categories listed in the Standard Exemption list.

A review of the Standard Exemption list indicated that Exemption No. 68 would apply to the site. This exemption applies to equipment used to reclaim or destroy chemicals removed from contaminated groundwater or contaminated soil, for the purpose of remedial action, meet certain conditions. The requirements specified in the exemption which are applicable to the IRA at Burning Ground No. 3 are as follows:

- Emissions from the equipment must also meet the requirements of Standard Exemption 118(b), (c), and (d). Standard Exemption 118 states that new or increased emissions, including fugitives, of chemicals shall not be emitted from the control equipment in a quantity greater than 5 tons per year (TPY) or in a quantity that is greater than the maximum allowable hourly emission (calculated based on distance to the nearest off-site receptor and TNRCC limits for parameters of concern) which never exceeds 6 lb/hr.

- Handling and processing (screening, crushing, etc.) of contaminated soil and the handling and conditioning (adding moisture) of remediated soil must be controlled such that there are no visible emissions with the exception of moisture.

- Vapors must be burned in a catalytic oxidizer which destroys at least 90% of the vapors. An evaluation of the oxidizer effectiveness must be made at least weekly using a portable flame or photoionization detector, or equivalent instrument to determine the quantity of carbon compounds in the inlet and outlet of the catalytic oxidizer.

- Records of monitoring must be maintained at the site and made available upon request to personnel from TNRCC or any local agency having jurisdiction. These records must be retained for at least two years following the date on which the data is obtained.

4.0 AIR EMISSION ESTIMATES

This section describes the methods used to estimate emissions from the IRA and presents the results of those estimations.

4.1 Soil Treatment Plant Emissions

The STP at the LHAAP will be a low temperature, thermal desorption unit. Emissions from the desorption unit will be routed to an emissions control device consisting of a catalytic oxidizer. Potential air emissions from the Soil Treatment Plant (STP) soil were estimated based on the following:

- Average historical soil concentrations
- An assumption that 100 percent of the total VOCs contained in the in-place soil would be removed during excavation and treated.
- The operating schedule of the STP is: 12 tons of soil/hr, for 24 hours /day.
- The density for contaminated soil and source material is 1.73 tons per cubic yard, and
- The minimum destruction efficiency for the STP emission control device (catalytic oxidizer/scrubber) is 99 percent.

The potential emissions from the STP, after emission control, were calculated using the average historical soil concentration for each VOC detected in the soil and a treatment efficiency of 99% These emissions are presented in Table 4-1. A discussion of the method of calculation of the average soil concentrations is found below.

Average historical soil concentrations were calculated as follows. The entire excavation area for the IRA was divided into depth zones according to the following:

- 0 feet to less than or equal to 4 feet in depth;
- greater than 4 feet to less than or equal to 8 feet in depth;
- greater than 8 feet to less than or equal to 12 feet in depth;
- greater than 12 feet to less than or equal to 16 feet in depth;
- greater than 16 feet to less than or equal to 20 feet in depth; and
- greater than 20 feet to less than or equal to 28 feet in depth.

TABLE 4-1

SOIL TREATMENT PLANT EMISSIONS

CHEMICAL CONSTITUENT	WEIGHTED AVERAGE HISTORICAL CONCENTRATION (mg/kg)	VOCs MASS FLOW RATE (lbs/hour)	EMISSIONS IN LBS/HOUR BASED ON MINIMUM EFFICIENCY OF 99 PERCENT**	EMISSIONS IN LBS/HOUR BASED ON MAXIMUM EFFICIENCY OF 99.99 PERCENT**
Methylene Chloride	24.85	0.590	0.006	0.00006
Trichloroethylene	10.83	0.257	0.003	0.00003
Vinyl Chloride	0.22	0.005	0.0001	0.0000005
1,2-Dichloroethene	2.69	0.064	0.0006	0.00001
1,2-Dichloroethane	1.03	0.024	0.0002	0.000002
1,1-Dichloroethane	4.57	0.109	0.0011	0.00001
1,1-Dichloroethene	0.13	0.003	0.00003	0.0000003
Tetrachloroethane	0.28	0.007	0.00007	0.0000007
Toluene	0.61	0.014	0.0001	0.000001
Ethylbenzene	0.22	0.005	0.0001	0.000001
Xylene	0.52	0.012	0.0001	0.000001
Acetone	1.81	0.045	0.0005	0.000005
Chloroform	0.03	0.001	0.00001	0.0000001
Styrene	5.79	0.138	0.0014	0.00001
Benzene	0.17	0.004	0.00004	0.0000004
1,1,1-Trichloroethane	0.004	0.0001	0.000001	0.00000008
Trichlorofluoromethane	0.05	0.001	0.0001	0.0000001
Total		1.279	0.0135 = 0.05 ton/year	0.00013 = 0.005 ton/year

NOTES: The above calculations are based on treating 12 tons/hour, for 24 hours/day, for 300 days/year, for a total of 50,000 CY treated soil.
** - Efficiency of Catalytic Oxidizer.

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In each depth zone, the historical data for each contaminant detected at the Burning Ground was averaged to obtain average concentrations in depth zone (see Appendix B for detailed calculations). Where the analytical results were reported as less than the detection limit (< 5 *u*g/kg, for example), one-half the analytical detection limit was used to calculate the average concentrations. Once average concentrations per depth were calculated, a weighted average for each contaminant was calculated. In order to do this, the volume of soil in each depth zone was determined by calculating the total area of soil to be treated, and then multiplying this area by the depth of soil in each zone. The total area of contaminated soil and source material was calculated by dividing the total soil volume (50,000 CY) by the maximum depth of contaminated material, determined by the deepest historical boring (28 feet). The total area calculated by this method was approximately 48,214 ft^2. The volume for each depth zone was then calculated by multiplying this area by the depth. For example, for the depth zone of *0 to 4 feet*, the depth of the zone is 4 feet, and the total volume of soil in this depth zone is approximately 7,143 CY.

To determine the average weighted concentration of each target compound, the average concentration for each depth zone was multiplied by the volume of soil in that zone. These values were then summed for each compound in each depth zone, and the total value obtained divided by the total soil volume (50,000 CY), as illustrated below:

$$Avg\ weighted\ soil\ MEC\ concentration(\mu g/Kg) = \frac{\sum_{i=0}^{28 feet} (MEC)_i V_i}{V_{TOTAL}}$$

WHERE:
methylene chloride = Average methylene chloride concentration in depth zone,
V_i = Volume of soil in each depth zone, and
V_{TOTAL} = Total soil volume = 50,000 CY.

Depth Zone (ft)	Soil Volume (CY)	Avg methylene chloride Concentration (µg/kg)
0 ≤ 4	7,143	347.6
4 ≤ 8	7,143	4,770
8 ≤ 12	7,143	9,674
12 ≤ 16	7,143	60,401
16 ≤ 20	7,143	86,290
20 ≤ 28	14,286	6,248

Avg weighted methylene chloride concentration =

$$\frac{[(347.6 \times 7{,}143) + (4{,}770 \times 7{,}143) + (9{,}674 \times 7{,}143) + (60{,}401 \times 7{,}143) + (86{,}290 \times 7{,}143) + (6{,}248 \times 14{,}286)]}{50{,}000}$$

= 24,855 µg/kg or 24.85 mg/kg.

The average concentrations in untreated soil obtained for each compound are presented in Table 4-1. Table 4-1 illustrates that the two contaminants detected at the highest concentrations are methylene chloride (24-85 mg/kg) and trichloroethylene (10.83 mg/kg). Therefore, these two contaminants are considered to be compounds of concern (target compounds) for the IRA.

4.2 Groundwater Treatment Plant Emissions

The GWTP will include air stripping in order to separate VOCs from the groundwater. The stripper off-gases will be routed to a catalytic oxidizer and scrubber system for treatment. The potential air emissions associated with the GWTP were estimated to be 1.9 TPY. This estimate was developed using the results of a process simulation model (HYSIM) for the stripper. The results of the simulation have been included in Appendix A. The results indicate that the treated off-gas emissions (Stream 118) would be 0.5327 lb/hr VOCs. The annual emissions were calculated using the following assumptions:

- The treated stripper exhaust gas flow rate is 6,117 cubic feet/min (CFM).
- The GWTP would only be operational for 80% of the time during the first year of operation (which is when soil excavation and treatment will be occurring). When operational, the stripper will operate continuously for 24 hours/day.
- The catalytic oxidizer treatment efficiency is 99%. However, the GWTP catalytic oxidizer is designed for 99.99 percent efficiency. Therefore, the assumption for the calculation is conservative.

4.3 Soil Excavation and Handling Emissions

Emissions due to soil excavation and staging prior to treatment were calculated using approved U.S. EPA models and guidelines. According to the EPA's Estimation of Air Impacts for the Excavation of Contaminated Soil, emissions from excavation can occur by three mechanisms:

- Emissions from soil pore space during excavation of soils saturated with VOCs.
- Emissions from soil pore space during excavation of unsaturated soils containing VOCs.
- Emissions from diffusion of adsorbed VOCs from saturated and unsaturated soil particles. A total of 50,000 CY will be excavated and treated during the IRA. This includes the estimated 30,000 cubic yards of contaminated soil and source material, and 20,000 cubic yards of ICT excavated soils.

Total emissions from excavation and handling activities would therefore equal the sum of the emissions from each of the three mechanisms. Detailed calculations are presented in Appendix B for the associated emissions.

4.3.1 Estimation of Target Compound Saturation Concentrations in Soil and Source Material

The target compound (methylene chloride and trichloroethylene) saturation concentrations for contaminated soil were estimated using U.S. EPA models. Specifically, the Guideline for Predictive Baseline Emissions Estimation Procedures for Superfund Sites was used.

VOC saturated and unsaturated soil are defined below.

- VOCs Saturated Soil Samples - VOC saturated soil is that soil at which the VOC concentration is at the adsorptive limit of the soil, plus the theoretical dissolution limit of the contaminant in the available soil moisture. Saturated soil is characterized by free phase contaminants within the soil matrix.

- VOCs Unsaturated Soil - Unsaturated soil is that for which the concentration for VOCs in soil is the adsorptive limit of the soil, plus the theoretical dissolution limit of the contaminant in the available soil moisture. Unsaturated soil is characterized by the absence of free phase contaminants within the soil matrix.

Calculations were performed to determine the saturation concentration of methylene chloride and trichloroethylene. The calculations detailed in Appendix B indicated that the saturation concentration for methylene chloride is 2,822 mg/kg and the saturation concentration for trichloroethylene is 464.6 mg/kg. A review of historical data indicated that no samples, out of the historically collected and tested 174 on-site soil samples, exceeded the saturation concentration for trichloroethylene. However, one sample (Boring 8A-940 at 4 ft in depth) indicated a trichloroethylene concentration of 430 mg/kg, approaching the saturation concentration. Therefore, it was assumed that trichloroethylene could be found at saturated soil concentrations in the targeted excavation area. The volume of soil assumed to be saturated was calculated to be 11,000 CY. This volume was obtained by taking the depth interval to the saturated depth and the circular distance between adjoining unsaturated soil and the saturated soil sample locations. (See Appendix B for detailed calculations.) No samples exceeded the saturation concentration for methylene chloride. The highest methylene chloride concentrations occurred at Soil Borings 8A-902dup at 18 feet in depth (742.05 mg/kg) and 8A-984 at 14 feet in depth (600 mg/kg). These concentrations represent less than half the saturated soil concentration for methylene chloride. Therefore, for the purpose of calculating emissions, it was assumed that no methylene chloride saturated soil was present in the targeted excavation area.

The results of the emissions calculations for soil excavation and handling for soils contacting trichloroethylene resulted in two cases: 1) excavation and handling of soils considered to be saturated with trichloroethylene, and 2) excavation and handling of soils considered to be unsaturated with trichloroethylene. For both pore space and diffusion emissions, methylene chloride emissions were calculated using the average weighted concentration at unsaturated soil conditions. The results of the emissions calculations are found in Appendix B and are summarized in Table 4-2.The short-term health effects screening levels (ESLs) published by the TNRCC for each of the contaminants detected has also been included in Table 4-2. These ESLs were used to determine the maximum emission rate allowable which will be protective of human health for a receptor located 1200 meters from the excavation area. The maximum allowable emission rates for each contaminant

were determined using the SCREEN2 air dispersion model, as discussed in the following section. (See Appendix B for detailed calculations and Appendix C for model results.)

As indicated in Table 4-2, the actual total emission rates calculated for each compound are significantly lower than the predicted maximum allowable emission rates. Therefore, no adverse health effects would be anticipated from excavation activities conducted during the IRA. In addition, worst case methylene chloride and trichloroethylene emissions were calculated, and are presented in Appendix B.

TABLE 4-2

COMPARISON OF EMISSIONS AT 30 YD³ EXCAVATION RATE & THE MAXIMUM ALLOWABLE EMISSION RATE

Longhorn Army Ammunition Plant
Karnack, Texas

Contaminant	Short-Term ESL ($\mu g/m^3$)	Total Unsaturated Emission Rate (g/s)	Maximum Emission Rate Based on ESL (g/s)[a]
Methylene Chloride	260	0.101	3.56
Trichloroethylene	1,350	0.0451	18.47
Vinyl Chloride	130	0.0010	1.78
1,2-Dichloroethene	7,930	0.0112	108.50
1,2-Dichloroethane	40	0.0040	0.55
1,1-Dichloroethane	4,000	0.0193	54.73
Tetrachloroethylene	340	0.0010	4.65
Toluene	1,880	0.0020	25.72
Ethylbenzene	2,000	0.0010	27.36
Xylene	3,700	0.0020	50.62
1,1-Dichloroethene	40	0.0010	0.55
Acetone	5,900	0.0070	80.72
Styrene	215	0.0243	2.94
Chloroform	98	0.0001	1.34
Trichlorofluoromethane	28,000	0.00022	383.09
Benzene	30	0.0010	0.41
1,1,1-Trichloroethane	10,800	0.00002	147.76
TOTAL		**0.22124**	

NOTE: [a] For a receptor located at 1200 meters from the excavation area

Total Excavation Period = 27,230 m^3 / (22.94 m^3/hr) = 1,187 hr/yr
Total VOC Emissions = (0.2224 g/s) x (3600 s/hr) x (1,187 hr/yr) / (454 g/lb) x (2000 lb/ton) =
Total VOC Emissions = 1.047 tpy

4.4 Determination of Ambient Air Concentrations

The Screening Procedures for Estimating the Air Quality Impact of Stationary Sources (SCREEN2) model was used in conjunction with the emission rates described in Section 4.3.1 in order to determine VOC concentrations in air at various distances from Burning Ground No. 3. The air dispersion modeling analysis was performed to determine what the ambient impact would be from the three potential emission sources: GWTP, STP, and contaminated soils and source material excavation and handling.

The SCREEN2 model was selected for this analysis because the model is a conservative screening tool to determine maximum concentrations at varying distances from the site. If the concentrations obtained here, using the SCREEN2 model, do not indicate the potential for adverse health effects to occur at off-site receptor locations, there is no need to perform more refined emissions modeling.

The potential emissions from the three sources were determined as follows. For the determination of average emissions during the IRA, the following procedure was used. The distance from each source area was measured to the nearest off-site receptor (1200 meters). The screening model was then used to estimate concentrations at each of these locations using a generic emission rate of 1 gram/second. The model was run initially using the full meteorology to determine the worst-case meteorological conditions. (See Appendix C for model results.) However, because excavation will not occur at the Burning Ground No. 3 during pre-dawn or evening hours, during precipitation events, or imminent precipitation, or conditions of low cloud cover or temperature inversions, the results obtained from Stability Classes D, E, and F were not considered. The concentrations obtained using the generic emission rates were then multiplied by the actual emission rates for methylene chloride and trichloroethylene calculated for each source, and the results from all three sources obtained for each contaminant were then summed. The GWTP and the STP were modeled as point sources, while the soil excavation area was modeled as an area source.

The area of excavation used in the model was determined by taking the average depth of 3.7 meters (see Appendix B for detailed calculations) and using a 3:1 (run to rise) slope to the surface. This resulted in a side length of 26 meters. The average area of exposed soil during excavation was assumed to be approximately square or 676 m^2. Therefore, the typical excavation rate of 30 CY/hr was used.

The results for methylene chloride and trichloroethylene obtained from screening of the three emission sources are summarized below in Table 4-3. The critical distance for all sources from the Burning Ground No. 3 was 1200 meters which is the distance from the site boundary to the nearest off-site receptor. The combined impact at 1200 meters from the GWTP and STP for methylene chloride and trichloroethylene were calculated to be approximately 14.76 ug/m^3 and 1.98 ug/m^3, respectively. The impact at 1200 meters from the excavation of source material, using a width of 26 meters, was determined. The modeling results indicated that these impacts would be 7.47 ug/m^3 for methylene chloride and 35.31 ug/m^3 for trichloroethylene. The short-term ESLs for methylene chloride and trichloroethylene are 260 ug/m3 and 1350 ug/m3, respectively. The results obtained in Table 4-3 indicate that the resulting concentrations of the target compounds from all three sources would be well below the ESLs. As discussed in the previous section, the emission rates from excavation of all of the other VOCs detected at the site was also calculated and compared to the ESL. In no case did the emission rate for any compound result in an exceedance of the ESL at 1200 meters from the site.

This modeling effort was also used to determine what measured concentrations along the perimeter of Burning Ground No. 3 may be allowed during the excavation of source material without exceeding health effects screening level, as discussed in Section 5.2.2.2.

Considering that the SCREEN2 dispersion model is a conservative emissions screening model, and that the screening results indicated that no exceedance of applicable ESLs occurred, no adverse air quality impacts would be expected to result from any of the activities conducted as part of the IRA.

TABLE 4-3

SUMMARY OF SCREEN2 MODEL
RESULTING CONCENTRATIONS OF METHYLENE CHLORIDE & TRICHLOROETHYLENE
AT 1200 METERS FROM ALL SOURCES

Source	Concentration at 1 g/s ($\mu g/m^3$)	Actual Emission Rate (g/s)		Calculated Concentration ($\mu g/m^3$)		Short-Term ESLs ($\mu g/m^3$)	
		Trichloroethylene	Methylene Chloride	Trichloroethylene	Methylene Chloride	Trichloroethylene	Methylene Chloride
Groundwater Treatment Plant	260.3	0.0075	0.0565	1.95	14.71	1350	260
Soil Treatment Plant	64.29	0.0004	0.0008	0.03	0.05	1350	260
Soil Excavation	73.09	0.4831	0.1022	35.31	7.47	1350	260
Total		0.491	0.1595	37.29	22.23	1350	260

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5.0 MONITORING PROGRAM DESCRIPTION

This section describes the monitoring program that will be implemented at Burning Ground No. 3 during the IRA. The program is presented in terms of the constituents to be monitored, the monitoring phases, meteorological monitoring, air monitoring, air monitoring methods, and quality assurance/quality control (QA/QC).

5.1 Constituents to be Monitored

The contaminants of concern during the IRA are VOCs. Therefore, the monitoring program will focus on monitoring of VOCs during soil excavation and handling and during soil and ground water treatment. In addition, other pertinent operational parameters will be monitored at the GWTP and STP. To determine the potential of off-site migration of contaminants from the site, meteorological monitoring will also be performed.

5.2 Monitoring Program Details

The AMP will consist of four components. These are: Baseline Monitoring (with Screening risk assessment submitted under separate cover), Treatment System Performance Monitoring, Excavation Zone First-Alert Monitoring, and Perimeter Monitoring. The monitoring activities associated with these components are described in the following sections. Detailed monitoring procedures are discussed in Sections 5.3, 5.4, and 5.5. Table 5-1 presents a summary of the overall analytical program.

5.2.1 Baseline Monitoring Program

Baseline monitoring will be performed to augment historic site characterization and for final fine-tuning of the IRA AMP components. The emphasis of the Baseline Monitoring Program is on gaining a full understanding of the site conditions and identifying contaminants of concern prior to the onset of the planned activities. The purpose of this monitoring is to characterize conditions before the disturbance of the site so that site-specific impacts may be more accurately defined. If off-site sources of target compounds exist in the upwind direction of the site, the contribution of these sources will be evaluated. This will permit an accurate evaluation of the impact of specific IRA activities on ambient air quality throughout implementation of the IRA. Real-time data acquisition was not considered to be required at this stage because on-site baseline conditions are considered to be steady state.

TABLE 5-1

LHAAP, BURNING GROUND No. 3, IRA
SUMMARY OF ANALYTICAL AIR MONITORING PROGRAM

Activity	Parameters Required	Test Method	Frequency of Sampling
1. Baseline Monitoring	VOCs	Method TO-14 at Off-site Laboratory	Biweekly for 2 months Prior to Remedial Activities
2. Proof of Performance for GWTP.	See Table 5-2	See Table 5-2	See Table 5-2
3. Proof of Performance for STP	See Table 5-3	See Table 5-3	See Table 5-3
4. Real Time - Excavation Zone	VOCs/Target Compounds	On-site OVM / per Manufacturer's Information	Real Time Daily During Remedial Activities
5. Real Time - Perimeter	VOCs/Target Compounds [a]	On-site GC for VOCs	Real Time Daily During Remedial Activities, Biweekly Confirmation Sampling [b]
6. Stack Sampling and Monitoring For the GWTP	See Table 5-2	See Table 5-2	See Table 5-2
7. Stack Sampling and Monitoring For the STP	See Table 5-3	See Table 5-3	See Table 5-3

Notes : [a] Initially, Method TO-14 will be used for offsite testing to identify all VOCs present during the 2 month baseline monitoring period and the first 2 months of actual source materials excavation and handling, on a biweekly basis. After this period, target compounds will be selected based on the results obtained from offsite testing.

[b] Biweekly samples will be collected throughout the IRA and sent off-site for full TO-14 scan analyses.

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The baseline monitoring program will the include appropriate QA/QC procedures to ensure data quality and will consist of the following elements:

Sampling Methodology:	**Time-integrated, constant flow rate, stationary SUMMA Canisters**
Analytical Method:	**TO-14 GC/MS (full scan for VOCs)**
Sampling Duration:	**2 Months, at a frequency of once every two weeks**
Sampler Locations:	**1 Upwind, 3 Downwind from Burning Ground No. 3, inside the LHAAP Perimeter.**
Meteorology:	**1 Stationary Meteorological Station**

SUMMA canisters will be used to collect time-integrated whole air samples composited over an 8-hour period, biweekly for a two-month period prior to the onset of IRA activities. The sampling duration and period will reflect the normal hours of activities in other areas of the facility, as well as the expected periods of IRA activities. The baseline monitoring period will include collection of samples at upwind and downwind locations from the burning ground.

A stationary meteorological monitoring station will be used to collect pertinent meteorological data, such as wind speed, direction, temperature and relative humidity. The meteorological monitoring program discussed in Section 5.3 will continue for the duration of the air monitoring program. The only exception will be if a long lag occurs during the remedial activities. In such a case, the meteorological program may be ceased until one week before resuming site activities.

Following collection of the baseline meteorological and analytical data, health effects screen modeling will be performed, using calculated emission rates as discussed in Section 4 and the appropriate air dispersion model. The modeling will identify emission level limits in the excavation zone which will be protective of health, based on determined action levels for the contaminants of concern.

5.2.2 Remedial Action Monitoring Program

Remedial Action Monitoring will consist of Excavation Zone First-Alert Monitoring, Treatment System Performance Monitoring, and Perimeter Monitoring. Real-time sampling for the target compounds will be performed during the excavation of source material. Confirmation time-integrated whole air samples will be collected using SUMMA canisters on a biweekly basis and sent off-site for analysis. Time-integrated samples will also be sent off-site for analysis if the continuous real-time analyzers at the site perimeter monitoring stations indicate that the daily trigger level for the target compounds was exceeded. Detection of elevated organic contaminant levels at the first-alert stations will potentially trigger increased monitoring activities and reduced excavation activities until the first-alert levels are reduced to background levels as determined in the

baseline study. Treatment system performance monitoring will ensure that the required treatment efficiency is being achieved. Perimeter monitoring will be performed to ensure that health effects screening levels are not exceeded for potential receptors during the IRA.

5.2.2.1 Treatment System Performance Monitors

The remedial activities at the site will include the GWTP and STP. The treatment systems' performance monitoring will consist of two elements. These are the initial Proof of Performance tests and the routine, ongoing compliance sampling. A QA/QC plan for the treatment system monitoring will be provided based on the requirements outlined in 40 CFR 60, Appendix A.

Proof of performance (POP) and stack testing will be performed for the exhaust stacks at the catalytic oxidizers for the GWTP and STP according to the specifications in 40 CFR Part 60, Appendix A The exit gas velocity and flow rate measurements will be performed according to Method 2, a copy of which is in Appendix G. The analytical methods which will be employed during the tests are listed in the table in this section.

The POP tests will be performed to:

- Demonstrate that the treatment unit can meet performance levels (e.g., ARARs and site-specific clean-up goals);
- Demonstrate that the unit is operated in a manner that is protective of human health and the environment; and
- Establish operational performance criteria.

Stack sampling will be performed in the exit stacks at the catalytic oxidizers for the GWTP and STP during both the pop tests and for ongoing compliance sampling. Sampling will be performed on a continuous basis to ensure ongoing compliance with equipment treatment specifications and to ensure that emissions estimates made are representative of actual site conditions. The parameters to be monitored and specific test methods that will be used during stack sampling are listed in Table 5-2 for the GWTP and Table 5-3 for the STP.

5.2.2.2 Excavation Zone Monitoring

A conceptual layout of the excavation zone and perimeter monitoring is illustrated in Figure 5-1 and the system is discussed in the following sections.

Table 5-2
LHAAP, Burning Ground No. 3, IRA
Groundwater Treatment Plant Emissions Monitoring

Description of Activity	Frequency of Onsite Testing	Frequency of Offsite Testing	Parameters	Test Methods 40 CFR 60 Appendix A
A. Proof Of Performance*	Continuous Emissions Monitors (CEMs)	None	TOC's	Method 25A
	None	Daily During Testing Interval	VOCs**	Method TO-14
B. Normal Operations (One Year O&M)	Continuous Emissions Monitors (CEMs)	None	TOC's	Method 25A
	Real Time - Onsite	At Least Once Every Day the GWTP is Operational	VOCs	OVA/ per Manufacturer`s Information
	None	Quarterly	VOCs	Method TO-14

* Sampling and testing would start when contaminated water is introduced into the GWTP
* * VOST and Method 0010 will be used to sample for organic compounds.

Table 5-3
LHAAP, Burning Ground No. 3, IRA
Soil Treatment Plant Stack Emissions Monitoring

Description of Activity	Frequency of Onsite Testing	Frequency of Offsite Testing	Parameters	Test Methods 40 CFR 60 Appendix A
A. Proof Of Performance*	Continuous Emissions Monitors (CEMs)	None	TOC's	Method 25A
			Carbon Dioxide	Method 3
			Oxygen	Method 3
			Nitrogen Oxides	Method 7
			Carbon Monoxide	Method 10
	None	One Sample Per Run**	VOCs	Method TO-14
			Heavy Metals	Modified Method 5
			Acid Gas (HCl)	Method 26
			Total Particulates	Method 5
			Chlorine Gas	Method 26A
			Dioxins & Furans	Method 23
			Moisture Content	Method 4
			Stack Gas Velocity and Volumetric Flow Rate	Method 2
B. Normal Operations	Continuous Emissions Monitors (CEMs)	None	TOC's	Method 25A
			Carbon Dioxide	Method 3
			Oxygen	Method 3
			Carbon Monoxide	Method 10
	None	Week 1 One Sample/day Week 2 to 4 One Sample/ 48 hrs of Treatment Week 5 to End 1 Sample/2weeks of Treatment	VOCs	Method TO-14
			Acid Gas (HCl)	Method 26
			Total Particulates	Method 5
			Chlorine Gas	Method 26A

*POP testing will include one test for each of 2 conditions (high temperature feed rate and low temperature feed rate). Each test will consist of 3 one hour runs from which results of each test will be averaged. Depending on the results of initial POP testing, additional test conditions may be added to the testing program. A new test condition may be added to the testing program. Each new test will consist of 3 one hour runs.

** VOST and Method 0010 will be used to sample for organic compounds.

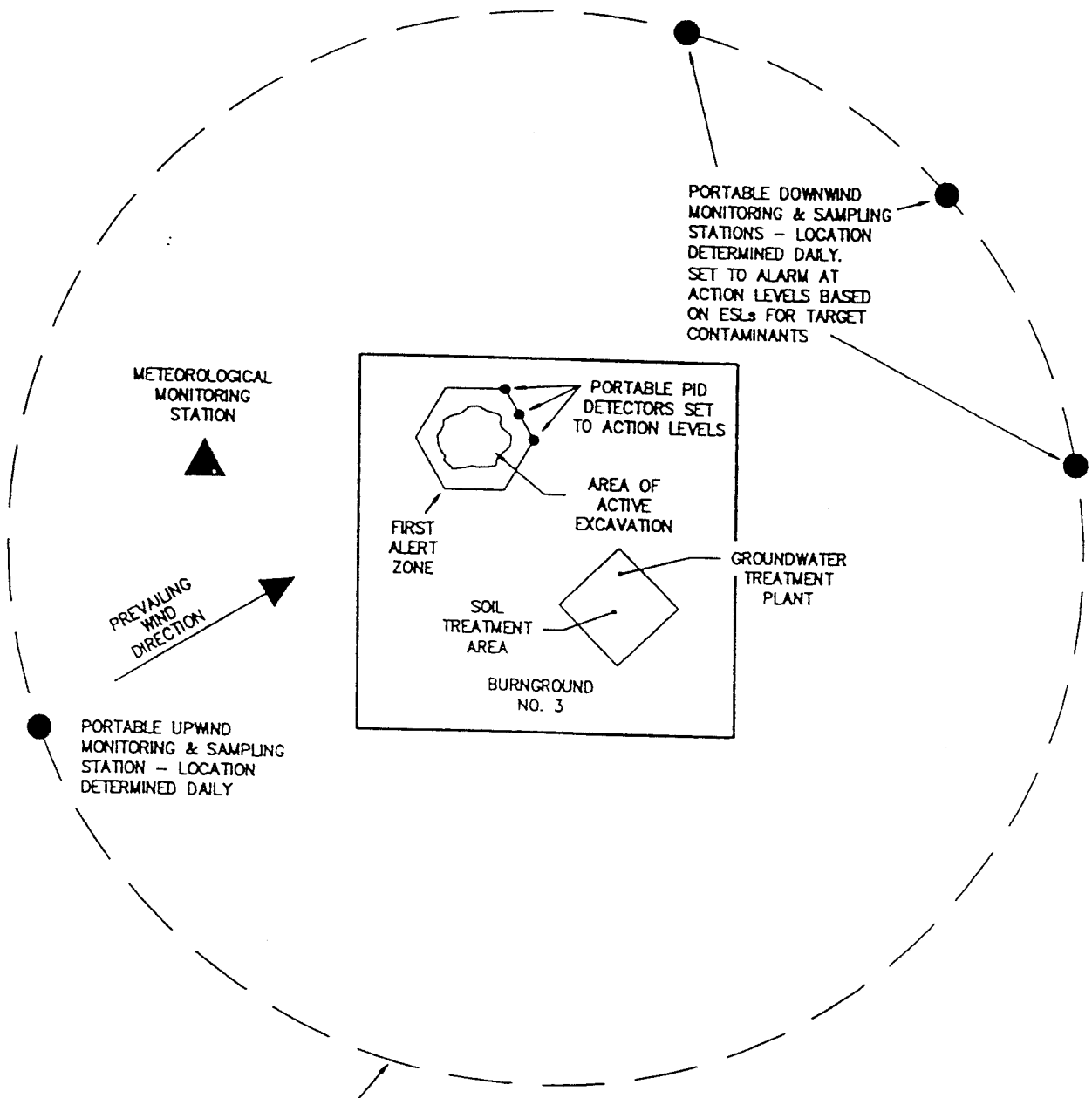


FIGURE 5-1
CONCEPTUAL LAYOUT OF EXCAVATION ZONE AND PERIMETER MONITORING
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

DRAWN BY:	DATE:	PROJ. NO.
LMG	11-30-95	39-04

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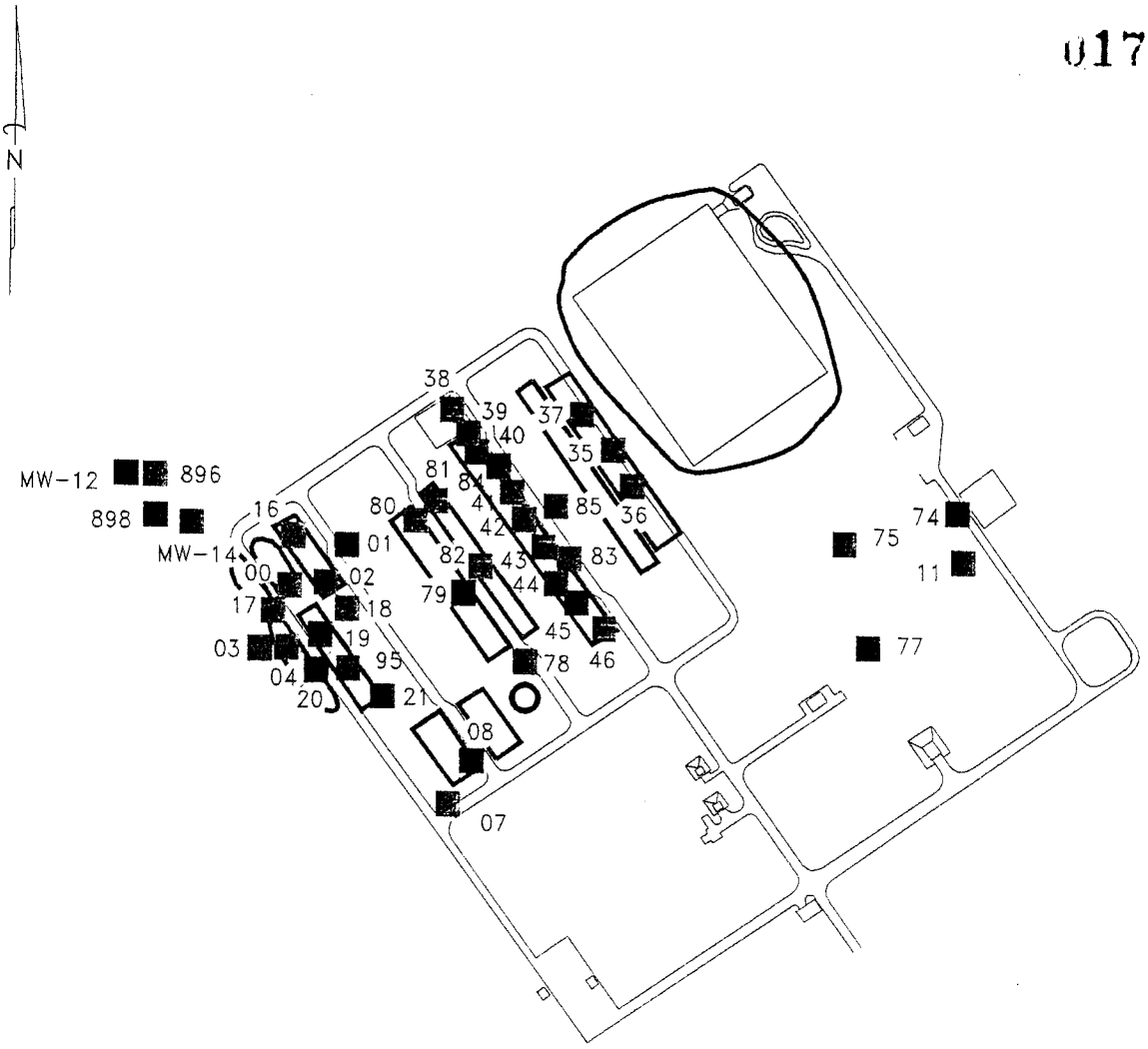
The Excavation Zone monitoring will be performed on a daily basis during excavation of contaminated soils and source materials. This monitoring will consist of the following elements:

Data Analysis:	**Delineation of excavation contamination zones and determination of maximum excavation rates in each zone, based on calculated emission rate estimates and modeling.**
Modeling:	**Determination of First-Alert trigger levels (concentration-based) in the active excavation areas based on air quality health effects screening levels.**
Monitoring:	**At First-alert stations with PID detectors set to alarm at pre-determined trigger levels.**
Trigger Response:	**Potential increase in monitoring and sample collection and modification of excavation activities.**

Available site data was reviewed and utilized to divide the excavation area into rated zones of contamination (as shown in Figure 5-2). A rating of 1 indicated the excavation zone with the lowest reported contamination and highest maximum allowable excavation rate, and a rating of 5 indicated the excavation zone with the highest contamination and the lowest maximum allowable excavation rate (see Table 5-4). The maximum allowable excavation rates were determined as follows. Total emission rates (pore space emission rates and diffusion emission rates) were calculated for each excavation zone, for each contaminant detected, using the following concentrations: Zone 1 - 0.1 mg/kg; Zone 2 - 1.0 mg/kg; Zone 3 - 10.0 mg/kg; Zone 4 - 100 mg/kg; and Zone 5 - 120 mg/kg, as a function of Q (the excavation rate). The concentrations in the zones correspond to any one VOC which could be present at or below the maximum concentration for that zone. These maximum concentrations were used to calculate the emission rates (see Appendix B for detailed calculations).

The maximum allowable emission rate for each contaminant was then determined using the SCREEN2 model and a generic emission rate of 1 gram/sec (see Appendix C for modeling results). The concentration obtained at 1200 meters was then ratioed to one-half of the actual ESL for the compound, and this value was multiplied by the generic emission rate to obtain the maximum allowable emission rate for each compound. These maximum allowable emission rates were then used to solve for Q, the maximum excavation rate. The smallest value of Q obtained for each excavation zone was used to set the maximum excavation rate in each zone.

During site activities, the immediate area of the active Excavation Zone will be monitored, real-time, utilizing two PIDs (Photoionization Detectors) (see Figure 5-1). The location of these monitors will be determined daily, based on the wind direction and the area of active excavation. These monitors will comprise the "First-Alert Stations". The PID trigger level will be determined by evaluating the instrument response for the major



EXCAVATION ZONES

- 0 ≥ 0.1 mg/Kg – EXCAVATION ZONE 1
- 0.1 ≥ 1.0 mg/Kg – EXCAVATION ZONE 2
- 1.0 ≥ 10.0 mg/Kg – EXCAVATION ZONE 3
- 10.0 ≥ 100 mg/Kg – EXCAVATION ZONE 4
- 100 mg/Kg+ – EXCAVATION ZONE 5

LEGEND

MW-7	EXISTING MONITORING WELLS
76	PREVIOUS SOIL BORING
———	SOURCE UNITS

0 150 300 600

SCALE IN FEET

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

FIGURE 5-2
EXCAVATION ZONES
INTERIM REMEDIAL ACTION
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

DRAWN BY:	DATE:	PROJ. NO.
LMG	11-30-95	39-04

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TABLE 5-4 IRA EXCAVATION ZONES & MAXIMUM EXCAVATION RATES	
CONTAMINANT CONCENTRATION (mg/kg) [1]	**MAXIMUM EXCAVATION RATE (CY/hr) [2]**
0 ≤ 0.1	14,800
0.1 ≤ 1.0	1,480
1.0 ≤ 10.0	148
10.0 ≤ 100	14.8
> 100	12.3

[1] Corresponds to at least one contaminant present at or below the maximum concentration for the excavation zone.

[2] The maximum excavation rate which would result in an off-site concentration equal to one-half the Effects Screening Level for the limiting contaminant.

contaminants of concern and assuming the contaminant with the lowest detector response value as the worst case, and determining the maximum ambient concentration in the excavation zone which would be protective of the ESLs at the perimeter of the site. Detection of concentrations above the trigger level at the first-alert stations will potentially trigger increased monitoring activities and modified excavation activities until the instrument readings return to normal background levels. The Excavation Zone will include the actual excavation area as well as the Soil Handling Pad in the Soil and Groundwater Treatment Area (Soil Staging Area).

5.2.2.3 Perimeter Monitoring Program

Perimeter monitoring will be performed to ensure that the health effects screening levels are not exceeded off-site for potential receptors.

Perimeter monitoring will consist of real-time analyses performed utilizing four portable gas chromatographs equipped with data recording capability. The perimeter sample point locations will be surveyed in, equidistant from the remediation area (encompassing both the Excavation Zone and the Soil Staging Area), at the major compass points (for 360 ° around the area) (see Figure 5-1). The prevailing wind direction will be determined on a daily basis and the portable GCs will be stationed at the appropriate upwind and downwind locations. One GC will comprise the upwind monitor and three GCs will comprise the downwind monitors. The meteorological station will be monitored at periodic intervals throughout the day to ensure that the prevailing wind directions remain constant. The sampling program and location of samplers will be adjusted to correspond to any shifts in wind direction which may occur during the day.

If the First-Alert alarm level is reached in the excavation zone, locations directly downwind, at the burning ground perimeter, will be sampled immediately using SUMMA canisters and sent off-site for analysis. Sampling will continue at the site perimeter for 30 minutes to one hour following the return to normal readings obtained on the First-Alert Station monitor.

The SCREEN2 Air Dispersion Model was used to estimate ambient air concentrations of the target compounds at the nearest off-site receptors as detailed in Sections 4.4 and 5.2.2.2. To be protective of human health and the environment, the downwind perimeter monitors will be set to alarm at one-half the ESL for the limiting compound. The limiting compound for a particular excavation area will be the compound detected in historical or recent soil samples which has the lowest ESL (see Appendix B for a list of the historically detected compounds and their ESLs). These ESLs were used to determine the maximum excavation rates and will be sued to set the daily alarm limits at the excavation zone monitoring stations.

Site perimeter confirmation samples will also be collected biweekly (by SUMMA canister) and sent off-site for analyses for full-scan volatile analysis to ensure that site conditions have been accurately represented.

5.3 Meteorological Monitoring Program

Meteorological monitoring will be performed as an integral part of the IRA. To estimate the potential for off-site migration of contaminants, meteorological data would be used in conjunction with measured air concentrations at the site perimeter to determine the impact of IRA activities on ambient air quality. A dedicated meteorological system will be installed for the air monitoring program that will collect real-time data on a continuous basis. Sections 5.3.1, 5.3.2, and 5.3.3 discuss the siting criteria for such the meteorological monitoring station, the monitoring duration, and system parameters, respectively.

5.3.1 Meteorological Station Siting

The primary objective of the meteorological station will be to obtain measurements that are representative of the area. Representative data are obtained by adhering to guidelines for minimum sensor height above the surface, and distances from natural and manmade obstructions.

The meteorological station would be permanently installed on level and open terrain away from interferences. Interferences are unwanted local effects that distort the actual conditions at the site. Interferences may be buildings that disrupt the normal flow of winds or direct solar radiation that falsely elevates ambient air temperature readings. Conventions have been adopted by the U.S. EPA to aid in the collection of comparable data by avoiding interferences. These conventions would be adhered to for parameters that are dependent on height, such as wind speed, wind direction, relative humidity, temperature, and precipitation (see Table 5-5). The tower height would be 10 meters.

5.3.2 Duration of Monitoring

Meteorological data would be collected starting at least two weeks prior to the initiation of the baseline monitoring program. Data will be collected throughout the duration of the IRA. If a significant lag occurs during the remedial activity, meteorological monitoring may be ceased until one week before resuming treatment work.

5.3.3 Monitoring Parameters

The meteorological monitoring system for the site will collect information for the following parameters: wind speed, wind direction (with sigma theta), ambient temperature, precipitation, and barometric pressure. The meteorological equipment specifications would comply with the recommended accuracies,

resolution, and response characteristics outlined in Tables 5-6 and 5-7. Meteorological data will be recorded continuously by a data logger and/or a strip chart recorder and will be available in hourly averages to site personnel.

The meteorological equipment installation and operation specifications would be performed according to the manufacturer's recommendations and the U.S. EPA's On-site Meteorological Program Guidance for Regulatory Modeling Applications (U.S. EPA 450/4-87-013, June 1987).

TABLE 5-5

METEOROLOGICAL SENSOR SITING CONVENTIONS[a]
LHAAP SITE

SITING CONSIDERATION	CONVENTION
Instrument Tower	Located at least 10 times the height of obstructions away from said obstructions. Avoid areas with sloping terrain, valleys, and land-water interfaces, unless features are present at project site. If located on building roof; sensors must be elevated to 1.5 x building height.
Wind Speed/Wind Direction	Ten meters above ground level. Sensors should be mounted on booms no closer than 2 x the tower width away. Booms should be oriented normal to the prevailing wind direction.
Dry-bulb Temperature and Relative Humidity	Sensors should not be influenced by direct solar radiation or radiant heat. Standard siting for sensor is 2 meters above a plot of level ground, 9 meters in diameter. Surface should be short grass or soil. Additional heights may be appropriate.
Precipitation	Gauge is mounted on level ground with no obstructions. Wind screens are installed to prevent high winds from deflecting precipitation away from gauge orifice.

(a) U.S. EPA. June 1987. On-Site Meteorological Program Guidance for Regulatory Modeling Applications. EPA-450/4-87-013. Office of Air Quality Planning and Standards. Research Triangle Park, North Carolina 27711.

U.S. EPA. May 1987. Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD). EPA-450/4-87/007. Office of Air Quality Planning and Standards. Research Triangle Park, North Carolina 27711.

TABLE 5-6 RECOMMENDED RESPONSE CHARACTERISTICS FOR METEOROLOGICAL SENSORS LHAAP SITE	
METEOROLOGICAL VARIABLE	**SENSOR SPECIFICATION[a]**
Wind Speed	Starting speed ≤0.5 m/s; Distance constant ≤5 m
Wind Direction	Starting speed ≤0.5 m/s at 10° deflection; Damping Ratio 0.4 to 0.7; Delay distance ≤5 m
Temperature	Time Constant ≤1 minute
Dew Point Temperature	Time Constant ≤30 minutes; operating temperature range -30°C to +30°C

(a) U.S. EPA, June 1987. On-Site Meteorological Program Guidance for Regulatory Modeling Applications, EPA-450/4-87-013, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina 27711, Table 5-2.

TABLE 5-7

RECOMMENDED SYSTEM ACCURACIES AND RESOLUTIONS[a]
LHAAP SITE

METEOROLOGICAL VARIABLE	SYSTEM ACCURACY	MEASUREMENT RESOLUTION
Wind Speed	±0.2 m/s	0.1 m/s
Wind Direction	±5 degrees	1 degree
Ambient Temperature	±0.5°C	0.1°C
Dew Point Temperature	±1.5°C	0.1°C
Precipitation	±10% of observed	0.3 mm
Pressure	±3 mb (0.3 kPa)	0.5 mb
Time	±5 minutes	---

(a) U.S. EPA, June 1987. On-Site Meteorological Program Guidance for Regulatory Modeling Applications. EPA-450/4-87-013. Office of Air Quality Planning and Standards. Research Triangle Park, North Carolina 27711.

5.4 Quality Assurance and Quality Control Program

The data acquired from the Quality Assurance and Quality Control (QA/QC) procedures implemented for this project will be used to estimate analytical data quality, to determine the need for corrective action, and to interpret results after corrective action procedures have been implemented. Method specific QC procedures have been incorporated into the individual test methods to be used during the IRA. QA also includes the management of procedures and controls to generate data of acceptable quality.

The QA/QC program for the AMP requires the specification and implementation of the following measures:

- Conformance to Standard Methods for Sampling and Analysis.
- Performance of Routine QA/QC Checks and Audits.
- Development of Documentation and Recordkeeping Procedures.
- Assignment of QA/QC Organizational Chart and Responsibilities.

The AMP will incorporate a four-component approach for routine QA/QC checks as follows:

- Use of collocated samples for precision checks.
- Blank samples for accuracy checks.
- Use of analytical standards, equipment calibrations, and laboratory spiking for equipment performance checks.
- Data review and validation for internal consistency.

Control samples, which may include blanks (trip, equipment, and laboratory), duplicates, spikes analytical standards and reference materials will be utilized throughout the AMP in different phases of the data collection process, beginning with sampling and continuing on through transportation, storage and analysis.

5.4.1 Data Quality Objectives

Precision, accuracy and completeness checks will be performed for each primary measurement parameter with reference to the project objective. The objectives of the data quality program during implementation

of the IRA will be to: 1) demonstrate compliance with the treatment efficiency requirements of the GWTP and the STP; and 2) evaluate the impact of IRA activities on overall ambient air quality in the area, in particular, with reference to the potential for off-site migration of contaminants at concentrations which exceed health effect screening levels. The overall quality of the data collected for these objectives must be known. The majority of the data precision and accuracy checks are method-specific, and are incorporated here by reference to the use of specific methods. Other quality assurance aspects of the data quality program will include personnel training (demonstrated technical competence), standardization of procedures, documentation, data validation and periodic data quality evaluations. Quality control aspects will include routine instrument checks, flow rate checks, duplicate analyses, calibration checks, blank analyses and equipment drift checks.

5.4.2 Sampling Procedures

Standard methods will be used which specify the: 1) preparation, cleaning and certification of sampling equipment; 2) sample preservation, transport and storage; and 3) sample holding times before extraction and analysis. These standard methods were presented in Table 5-1 and discussed in Section 5.2.2.1, and are incorporated here by reference.

5.4.3 Sample Custody

Procedures will be documented for preparing reagents or other supplies that become an integral part of the sample. Procedures and forms will be prepared for documenting the dates, times, locations and other relevant data pertaining to sample collection and analysis.

All field notes, laboratory notes and original calculations will be retained. All samples will be uniquely identified to ensure positive identification throughout analysis procedures. Chain-of-custody forms will accompany all samples from the field to the laboratory or intermediate storage points, and the forms should be signed by all persons who handle the samples along the way. The completed chain-of custody form will include documentation of sample preservation methods and the analyses requested for the samples.

Samples will be handled in a manner suitable for ensuring that there is no contamination or other breach of sample integrity that might be caused by leakage, accidental destruction, or tampering. Samples will be packaged, labeled, preserved and documented in an area which is free of contamination and provides for secure storage. Samples will be shipped only by registered mail or other forms of registered service. Samples will be delivered and analyzed within required holding times.

5.4.4 Calibration Procedures and Frequency

Calibration will be performed at the frequency referenced in the appropriate method outlined in 40 CFR Part 60, Appendix A, or at the equipment Manufacturer's recommendation. For sampling and analysis performed onsite, the applicable QA/QC requirements for CEMs (continuous emission monitors) in 40 CFR Part 60, Appendix A, particularly in Method 2, 5A, Method 3, Method 6C (referenced in Method 3), Method 7 and Method 10 will be followed. These procedures address preparation of calibration gases, calibration and zero drift testing, response time testing, span checking, sampling system bias, and interference checks. Calibration gases are known concentrations of a gas in an appropriate diluent gas. Certified calibration gases, with the manufacturer's tolerance not to exceed 2 percent of the tag value, will be used. Zero gas and 3 ranges of calibration gases will be used.

5.4.5 Analytical Equipment and Procedures

EPA approved analytical procedures will be used where possible, or modified procedures will be validated. Appropriate environmental conditions will be maintained to ensure that all equipment in use is not adversely affected by surroundings.

Manufacturer' recommended specifications will be used to ensure that all onsite analytical equipment is operational and functioning properly.

5.4.6 Data Reduction, Validation, and Reporting

A description for each primary measurement parameter including all equations, statistics, method for treating blank, method for treating undetected compounds in statistical calculations, methods to identify and treat outliers, criteria for flagging and validating data, will be prepared for reporting data results.

For samples sent to off-site laboratories, all laboratory data reports will be reviewed and independently validated by the assigned project QA Officer before preparation of final data reports to assure that proper protocols were followed.

On a routine basis, the outside laboratory data will be evaluated for: (1) completeness of laboratory records (analyses and QC samples) ; (2) detection and quantitation limits ; (3) calibration control limits, (4) sample holding time limits (where applicable); and (5) correlation of laboratory data.

5.4.7 Internal Quality Control

Internal quality control during the AMP will be preformed to evaluate and document the performance of the sampling and analytical systems. The minimum level of quality control checks that will be performed are summarized in Table 5-8.

TABLE 5-8
Summary of Quality Control Checks

Activity	Monitoring Approach	Sampling		Analysis	
		QC Check	Frequency	QC Check	Frequency
VOC Monitoring (baseline & other)	Canisters w/offsite TO-14 analysis	* Collocated samples (baseline tests) * Duplicate samples (stack sampling)	* 1/sampling event * 10%	* Calibrations * Analytical blanks * Duplicate analysis * QC standards	Follow laboratory's standard procedures
Meteorological Monitoring	On-site weather station	N/A	N/A	* QC audit	At installation and 1/year thereafter
Emissions Monitoring	CEMs on GWTP and LTTD units	* Inspect for proper operation (look for plugged filters & water in lines)	* 2/day	* Calibration * Span/zero check	* Weekly * Daily
Stack Emissions Testing	Standard EPA stack sampling methods w/offsite analysis	Follow standard procedures in EPA methods (e.g., leak checks in every run)	As Required	*Calibrations * Analytical blanks * Duplicate analyses * QC standards	Follow laboratory's standard procedures
Excavation Zone Monitoring	Real-time portable monitors(e.g., PIDs)	N/A	N/A	* Calibration * Span/zero check * Drift check	* Weekly * Daily * Daily
Perimeter Monitoring	Portable GCs	N/A	N/A	* Calibration * Span/zero check * Drift check	*Weekly * Daily * Daily

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5.4.8 Data Precision, Accuracy and Completeness Procedures

For automated on-site analytical systems, precision data will be obtained periodically (daily or weekly), challenging the analyzer with a gas standard of known concentration and observing the analyzer's response. Precision will be expressed in terms of relative standard deviation (Standard deviation divided by the mean, expressed as a percentage) of successive precision check results. Accuracy will be expressed as the percent of the known concentration recovered through the analytical system (the observed concentration divided by the known concentration, expressed as a percentage).

For measurement methods that require integrated sampling and off-site analysis (manual methods) duplicate (collocated) sample results will be used for determining data precision. To obtain precision data, collocated samplers will be located in areas with the highest expected concentration levels of target analytes. Precision will be expressed as the relative percent difference of duplicate sample results, or as pooled standard deviation.

One set of samples will be simultaneously collocated at each downwind station for 10 percent of the sampling activities. Comparison of the results for collocated samples will be used to evaluate the integrity of the samples and the adequacy of the laboratory procedures.

Accuracy determinations for manual methods will be performed by spiking sampling media with known quantities of target analytes and measuring their recovery through the extraction and analytical systems. The accuracy of the measurement data should be expressed as the percentage of the spiked amount recovered in the analysis. The analytical laboratory will perform spike sample analyses at a frequency of one in 20.

6.0 MITIGATING MEASURES

If the perimeter concentrations of target compounds exceed the established action level trigger, efforts will be taken to mitigate the off-site migration of these constituents. These efforts include the determination of the specific source of the emissions causing the high perimeter concentrations along with the review of the coinciding meteorological data and site activity log. This investigation would be performed by the assigned Site Manager and Health and Safety Specialist. Based on the result of this investigation, one of the following conditions would apply:

- If it is determined that site activities are not responsible for the event, no further action is required.

- If site activities are deemed responsible for the exceeded action level trigger, a determination will be made whether or not the event will be of short or long duration. A short-duration event, whether caused by high winds or by handling of an isolated pile of debris, may be mitigated by temporarily increasing the control efforts associated with this source (e.g., installing a temporary wind barrier). Any emission control measures required will take into consideration existing site meteorological conditions and sensitivity of potential off-site receptors. Conversely, if the source will be of long-term duration, e.g., excavation of source material in a particular excavation zone, then further action will be taken.

Emission control measures may have to be modified to prevent further action level exceedances. Additional engineering controls such as wind barriers or chemical stabilization may be required. If engineering controls cannot be developed to mitigate the off-site migration of airborne contaminants, then the remedial operations will need to be modified accordingly. Possible modification may include limiting the size of the exposed area controlling the rate of excavation or adjusting the rate of soil or waste water treatment or decreasing excavation.

7.0 DATA MANAGEMENT AND REPORTING

7.1 Air Monitoring Documentation

Complete and detailed documentation of field and laboratory QA/QC activities will be a key factor in the AMP. Required documentation will include the following:

- Field logs.
- Sample information sheets.
- Calibration data records.
- Chain-of-custody forms.
- Sample analysis sheets.

A field log will be used to maintain a record of sample identification numbers, dates deployed, and sample conditions. Notes will also be taken of equipment conditions, sampling problems or equipment failures, observed weather conditions, and unusual site activities. Copies of field logs from each sampling phase will be included in the respective Air Monitoring Program Reports described in Section 7.3 and with the daily QC report.

Sample information sheets (equivalent to those presented in the respective standard methods referenced) will be completed for each sample. The information included will be similar to that required for field log entries. However, the sample information sheets will be sample-specific and will be considered the primary sample collection documentation. Conversely, the field log is back-up of documentation sources and presents information on a chronological basis. Copies of each sample information sheet will be submitted as part of the daily QC report unless an action level trigger is exceeded. In the latter case, the information sheet will be delivered to the Project Manager at the earliest opportunity.

Calibration data records (as specified in the respective standard methods referenced) will document required periodic calibrations and any other maintenance activities for individual instruments. Calibration data records will be submitted with the Daily QC Report.

Chain-of-custody forms will be initiated by the analytical laboratory when issuing sample containers. The chain-of-custody will be continued through container acquisition and sampling and returned to the analytical laboratory upon submittal of samples. Individuals who receive and handle each sample assure sample integrity until delivery to the laboratory. Information to be recorded on the chain-of-custody forms includes the date, time, sample identification, sampling method, individuals who handle each sample and the analysis

requested. The chain-of-custody is maintained by the laboratory through final analysis and recording of the results.

Within 72 hours of sample receipt by the laboratory, verbal analytical results will be obtained. The results will be confirmed in a written sample analysis sheet with one original and three copies provided to DEI within 48 hours of providing the verbal results. Used VOC sampling canisters must be certified clean, by the laboratory, before re-use.

Equipment data sheets will be prepared to document the POP test (one-time) and CEM results (daily). These records will be kept onsite for reference and will be incorporated into the AMP Reports as appropriate.

7.2 Meteorological Data

Fifteen minute and hourly averaged meteorological data will be generated by a data logger. The hourly averages will be printed and saved onsite for reference. The data sheets generated will include wind speed, wind direction, precipitation, temperature, and barometric pressure.

The data will be scanned for validity by using out of range tests and no variability in measurements over a time except for precipitation. Appendix D provides a screening criteria for meteorological data.

Electronic checks on equipment, as specified by the equipment manufacturer, will be performed weekly and monthly to maintain accuracy of data.

7.3 Monitoring Program Reports

Air Monitoring Program Reports will be submitted to the USACE within 30 days of the conclusion of a sampling and testing activity. Each report will provide a tabular summary of monitoring results and all associated QA/QC documentation and laboratory data. All occurrences of equipment failures and air concentrations in excess of the established action level trigger will be identified. In addition, a discussion of mitigating measures that were applied in response to any action level exceedances will be provided.

All Exceedances of air action levels shall be verbally reported to EPA and TNRCC within 24 hours of sample analysis or within five (5) hours for real-time monitors.

APPENDIX A

PROCESS SIMULATOR HISYM MODELING RESULTS FOR WASTEWATER AIR STRIPPING

Hyprotech's Process Simulator HYSIM - Licensed to AWD Technologies Inc.
Date 95/03/02 Version C2.53 Case Name LHOINORG.SIM
Time 8:39:9 Prop Pkg UNIQUAC-Ideal

DESIGN BASIS FOR VENT IS 99% (BASE)

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Stream		117	117R	118	119
Description					
Vapour frac.		0.0000	0.0000	0.9999	0.9999
Temperature	F	120.3795	120.3710*	113.5210	113.5210
Pressure	psia	44.7000*	44.7000*	14.7000*	14.7000*
Molar Flow	lbmole/hr	360.2622	360.3073*	876.8053	1.1842
Mass Flow	lb/hr	6491.8661	6492.4399	24442.8566	43.1764
LiqVol Flow	USGPM	12.9913	12.9924	56.2162	0.0991
Enthalpy	Btu/hr	-5.08448E+06	-5.08510E+06	3.52093E+06	4850.2734
Density	lb/ft3	61.7432	61.7439	0.0666	0.0871
Mole Wt.		18.0198	18.0192	27.8772	36.4604
Spec. Heat	Btu/lb-F	1.0009	1.0009	0.2541	0.1935
Therm Cond	Btu/hr-ft-F	0.3711	0.3711	---	---
Viscosity	cP	0.5526	0.5526	---	---
Z Factor		0.0021	0.0021	---	---
Sur Tension	dyne/cm	67.8902	67.8915	---	---
Std Density	lb/ft3	63.3278	63.3283	---	---
Nitrogen	lb/hr	0.0472	0.0472*	17669.2338	0.0000
Oxygen	lb/hr	0.0433	0.0432*	4965.9176	0.0000
Cl2-C1	lb/hr	0.0004	0.0004*	0.4482	0.0000
Cl3-C2=	lb/hr	0.0000	0.0000*	0.0597	0.0000
11-ClC2	lb/hr	0.0000	0.0000*	0.0007	0.0000
1*-ClC2=	lb/hr	0.0000	0.0000*	0.0001	0.0000
[illegible]lC2	lb/hr	0.0000	0.0000*	0.0001	0.0000
VinylCl	lb/hr	0.0000	0.0000*	0.0000	0.0000
cetone	lb/hr	0.0001	0.0001*	0.0195	0.0000
hloroform	lb/hr	0.0000	0.0000*	0.0023	0.0000
Cl4-C2=	lb/hr	0.0000	0.0000*	0.0002	0.0000
1-ci2-ClC2=	lb/hr	0.0000	0.0000*	0.0007	0.0000
1-tr2-ClC2=	lb/hr	0.0000	0.0000*	0.0012	0.0000
BARIUM	lb/hr	0.0000	0.0000*	0.0000	0.0000
Calcium	lb/hr	0.0000	0.0000*	0.0000	0.0000
IRON	lb/hr	0.0000	0.0000*	0.0000	0.0000
NICKEL	lb/hr	0.0000	0.0000*	0.0000	0.0000
SODIUM	lb/hr	0.0000	0.0000*	0.0000	0.0000
ZINC	lb/hr	0.0000	0.0000*	0.0000	0.0000
H2O	lb/hr	6488.3912	6489.4518*	1518.9066	0.0000
Methane	lb/hr	0.0000	0.0000*	0.0000	0.0000
CO2	lb/hr	0.0424	0.0424*	288.2668	0.0000
HCl	lb/hr	0.0688	0.0687*	0.0000	43.1608
Mg(OH)2	lb/hr	0.0000	0.0000*	0.0000	0.0000
CL(ION)	lb/hr	3.2730	2.7863*	0.0000	0.0156
Total:	lb/hr	6491.8661	6492.4399	24442.8566	43.1764

.5327

24442.8566 / 1066.60

FLOW 6,116.83 CUFT/HR

ELEV
24.375 (EQUIP)
1.5 (PEDESTAL)
25.875'

DIAMETER 22" ϕ

OPR — 24 HRS @ 80%

.5327 #/HR × 24 × 365 × 80% ~ 3,733 #/2000 ~ 1.867 TONS/YR.

APPENDIX B

CALCULATIONS FOR EMISSIONS ASSOCIATED WITH SOIL AND SOURCE MATERIAL EXCAVATIONS

FINAL

CALCULATION OF SATURATED CONCENTRATIONS OF METHYLENE CHLORIDE AND TRICHLOROETHYLENE

CALCULATIONS FOR TARGET COMPOUND EMISSIONS ASSOCIATED WITH SOIL AND SOURCE MATERIAL EXCAVATIONS

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1. Calculation of Saturation Vapor Concentration (Csat)

Equation 1

$$Csat = (Kd \times S \times n_m) \times (S \times 0_m)$$

Kd = soil/water partition coefficient (L/kg)
Kd = Koc x foc
S = Solubility (mg/L)
n_m = Soil moisture content (kg-water/kg-soil)
0_m = Soil moisture content (L-water/kg-soil -mL/g)

Calculation of Csat for Methylene Chloride

Step 1 - Calculation of Kd

Koc := 8.8

foc := .02

Kd := Koc x foc

Kd = 0.176 L/kg

Calculation of Csat

Kd = 0.176

S := 2.0×10^4

Nm := 0.12

0m := 0.12

Csat := $(Kd \times S \times N_m) + (S \times 0_m)$

Csat $2.822 \cdot 10^3$ **mg Methylene chloride / kg**

CALCULATIONS FOR TARGET COMPOUND EMISSIONS ASSOCIATED WITH SOIL AND SOURCE MATERIAL EXCAVATIONS

(CONTINUED)

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Calculation of Saturation Vapor Concentration (Csat)

Equation 1

$$Csat = (Kd \times S \times n_m) \times (S \times 0_m)$$

Kd = soil/water partition coefficient (L/kg)
Kd = Koc x foc
S = Solubility (mg/L)
n_m = Soil moisture content (kg-water/kg-soil)
0_m = Soil moisture content (L-water/kg-soil -mL/g)

Calculation of Csat for Trichloroethylene

Step 1 - Calculation of Kd

Koc := 126

foc := .02

Kd := Koc x foc

Kd = 2.52 L/kg

Calculation of Csat

Kd = 2.52

S := 1.1×10^3

n_m:= 0.12

0_m := 0.12

Csat := (Kd x S x n_m) + (S x 0_m)

Csat = 464.64 **mg Trichloroethylene / kg**

Complete and detailed calculations of vapor emission rates for the target compounds are provided in Appendix C. Assumptions and input parameters employed in these emission equations are discussed in the following paragraphs.

2. Pore Space Emissions of VOCs from Soil and Source Material Excavation

For soil saturated with trichloroethylene, the pore space emission rate (Er_{ps}) is defined as:

Equation 2

$$Erps = \frac{P\ MW\ 10^6\ E_a\ Q\ ExC}{RT}$$

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where:

P	=	Vapor pressure of each chemical (mmHg)
MW	=	Chemical molecular weight (g/mole)
E_a	=	Air filled porosity (dimensionless)
Q	=	Excavation rate (m^3 of soil/day)
ExC	=	Soil-to-atmosphere exchange constant (dimensionless)
R	=	Universal gas constant (mmHg-cm^3/g-mole)
T	=	Temperature (°K)
10^6	=	Conversion factor (cm^3/m^3)

For unsaturated soils, the pore space emission rate Erps is defined as:

Equation 3

$$Erps = M \times 0.33/tsv$$

where:

M	=	Total mass in grams of contaminant in a given volume of soil.
tsv	=	Time in seconds to excavate a given volume of soil.

The following assumptions were made in the estimation of pore space emissions.

- The value of air filled porosity (E_a) employed in all calculation is 0.35. This value is recommended by the Superfund Exposure Assessment Manual (SEAMs) for compacted soils.

- The volume of saturated soil which is used to estimate the excavation rate (Q = volume of soil excavated divided by the time from the start of excavation in seconds) is the volume of saturated soil expected to be excavated in one hour. A typical excavation rate of 30CY/hr was used. Therefore, Q is equal to 0.006 meters/sec. The total volume of saturated soil to be excavated is 11,000 m^3.

- The volume of unsaturated soil which is used to estimate the excavation rate (Q = volume of soil excavated divided by the time from the start of excavation in seconds) is the volume of saturated soil expected to be excavated in one hour. A typical excavation rate of 30 CY/hr was

used. Therefore, Q is equal to 0.006 meters/sec. The total volume of unsaturated soil to be excavated is 27,230 m^3.

- The value of the soil-to-atmosphere exchange constant (ExC) is 0.33. This is the default supplied by the EPA's documentation for the excavation model.

- The temperature employed in the emission rate model is 299°K (78.5°F). This temperature is approximately the daily maximum average for the site area (NOAA, 1990).

- The average depth of excavation was calculated to be 3.7 meters. This depth was calculated based on the four most contaminated trichloroethylene sample depths (4 feet, 6 feet, 14 feet, and 18 feet) and the three most contaminated methylene chloride sample depths (10 feet,14 feet, and 18 feet). The averages of the trichloroethylene and methylene chloride depths were then averaged to calculate the overall average excavation depth.

- Time of excavation for saturated and unsaturated soils is one hour = 3600 seconds..

3. Diffusion of VOCs from Soil and Source Material Excavation

The emission rate in saturated and unsaturated soils due to diffusion is:

Equation 4

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$$ER_{diff} = \frac{C\ 10{,}000\ SA}{\frac{Ea}{K_{eq}\ k_g} + \left(\frac{\pi t}{D_e\ K_{eq}}\right)^{1/2}}$$

where:

C	=	Chemical concentration in soil (mg/Kg)
SA	=	Emitting surface area (m^2)
E_a	=	Air filled porosity (dimensionless)
K_{eq}	=	Equilibrium coefficient (dimensionless)
k_g	=	Gas-phase mass transfer coefficient (cm/sec)
D_e	=	Effective diffusivity in air (cm^2/sec)
t	=	time of excavation (sec)
π	=	3.1416

The following assumptions and variables are used in the estimation of emissions for diffusion (Er_{diff}):

- The average historical soil concentrations listed in Table 4-1 were used for the target compound concentrations in soil.

- The emitting surface area (SA) used in the unsaturated and saturated soil calculations is 6.2 m^2. This value was determined in each case by dividing the total soil volume by the average depth (3.7 m) and the number of hours to complete the excavation at a typical excavation rate of 30 CY/hr. For example, for saturated soils, the total soil volume is 11,000 m^3. At an excavation rate of 30 CY/hr (23 m^3/hr), the total time of excavation is approximately 480 hours. The exposed emitting surface area on an hourly basis is therefore (11,000/3.7) m^3, or 2,973 m^3, divided by 480 hours. This equals 6.2 m^2/hr.

- K_{eq} is the chemical specific equilibrium coefficient which is dependent on Henry's Law Constant and temperature (K_{eq} = H/RT). Calculated K_{eq} values are provided in Appendix C.

- The value of the gas-phase mass transfer coefficient (k_g) is 0.15 cm/sec. This value is supplied in the EPA's documentation for the excavation model.

- Effective diffusivity in air (De) values were estimated for each chemical included in emission calculations. The formula for calculating De is:

Equation 5

$$D_e = D_a \times E_a^{3.33} / E_t^2$$

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where:

D_a = Diffusivity of a chemical in air (cm^2/sec)
E_a = Air filled porosity (dimensionless) = 0.35
E_t = Total porosity = 0.35

Values for Da were obtained from the U.S. EPA's Air/Superfund National Technical Guidance Study Series.

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FINAL

CALCULATION OF TRICHLOROETHYLENE AND METHYLENE CHLORIDE EMISSIONS

017348

FINAL

CALCULATION OF ONE-HOUR WORST-CASE TRICHLOROETHYLENE AND METHYLENE CHLORIDE EMISSIONS

WORST-CASE TRICHLOROETHYLENE AND METHYLENE CHLORIDE EMISSIONS

Worst-case emissions for methylene chloride and trichloroethylene were determined by the following method.

In order to calculate the maximum emissions which could result from excavation activities during the IRA, a worst-case scenario was defined. A review of historical analytical data determined that maximum emissions could be expected to result during excavation of soils containing maximum concentrations of both of the target contaminants, methylene chloride and trichloroethylene. Therefore, the following soil concentrations were used to calculate the worst-case short-term emissions: methylene chloride - 600 mg/Kg and trichloroethylene - 465 mg/Kg. The short-term emission rate period was taken as one hour. The maximum short-term excavation rate was taken as the hourly capacity of a typical excavator expected to be employed during the IRA. The standard excavation capacity of this type of equipment is 30 cubic yards per hour (CY/hr).

Emission rate calculations were performed for methylene chloride and trichloroethylene according to the procedure used for calculation of average emissions. Trichloroethylene emission rates were calculated using the saturation concentration of trichloroethylene (465 mg/Kg), the pore space emission rate equation for saturated soils and the diffusion emission rate equation , and emission rates were calculated using a methylene chloride concentration of 600 mg/Kg, the pore space emission rate for unsaturated soils and the diffusion emission rate equation .

The total short-term worst-case trichloroethylene emission rate calculated for an excavation rate of 30 CY/hr was approximately 0.605 grams/sec (4.8 lbs/hr). The short-term methylene chloride emission rate calculated for an excavation rate of 30 CY/hr was approximately 2.7 grams/sec (21.4 lbs/hr).

Air quality impact screening was then performed to determine the impact of emissions on downwind receptors, using the SCREEN2 model, with methylene chloride and trichloroethylene as the limiting contaminants, at a soil excavation rate of 30 CY/hr (see Appendix C). The excavation area was modeled as an area source using similar input parameters, stability classes and wind speeds used in the calculation of average emissions.. The results of all the cases modeled are summarized in the table below. These results were compared to the TNRCC's Health ESLs list from April 10, 1995. (These are the concentration levels determined by the TNRCC to be protective of human health and the environment.) The results indicate that in no instance was the short-term ESL for methylene chloride (260 ug/m^3) or trichloroethylene (1350 ug/m^3) exceeded for a receptor located at 1200 meters downwind from the excavation site. A maximum methylene chloride concentration of 133.6 ug/m^3 was obtained at stability class 4 with a wind speed of 3.0 meters/sec, at a distance of 1000 meters.

SUMMARY OF SCREEN2 MODEL RESULTING CONCENTRATIONS OF METHYLENE CHLORIDE AT 1200 METERS					
Stability Class	**Wind Speed (m/sec)**	**Methylene Chloride Emission Rate (g/sec)**	**Excavation Rate (CY/hr)**	**Methylene Chloride Concentration ($\mu g/m^3$)**	**Trichloroethylene Concentration ($\mu g/m^3$)**
3	2	2.752	30	49.84	9.78
3	5	2.752	30	19.94	3.912
4	3	2.752	30	100.6	19.75
4	6	2.752	30	50.32	9.875

The emission rates calculated here, and the screen modeling performed are truly representative of worst-case conditions. Affected soils having the highest concentrations of trichloroethylene and methylene chloride are restricted to relatively small areas within the excavation area. The amount of excavation performed in these areas will most likely be limited The maximum excavation rate of 30 CY/hr will probably not be realized in these areas due to health and safety precautions which may be required for site personnel. For the majority of the IRA activities, emissions of trichloroethylene and methylene chloride will be significantly lower, as indicated in Table 4-3.

One Hour Worst Case TCE Emission Rate Calculations
Soil Excavation of Burning Ground #3

Longhorn Army Ammunition Plant
Karnack, Texas

Q = Excavation Rate =	**30 cy/hr**	0.007 m^3/s
Pile Depth (Assumed) =	**3 ft**	0.915 m
t = time of excavation =	**1 hr**	3600 s

1. Pore Space Emission Rate:
A. Saturated Soil:

Contaminant : TCE
VP = vapor pressure = **75 mm Hg**
MW = molecular weight = **131.4 g/mol TCE**
Pa = soil air-filled porosity = **0.35**
EXC = Soil to atmosphere exchange constant = **0.33**
R = Universal Gas Constant = **62,361 mm Hg cc/mol K**
T = Temperature = **299 K**

ERps = Pore Space Emission Rate
ERps = [(VP)*(MW)*(Pa)*(Q)*(EXC)] / [R*T]

ERps = 0.412 g/s

B. Unsaturated Soil: N/A

2. Diffusion Emission Rate
A. Saturated Soil:

Contaminant: TCE
Contaminant Concentration = **465 mg TCE/kg**

Ci = Concentration = 465 mg TCE/kg
SA = surface area = 27 m^2
Pa = air-filled porosity = 0.35
k-eq = **0.371**
k-g = **0.15 cm/s**
D e = **0.020 cm^2/s**
t = time of excavation = 3600 s
pi = 3.1416
B= Bulk Soil Density = 1.94 g/cc

ERdiff = Diffusion Emission Rate
ERdiff = [(Ci)(10,000cm^2/m^2)(SA)(B)]/[(Pa/(k-eq * k-g)) + (((pi*t)/(De*k-eq))^0.5)]

ERdiff = 0.193 g/s

B. Unsaturated Soil: N/A

3. Total Emission Rate
Total Worst-Case TCE Emission Rate = ERps (sat.) + ERdiff (sat)
ERwc = 0.605 g/s

One Hour Worst Case MEC Emission Rate Calculations
Soil Excavation of Burning Ground #3

Longhorn Army Ammunition Plant
Karnack, Texas

Q = Excavation Rate =	30 cy/hr	0.007 m^3/s
Pile Depth (Assumed) =	3 ft	0.915 m
t = time of excavation =	1 hr	3600 s

1. Pore Space Emission Rate:

A. Saturated Soil: N/A

B. Unsaturated Soil:

Contaminant: MEC
Contaminant Concentration = **600 mg MEC/kg**

Ci = Concentration = 600 mg MEC/kg
V = Volume Soil Excavated = 24.3 m^3
B = Bulk Soil Density = 1.94 g/cc

M = Total Mass = Ci * V * B = 28285 g

ERps = [(M)*(0.33)] / t

ERps = 2.593 g/s

2. Diffusion Emission Rate

A. Saturated Soil: N/A

B. Unsaturated Soil:

Contaminant: MEC
Contaminant Concentration = **600 mg MEC/kg**

Ci = Concentration = 600 mg MEC/kg
SA = surface area = 27 m^2
Pa = air-filled porosity = 0.35
k-eq = 0.090
k-g = 0.15 cm/s
D e = 0.020 cm^2/s
t = time of excavation = 3600 s
pi = 3.1416
B= Bulk Soil Density = 1.94 g/cc

ERdiff = Diffusion Emission Rate
ERdiff = [(Ci)(10,000cm^3/m^2)(SA)(B)]/[(Pa/(k-eq * k-g)) + (((pi*t)/(De*k-eq))^0.5)]

ERdiff = 0.122 g/s

3. Total Emmision Rate

Total Worst-Case MEC Emission Rate = ERps (unsat.) + ERdiff (unsat.) =
ERwc = 2.715 g/s

CALCULATION OF WEIGHTED AVERAGE CONCENTRATION

$$Weighted\,Avg.Conc. = \frac{[(C_{0\le4}XV_{0\le4})] + [(C_{4\le8}XV_{4\le8})] + [(C_{8\le12}XV_{8\le12})] + [(C_{12\le16}XV_{12\le16})] + [(C_{16\le20}XV_{16\le20})] + [(C_{20\le28}XV_{20\le28})]}{Total\,Excavated\,Volume}$$

Where:

C_i = Average Concentration in the depth range *i*

V_i = Total Soil Volume in the depth range *i*

Example Calculation: MEC

$$Weighted\,Avg.MEC\,Conc. = \frac{(348\,\mu g/kg)(7143\,cy) + (4770)(7143) + (9674)(7143) + (60401)(7143) + (86290)(7143) + (6248)(14286)}{50{,}000}$$

Therefore:

$$Weighted\,Avg.MEC\,Conc. = 24{,}854\,\mu g/kg$$

Sample Depth	0-4 ft																
	MEC (µg/kg)	TCE (µg/kg)	VC (µg/kg)	1,2-DCE (µg/kg)	1,2DCA (µg/kg)	1,1DCA (µg/kg)	PCE (µg/kg)	TOL (µg/kg)	EBZ (µg/kg)	XYL (µg/kg)	1,1 DCE (µg/kg)	ACE (µg/kg)	STY (µg/kg)	CHLOROFORM (µg/kg)	TCF (µg/kg)	BNZ (µg/kg)	1,1,1 TCA (µg/kg)
Average	348	7231	44	1121	76	21	76	492	258	87	ND	2527	ND	ND	27	ND	31
Minimum	2	0.9	2.5	2	2.5	2.5	2.5	0.2	2.5	2.5	ND	11	ND	ND	27	ND	31
Maximum	22000	430000	1500	39840	4600	750	4500	34000	10665	3000	ND	33000	ND	ND	27	ND	31
Std. Dev.	2610	51743	193	5159	546	97	534	4034	1360	396	ND	7955	ND	ND	NA	ND	NA
Total Sample	71	71	71	71	71	71	71	71	71	69	0	18	0	0	1	0	1

Sample Depth	4(+)-8 ft																
	MEC (µg/kg)	TCE (µg/kg)	VC (µg/kg)	1,2-DCE (µg/kg)	1,2DCA (µg/kg)	1,1DCA (µg/kg)	PCE (µg/kg)	TOL (µg/kg)	EBZ (µg/kg)	XYL (µg/kg)	1,1 DCE (µg/kg)	ACE (µg/kg)	STY (µg/kg)	CHLOROFORM (µg/kg)	TCF (µg/kg)	BNZ (µg/kg)	1,1,1 TCA (µg/kg)
Average	4770	2989	71	781	29	22	21	21	61	24	ND	2786	5565	5	130	ND	ND
Minimum	2.5	2.5	5	2.5	2.5	2.5	2	1	2.5	2	ND	5	17	5	130	ND	ND
Maximum	123090	40660	785	14645	312.5	312.5	312.5	312.5	1390	312.5	ND	11000	16660	5	130	ND	ND
Std. Dev.	23661	8648	190	2837	68	63	63	63	267	65	ND	5476	9609	NA	NA	ND	ND
Total Sample	27	27	27	27	27	27	27	27	27	26	0	4	3	1	1	0	0

Sample Depth	8(+)-12 ft																
	MEC (µg/kg)	TCE (µg/kg)	VC (µg/kg)	1,2-DCE (µg/kg)	1,2DCA (µg/kg)	1,1DCA (µg/kg)	PCE (µg/kg)	TOL (µg/kg)	EBZ (µg/kg)	XYL (µg/kg)	1,1 DCE (µg/kg)	ACE (µg/kg)	STY (µg/kg)	CHLOROFORM (µg/kg)	TCF (µg/kg)	BNZ (µg/kg)	1,1,1 TCA (µg/kg)
Average	9674	3471	157	77	2669	77	420	204	570	198	ND	1689	35000	5.5	160	ND	ND
Minimum	2.5	2	5	2.5	2	0.8	1	0.5	2.5	2.5	ND	7	35000	4	160	ND	ND
Maximum	420000	150000	3650	1800	120000	1800	16000	6700	18000	6100	ND	20000	35000	7	160	ND	ND
Std. Dev.	61893	22096	618	291	17686	304	2375	1017	2835	945	ND	5325	NA	2.1	NA	ND	ND
Total Sample	46	46	46	46	46	46	46	46	46	45	0	14	1	2	1	0	0

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Sample Depth	12(+)-16 ft																
	MEC (µg/kg)	TCE (µg/kg)	VC (µg/kg)	1,2-DCE (µg/kg)	1,2DCA (µg/kg)	1,1DCA (µg/kg)	PCE (µg/kg)	TOL (µg/kg)	EBZ (µg/kg)	XYL (µg/kg)	1,1 DCE (µg/kg)	ACE (µg/kg)	STY (µg/kg)	CHLOROFORM (µg/kg)	TCF (µg/kg)	BNZ (µg/kg)	1,1,1 TCA (µg/kg)
Average	60401	26825	726	15747	3764	31597	584	2772	374	547	750	26.5	ND	177	ND	ND	ND
Minimum	2.5	2.5	5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	750	20	ND	14	ND	ND	ND
Maximum	600000	220000	6000	153300	37000	310310	3100	25000	3100	3100	750	33	ND	340	ND	ND	ND
Std. Dev.	189597	69447	1870	48340	11679	97937	1160	7847	966	1138	NA	9.2	ND	230.5	ND	ND	ND
Total Sample	10	10	10	10	10	10	10	10	10	7	1	2	0	2	0	0	0

Sample Depth	16(+)-20 ft																
	MEC (µg/kg)	TCE (µg/kg)	VC (µg/kg)	1,2-DCE (µg/kg)	1,2DCA (µg/kg)	1,1DCA (µg/kg)	PCE (µg/kg)	TOL (µg/kg)	EBZ (µg/kg)	XYL (µg/kg)	1,1 DCE (µg/kg)	ACE (µg/kg)	STY (µg/kg)	CHLOROFORM (µg/kg)	TCF (µg/kg)	BNZ (µg/kg)	1,1,1 TCA (µg/kg)
Average	86290	33134	271	870	173	148	731	176	147	302	133	35	ND	ND	ND	1200	ND
Minimum	2.5	2.5	5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	133	26	ND	ND	ND	1200	ND
Maximum	742050	254700	1500	6600	750	750	4880	750	750	1200	133	45	ND	ND	ND	1200	ND
Std. Dev.	246110	84240	529	2164	267	260	1598	271	260	453	NA	10	ND	ND	ND	NA	ND
Total Sample	9	9	9	9	9	9	9	9	9	8	1	3	0	0	0	1	0

Sample Depth	20+ ft																
	MEC (µg/kg)	TCE (µg/kg)	VC (µg/kg)	1,2-DCE (µg/kg)	1,2DCA (µg/kg)	1,1DCA (µg/kg)	PCE (µg/kg)	TOL (µg/kg)	EBZ (µg/kg)	XYL (µg/kg)	1,1 DCE (µg/kg)	ACE (µg/kg)	STY (µg/kg)	CHLOROFORM (µg/kg)	TCF (µg/kg)	BNZ (µg/kg)	1,1,1 TCA (µg/kg)
Average	6248	1085	138	101	247	68	68	285	68	1251	ND	2800	ND	ND	ND	ND	ND
Minimum	10	2.5	5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	ND	2800	ND	ND	ND	ND	ND
Maximum	29000	2100	800	395	880	395	395	1700	395	2500	ND	2800	ND	ND	ND	ND	ND
Std. Dev.	11309	825	325	158	389	160	160	693	160	1766	ND	NA	ND	ND	ND	ND	ND
Total Sample	6	6	6	6	6	6	6	6	6	2	0	1	0	0	0	0	0

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FINAL

CALCULATION OF AVERAGE CONCENTRATIONS AND WEIGHTED CONCENTRATIONS

TCE Emission Rate Calculations - Soil Excavation of Burning Ground #3 017357

Longhorn Army Ammunition Plant
Karnack, Texas

Q = Excavation Rate =	30 cy/hr	0.0064 m^3/s
t = time of excavation =	1 hr	3600 s

1. Pore Space Emission Rate:

A. Saturated Soil:

Contaminant : TCE
VP = vapor pressure = **75 mm Hg**
MW = molecular weight = **131.4 g/mol TCE**
Pa = soil air-filled porosity = **0.35**
EXC = Soil to atm. exchange constant = **0.33**
R = Universal Gas Constant **62,361 mm Hg cc/mol K**
T = Temperature = **299 K**

ERps(sat.) = Pore Space Emission Rate for the Saturated Zone
ERps(sat.) = [(VP)*(MW)*(Pa)*(Q)*(EXC)] / [R*T]

ERps(sat.) = 0.389 g/s

B. Unsaturated Soil:

Contaminant: TCE
Contaminant Concentration **10.83 mg TCE/kg**

Ci = Concentration = 10.83 mg TCE/kg
V = Volume Soil Excavated 22.94 m^3
B = Bulk Soil Density = **1.94 g/cc**

M = Mass = Ci * V * B = 482 g

ERps(unsat.) = Pore Space Emission Rate for the Unsaturated Zone
ERps(unsat.) = [(M)*(0.33)] / t

ERps(unsat.) = 0.044 g/s

Total Pore Space Emission Rate = ERps(sat.) + ERps(unsat.)
Total Pore Space Emission Rate = 0.433 g/s

TCE Emission Rate Calculations - Soil Excavation of Burning Ground #3 cont.

Longhorn Army Ammunition Plant
Karnack, Texas

2. Diffusion Emission Rate

A. Saturated Soil:

Contaminant: TCE
Contaminant Concentration **465 mg TCE/kg**

Ci = Concentration = 465 mg TCE/kg
SA = surface area = 6.2 m^2
Pa = air-filled porosity = 0.35
k-eq = **0.371**
k-g = **0.15 cm/s**
De = **0.0196 cm^2/s**
t = time of excavation = 3600 s
pi = 3.1416

ERdiff(sat.) = Diffusion Emission Rate for the Saturated Zone
ERdiff(sat.) = [(Ci)(10,000cm^2/m^2)(SA)(B)]/[(Pa/(k-eq * k-g)) + (((pi * t)/(De * k-eq))^0.

ERdiff(sat.) = 0.045 g/s

B. Unsaturated Soil:

Contaminant: MEC
Contaminant Concentration **10.83 mg MEC/kg**

Ci = Concentration = 10.83 mg MEC/kg
SA = surface area = 6.2 m^2
Pa = air-filled porosity = 0.35
k-eq = 0.371
k-g = 0.15 cm/s
De = 0.0196 cm^2/s
t = time of excavation = 3600 s

ERdiff(unsat.) = Diffusion Emission Rate for the Unsaturated Zone
ERdiff(unsat.) = [(Ci)(10,000cm^2/m^2)(SA)(B)]/[(Pa/(k-eq * k-g)) + (((pi * t)/(De * k-eq))

ERdiff(unsat.) 0.001 g/s

Total Diffusion Emission Rate = ERps(sat.) + ERps(unsat.)
Total Diffusion Emission Rate = 0.046 g/s

TCE Emission Rate Calculations - Soil Excavation of Burning Ground #3 cont.

Longhorn Army Ammunition Plant
Karnack, Texas

3. Total Emission Rates

Total Saturated TCE Emission Rate = ERps(sat.) + ERdiff(sat.)
ERsat = 0.434 g/s

Total Unsaturated TCE Emission Rate = ERps(unsat.) + ERdiff(unsat.)
ERunsat = 0.045 g/s

Total TCE Emission Rate = ERps (sat.) + ERdiff (sat)
ERwc = 0.479 g/s

MEC Emission Rate Calculations - Soil Excavation of Burning Ground #3

017360

Longhorn Army Ammunition Plant
Karnack, Texas

Q = Excavation Rate =	30 cy/hr	0.0064 m^3/s
t = time of excavation =	1 hr	3600 s

1. Pore Space Emission Rate:

A. Saturated Soil: N/A

B. Unsaturated Soil:

Contaminant: MEC
Contaminant Concentration = **24.85 mg MEC/kg**

Ci = Concentration = 24.85 mg MEC/kg
V = Volume Soil Excavated = 22.94 m^3
B = Bulk Soil Density = 1.94 g/cc

M = Total Mass = Ci * V * B = 1105.876 g

ERps = [(M)*(0.33)] / t

ERps = 0.1014 g/s

2. Diffusion Emission Rate

A. Saturated Soil: N/A

B. Unsaturated Soil:

Contaminant: MEC
Contaminant Concentration = **24.85 mg MEC/kg**

Ci = Concentration = 24.85 mg MEC/kg
SA = surface area = 6.2 m^2
Pa = air-filled porosity = 0.35
k-eq = 0.090
k-g = 0.15 cm/s
D e = 0.0196 cm^2/s
t = time of excavation = 3600 s

ERdiff = Diffusion Emission Rate
ERdiff = [(Ci)(10,000cm^2/m^2)(SA)(B)]/[(Pa/(k-eq * k-g)) + (((pi*t)/(D-e*k-eq))^0.5)]

ERdiff = 0.0012 g/s

3. Total Emission Rate

Total Unsaturated MEC Emission Rate = ERps (unsat.) + ERdiff (unsat.) =
ERunsat = 0.103 g/s

FINAL

CALCULATION OF SOIL VOLUMES

CALCULATION OF VOLUMES AND AREAS FOR SOIL EXCAVATION

1. Calculation of Soil Volumes in each Depth Zone:

Total Soil Volume = 50,000 cubic yards
= 1,350,000 ft^3
Total Soil Depth = 28 ft
Total Area of Soil = (1,350,000 ft^3) / (28 ft) = 48,214.3 ft^2

Volume per Depth Zone:

Depth Zone	Depth (ft)	Area (ft^2)	Volume (yd^3)
0 ≤ 4	4	48,214.3	7,142.9
4 ≤ 8	4	48,214.3	7,142.9
8 ≤ 12	4	48,214.3	7,142.9
12 ≤ 16	4	48,214.3	7,142.9
16 ≤ 20	4	48,214.3	7,142.9
20 ≤ 28	8	48,214.3	14,285.7

2. Calculation of Average Soil Depth:

Most contaminated TCE Borings and Depth:

8A-902dup	-	18 feet
8A-917	-	6 feet
8A-940	-	4 feet
8A-984	-	14 feet
	Average =	10.5 feet

Most contaminated MEC Borings and Depth:

8A-902dup	-	18 feet
8A-940	-	10 feet
8A-984	-	14 feet
	Average =	14.0 feet

Average Overall Depth = (10.5+14)/2 = 12.3 feet (3.7 m)

3. Calculation of Exposed Surface Area of Excavation:

Average Depth = 3.7 m
Excavation Slope = 3:1 (run to rise) - (standard practice)
Run = 3.7 x 3 = 11.1 m - on each side of hole
Total Side Width = 26 m
Assume square excavation area:
Area = $(26\ m)^2 = 676\ m^2$

4. Calculation of Saturated Soil Volume for TCE:

Assumptions:

- Use four worst boring depths (See #2).
- Assume circular distance around boring (with boring in center).
- Radius of circle is distance to closest non-saturated soil boring.
- Calculate volume as a cylinder (Vol = Circle Area x Depth of Boring)

Boring	Depth (ft)	Distance to Next Boring (ft)
8A-902dup	18	75
8A-917	6	50
8A-940	4	50
8A-984	14	50

Boring	Circular Area (ft^2)	Volume (yd^3)
8A-902dup	7,854	5,236
8A-917	17,671	3,927
8A-940	7,854	1,164
8A-984	7,854	4,072
	Total	14,399
	Say	14,400 yd^3 or 11,000 m^3

5. Calculation of SA, Emitting Surface Area of Excavation:

Total Volume of Soil = 50,000 yd^3 or 38,230 m^3
Volume of Saturated Soils = 11,000 m^3
Volume of Unsaturated Soils = 27,230 m^3
Typical Excavation Rate = 30 yd^3/hr or 23 m^3/hr

Time to excavate saturated soils:

$$\frac{11{,}000\,m^3}{23\,m^3/hr} = 480\,hrs$$

Time to excavate unsaturated soils:

$$\frac{27{,}230\,m^3}{23\,m^3/hr} = 1{,}184\,hrs$$

$$SA = \frac{Soil\,Volume}{[(Average\,Depth)\times(Time\,of\,Excavation)]}$$

$$SA\ saturated soils = \frac{11{,}000\,m^3}{[3.7\,m \times 480\,hr]} = 6.2\,\frac{m^2}{hr}$$

$$SA\ unsaturated soils = \frac{27{,}230\,m^3}{[3.7\,m \times 1{,}184\,hr]} = 6.2\,\frac{m^2}{hr}$$

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FINAL

CALCULATION OF MAXIMUM EXCAVATION RATES

Assumptions:

- Use unsaturated soil pore-space emission rate equation;
- Use weighted average soil concentrations for all contaminants; and
- Rewrite equations as a function of Q, the excavation rate (m^3/hr).

Pore Space Emission Rate - Unsaturated Soils:

$$ER_{ps} = M \times \frac{0.33}{t}$$

where:
ER_{ps} = Pore Space Emission Rate
M = (C_i) (Q) (B)
C_i = Contaminant Concentration
Q = Volume of soil excavated in one hour
B = Bulk Soil Density
t = time

For:
C_i = 0.1 mg/kg; ER_{ps} = $Q(m^3) \times 1.78 \times 10^{-5}$
C_i = 1.0 mg/kg; ER_{ps} = $Q(m^3) \times 1.78 \times 10^{-4}$
C_i = 10.0 mg/kg; ER_{ps} = $Q(m^3) \times 1.78 \times 10^{-3}$
C_i = 100 mg/kg; ER_{ps} = $Q(m^3) \times 0.018$
C_i = 120 mg/kg; ER_{ps} = $Q(m^3) \times 0.021$

Diffusion Emission Rate:

$$ER_{diff} = \frac{(C_i)(10{,}000)(SA)(B)}{\left(\frac{P_a}{k_{eq} \times k_g}\right) + \sqrt{\left(\frac{3600\,\pi}{D_e\, k_{eq}}\right)}}$$

where:
- Er_{diff} = Diffusion Emission Rate
- SA = Emitting Surface Area
- P_a = Soil Air-Filled Porosity
- k_{eq} = Chemical-specific equilibrium constant
- k_g = Gas-phase mass transfer coefficient
- D_e = Effective Diffusivity in air

$$SA = \frac{27{,}230\,m^3}{3.7 \times \left(\frac{27{,}230}{Q}\right)} = Q(0.27)$$

For:

$$C_i = 0.1\,mg/kg;\ ER_{diff} = Q\,(0.0005) / \left[\frac{2.333}{k_{eq}} + \frac{759.623}{\sqrt{k_{eq}}}\right]$$

$$C_i = 1.0\,mg/kg;\ ER_{diff} = Q\,(0.0052) / \left[\frac{2.333}{k_{eq}} + \frac{759.623}{\sqrt{k_{eq}}}\right]$$

$$C_i = 10.0\,mg/kg;\ ER_{diff} = Q\,(0.052) / \left[\frac{2.333}{k_{eq}} + \frac{759.623}{\sqrt{k_{eq}}}\right]$$

$$C_i = 100\,mg/kg;\ ER_{diff} = Q\,(0.52) / \left[\frac{2.333}{k_{eq}} + \frac{759.623}{\sqrt{k_{eq}}}\right]$$

$$C_i = 120\,mg/kg;\ ER_{diff} = Q\,(0.624) / \left[\frac{2.333}{k_{eq}} + \frac{759.623}{\sqrt{k_{eq}}}\right]$$

COMPARISON OF EMISSIONS AT 30 YD³ EXCAVATION RATE AND THE MAXIMUM ALLOWABLE EMISSION RATE

Longhorn Army Ammunition Plant
Karnack, Texas

Contaminant	Weighted Average Conc. (mg/kg)	Short-Term ESL (µg/m³)	Total Unsaturated Emission Rate (g/s)	Maximum Emission Rate Based on ESL (g/s)
Methylene Chloride	24.85	260	0.101	3.56
Trichloroethylene	10.83	1350	0.0451	18.47
Vinyl Chloride	0.22	130	0.0010	1.78
1,2 Dichloroethene	2.69	7930	0.0112	108.50
1,2 Dichloroethane	1.03	40	0.0040	0.55
1,1 Dichloroethane	4.57	4000	0.0193	54.73
Tetrachloroethylene	0.28	340	0.0010	4.65
Toluene	0.61	1880	0.0020	25.72
Ethylbenzene	0.22	2000	0.0010	27.36
Xylene	0.52	3700	0.0020	50.62
1,1 Dichloroethene	0.13	40	0.0010	0.55
Acetone	1.81	5900	0.0070	80.72
Styrene	5.79	215	0.0243	2.94
Chloroform	0.03	98	0.0001	1.34
Trichlorofluoromethane	0.05	28000	0.00022	383.09
Benzene	0.17	30	0.0010	0.41
1,1,1 Trichloroethane	0.004	10800	0.00002	147.76
Total			**0.22124**	

Total Excavation Period = 27,230 m³/(22.94 m³/hr) =1,187 hr/yr

Total VOC Emissions = (0.2224 g/s) x (3600 s/hr) x (1,187 hr/yr) / (454 g/lb) x (2000 lb/ton) =
Total VOC Emissions = 1.047 tpy

CALCULATION OF MAXIMUM EXCAVATION RATE FOR CONCENTRATION OF 0.1 mg/kg

Longhorn Army Ammunition Plant
Karnack, Texas

Contaminant	k-eq	Excavation Rate Q (cy/hr)	Total Unsaturated Emission Rate (g/s)	1/2 of the Maximum Emission Rate Based on ESL (g/s)
Methylene Chloride	0.09	14800	0.20	1.78
Trichloroethylene	0.407	14800	0.21	9.24
Vinyl Chloride	1.1	14800	0.21	0.89
1,2 Dichloroethene	0.167	14800	0.20	54.25
1,2 Dichloroethane	0.04	14800	0.20	0.27
1,1 Dichloroethane	0.228	14800	0.20	27.36
Tetrachloroethylene	0.733	14800	0.21	2.33
Toluene	0.269	14800	0.21	12.86
Ethylbenzene	0.342	14800	0.21	13.68
Xylene	0.273	14800	0.21	25.31
1,1 Dichloroethene	0.855	14800	0.21	0.27
Acetone	0.002	14800	0.20	40.36
Styrene	0.114	14800	0.20	1.47
Chloroform	0.151	14800	0.20	0.67
Trichlorofluoromethane	3.951	14800	0.22	191.54
Benzene	0.228	14800	0.20	0.21
1,1,1 Trichloroethane	0.693	14800	0.21	73.88

CALCULATION OF MAXIMUM EXCAVATION RATE FOR CONCENTRATION OF 1.0 mg/kg

Longhorn Army Ammunition Plant
Karnack, Texas

Contaminant	k-eq	Excavation Rate Q (cy/hr)	Total Unsaturated Emission Rate (g/s)	1/2 of the Maximum Emission Rate Based on ESL (g/s)
Methylene Chloride	0.09	1480	0.20	1.78
Trichloroethylene	0.407	1480	0.21	9.24
Vinyl Chloride	1.1	1480	0.21	0.89
1,2 Dichloroethene	0.167	1480	0.20	54.25
1,2 Dichloroethane	0.04	1480	0.20	0.27
1,1 Dichloroethane	0.228	1480	0.20	27.36
Tetrachloroethylene	0.733	1480	0.21	2.33
Toluene	0.269	1480	0.21	12.86
Ethylbenzene	0.342	1480	0.21	13.68
Xylene	0.273	1480	0.21	25.31
1,1 Dichloroethene	0.855	1480	0.21	0.27
Acetone	0.002	1480	0.20	40.36
Styrene	0.114	1480	0.20	1.47
Chloroform	0.151	1480	0.20	0.67
Trichlorofluoromethane	3.951	1480	0.22	191.54
Benzene	0.228	1480	0.20	0.21
1,1,1 Trichloroethane	0.693	1480	0.21	73.88

CALCULATION OF MAXIMUM EXCAVATION RATE FOR CONCENTRATION OF 10 mg/kg

Longhorn Army Ammunition Plant
Karnack, Texas

Contaminant	k-eq	Excavation Rate Q (cy/hr)	Total Unsaturated Emission Rate (g/s)	1/2 of the Maximum Emission Rate Based on ESL (g/s)
Methylene Chloride	0.09	148	0.20	1.78
Trichloroethylene	0.407	148	0.21	9.24
Vinyl Chloride	1.1	148	0.21	0.89
1,2 Dichloroethene	0.167	148	0.20	54.25
1,2 Dichloroethane	0.04	148	0.20	0.27
1,1 Dichloroethane	0.228	148	0.20	27.36
Tetrachloroethylene	0.733	148	0.21	2.33
Toluene	0.269	148	0.21	12.86
Ethylbenzene	0.342	148	0.21	13.68
Xylene	0.273	148	0.21	25.31
1,1 Dichloroethene	0.855	148	0.21	0.27
Acetone	0.002	148	0.20	40.36
Styrene	0.114	148	0.20	1.47
Chloroform	0.151	148	0.20	0.67
Trichlorofluoromethane	3.951	148	0.22	191.54
Benzene	0.228	148	0.20	0.21
1,1,1 Trichloroethane	0.693	148	0.21	73.88

CALCULATION OF MAXIMUM EXCAVATION RATE FOR CONCENTRATION OF 100 mg/kg

Longhorn Army Ammunition Plant
Karnack, Texas

Contaminant	k-eq	Excavation Rate Q (cy/hr)	Total Unsaturated Emission Rate (g/s)	1/2 of the Maximum Emission Rate Based on ESL (g/s)
Methylene Chloride	0.09	14.8	0.20	1.78
Trichloroethylene	0.407	14.8	0.21	9.24
Vinyl Chloride	1.1	14.8	0.21	0.89
1,2 Dichloroethene	0.167	14.8	0.20	54.25
1,2 Dichloroethane	0.04	14.8	0.20	0.27
1,1 Dichloroethane	0.228	14.8	0.20	27.36
Tetrachloroethylene	0.733	14.8	0.21	2.33
Toluene	0.269	14.8	0.20	12.86
Ethylbenzene	0.342	14.8	0.21	13.68
Xylene	0.273	14.8	0.21	25.31
1,1 Dichloroethene	0.855	14.8	0.21	0.27
Acetone	0.002	14.8	0.20	40.36
Styrene	0.114	14.8	0.20	1.47
Chloroform	0.151	14.8	0.20	0.67
Trichlorofluoromethane	3.951	14.8	0.22	191.54
Benzene	0.228	14.8	0.20	0.21
1,1,1 Trichloroethane	0.693	14.8	0.21	73.88

CALCULATION OF MAXIMUM EXCAVATION RATE FOR CONCENTRATION OF 120 mg/kg

Longhorn Army Ammunition Plant
Karnack, Texas

Contaminant	k-eq	Excavation Rate Q (cy/hr)	Total Unsaturated Emission Rate (g/s)	1/2 of the Maximum Emission Rate Based on ESL (g/s)
Methylene Chloride	0.09	12.29	0.20	1.78
Trichloroethylene	0.407	12.29	0.21	9.24
Vinyl Chloride	1.1	12.29	0.21	0.89
1,2 Dichloroethene	0.167	12.29	0.20	54.25
1,2 Dichloroethane	0.04	12.29	0.20	0.27
1,1 Dichloroethane	0.228	12.29	0.20	27.36
Tetrachloroethylene	0.733	12.29	0.21	2.33
Toluene	0.269	12.29	0.20	12.86
Ethylbenzene	0.342	12.29	0.21	13.68
Xylene	0.273	12.29	0.20	25.31
1,1 Dichloroethene	0.855	12.29	0.21	0.27
Acetone	0.002	12.29	0.20	40.36
Styrene	0.114	12.29	0.20	1.47
Chloroform	0.151	12.29	0.20	0.67
Trichlorofluoromethane	3.951	12.29	0.22	191.54
Benzene	0.228	12.29	0.20	0.21
1,1,1 Trichloroethane	0.693	12.29	0.21	73.88

APPENDIX C

T-SCREEN MODELING RESULTS

SCREENING OF GWTP AT 1 GRAM/SEC

11/13/95
15:51:05

017376

*** SCREEN2 MODEL RUN ***
* VERSION DATED 92245 ***

horn Burning Ground No. 3 Groundwater Treatment Plant

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	POINT
EMISSION RATE (G/S)	=	1.00000
STACK HEIGHT (M)	=	7.9000
STK INSIDE DIAM (M)	=	.5600
STK EXIT VELOCITY (M/S)	=	11.8000
STK GAS EXIT TEMP (K)	=	293.0000
AMBIENT AIR TEMP (K)	=	293.0000
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	RURAL
BUILDING HEIGHT (M)	=	.0000
MIN HORIZ BLDG DIM (M)	=	.0000
MAX HORIZ BLDG DIM (M)	=	.0000

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = 10.916 M**4/S**2.

*** STABILITY CLASS 4 ONLY ***
*** 10-METER WIND SPEED OF 1.50 M/S ONLY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
15.	.5329E-06	4	1.5	1.5	480.0	21.12	3.21	3.02	NO
100.	7.870	4	1.5	1.5	480.0	21.12	9.03	5.99	NO
200.	108.2	4	1.5	1.5	480.0	21.12	16.01	9.30	NO
300.	182.2	4	1.5	1.5	480.0	21.12	22.92	12.67	NO
400.	184.5	4	1.5	1.5	480.0	21.12	29.70	15.73	NO
500.	165.0	4	1.5	1.5	480.0	21.12	36.34	18.68	NO
600.	142.1	4	1.5	1.5	480.0	21.12	42.88	21.54	NO
700.	121.3	4	1.5	1.5	480.0	21.12	49.33	24.33	NO
800.	103.9	4	1.5	1.5	480.0	21.12	55.70	27.05	NO
900.	89.50	4	1.5	1.5	480.0	21.12	62.00	29.71	NO
1000.	77.74	4	1.5	1.5	480.0	21.12	68.23	32.31	NO
1100.	68.75	4	1.5	1.5	480.0	21.12	74.41	34.33	NO
1200.	61.31	4	1.5	1.5	480.0	21.12	80.53	36.29	NO
1300.	55.07	4	1.5	1.5	480.0	21.12	86.60	38.19	NO
1400.	49.79	4	1.5	1.5	480.0	21.12	92.63	40.04	NO
1500.	45.28	4	1.5	1.5	480.0	21.12	98.61	41.84	NO
1600.	41.40	4	1.5	1.5	480.0	21.12	104.56	43.60	NO
1700.	38.02	4	1.5	1.5	480.0	21.12	110.47	45.33	NO
800.	35.07	4	1.5	1.5	480.0	21.12	116.35	47.01	NO
900.	32.48	4	1.5	1.5	480.0	21.12	122.19	48.67	NO
2000.	30.18	4	1.5	1.5	480.0	21.12	128.00	50.29	NO
2100.	28.14	4	1.5	1.5	480.0	21.12	133.78	51.89	NO
2200.	26.31	4	1.5	1.5	480.0	21.12	139.53	53.46	NO

*** SCREEN2 MODEL RUN ***
*** VERSION DATED 92245 ***

ghorn Burning Ground No. 3 Groundwater Treatment Plant

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	POINT
EMISSION RATE (G/S)	=	1.00000
STACK HEIGHT (M)	=	7.9000
STK INSIDE DIAM (M)	=	.5600
STK EXIT VELOCITY (M/S)	=	11.8000
STK GAS EXIT TEMP (K)	=	293.0000
AMBIENT AIR TEMP (K)	=	293.0000
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	RURAL
BUILDING HEIGHT (M)	=	.0000
MIN HORIZ BLDG DIM (M)	=	.0000
MAX HORIZ BLDG DIM (M)	=	.0000

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = 10.916 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
15.	.1007E-01	1	3.0	3.0	960.0	14.51	5.09	2.79	NO
100.	208.6	2	2.5	2.5	800.0	15.83	19.40	10.84	NO
200.	215.5	3	2.0	2.0	640.0	17.81	23.79	14.31	NO
300.	236.6	5	1.0	1.0	10000.0	19.15	17.20	9.27	NO
400.	300.2	5	1.0	1.0	10000.0	19.15	22.25	11.28	NO
500.	309.4	5	1.0	1.0	10000.0	19.15	27.21	13.20	NO
600.	293.8	6	1.0	1.0	10000.0	18.15	21.44	10.12	NO
700.	315.6	6	1.0	1.0	10000.0	18.15	24.63	11.32	NO
800.	314.4	6	1.0	1.0	10000.0	18.15	27.79	12.33	NO
900.	305.3	6	1.0	1.0	10000.0	18.15	30.91	13.31	NO
1000.	292.0	6	1.0	1.0	10000.0	18.15	34.01	14.26	NO
1100.	276.1	6	1.0	1.0	10000.0	18.15	37.08	15.11	NO
1200.	260.3	6	1.0	1.0	10000.0	18.15	40.12	15.93	NO
1300.	244.9	6	1.0	1.0	10000.0	18.15	43.14	16.73	NO
1400.	230.3	6	1.0	1.0	10000.0	18.15	46.14	17.51	NO
1500.	216.6	6	1.0	1.0	10000.0	18.15	49.12	18.27	NO
1600.	203.9	6	1.0	1.0	10000.0	18.15	52.08	19.01	NO
1700.	192.1	6	1.0	1.0	10000.0	18.15	55.02	19.73	NO
1800.	181.2	6	1.0	1.0	10000.0	18.15	57.94	20.44	NO
1900.	171.2	6	1.0	1.0	10000.0	18.15	60.85	21.14	NO
2000.	161.9	6	1.0	1.0	10000.0	18.15	63.74	21.82	NO
2100.	153.6	6	1.0	1.0	10000.0	18.15	66.62	22.40	NO
2200.	146.0	6	1.0	1.0	10000.0	18.15	69.49	22.97	NO
2300.	138.9	6	1.0	1.0	10000.0	18.15	72.34	23.52	NO

2400.	132.4	6	1.0	1.0	10000.0	18.15	75.18	24.07	NO
2500.	126.4	6	1.0	1.0	10000.0	18.15	78.00	24.60	NO
2600.	120.8	6	1.0	1.0	10000.0	18.15	80.82	25.12	NO
2700.	115.6	6	1.0	1.0	10000.0	18.15	83.62	25.64	NO
2800.	110.7	6	1.0	1.0	10000.0	18.15	86.41	26.15	NO
2900.	106.2	6	1.0	1.0	10000.0	18.15	89.20	26.64	NO
3000.	102.0	6	1.0	1.0	10000.0	18.15	91.97	27.13	NO
3500.	85.15	6	1.0	1.0	10000.0	18.15	105.69	29.13	NO
4000.	72.61	6	1.0	1.0	10000.0	18.15	119.21	30.98	NO
4500.	62.96	6	1.0	1.0	10000.0	18.15	132.53	32.70	NO
5000.	55.34	6	1.0	1.0	10000.0	18.15	145.70	34.33	NO
5500.	49.19	6	1.0	1.0	10000.0	18.15	158.72	35.88	NO
6000.	44.13	6	1.0	1.0	10000.0	18.15	171.60	37.35	NO
6500.	39.92	6	1.0	1.0	10000.0	18.15	184.37	38.76	NO
7000.	36.36	6	1.0	1.0	10000.0	18.15	197.01	40.11	NO
7500.	33.41	6	1.0	1.0	10000.0	18.15	209.56	41.27	NO
8000.	30.87	6	1.0	1.0	10000.0	18.15	222.00	42.38	NO
8500.	28.64	6	1.0	1.0	10000.0	18.15	234.36	43.46	NO
9000.	26.69	6	1.0	1.0	10000.0	18.15	246.63	44.50	NO
9500.	24.96	6	1.0	1.0	10000.0	18.15	258.81	45.50	NO
10000.	23.42	6	1.0	1.0	10000.0	18.15	270.92	46.48	NO
15000.	14.12	6	1.0	1.0	10000.0	18.15	388.44	54.96	NO
20000.	10.06	6	1.0	1.0	10000.0	18.15	500.96	60.37	NO
25000.	7.733	6	1.0	1.0	10000.0	18.15	609.76	64.92	NO
30000.	6.236	6	1.0	1.0	10000.0	18.15	715.59	68.90	NO
40000.	4.505	6	1.0	1.0	10000.0	18.15	920.23	74.55	NO
50000.	3.502	6	1.0	1.0	10000.0	18.15	1117.43	79.25	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 15. M:

737.	316.4	6	1.0	1.0	10000.0	18.15	25.84	11.70	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

017378

****
*** SCREEN DISCRETE DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
15.	.1007E-01	1	3.0	3.0	960.0	14.51	5.09	2.79	NO
25.	7.905	1	3.0	3.0	960.0	14.51	7.91	4.19	NO
50.	149.4	1	3.0	3.0	960.0	14.51	14.52	7.49	NO
75.	194.4	1	2.5	2.5	800.0	15.83	20.86	10.87	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

017379

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
PLE TERRAIN	316.4	737.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

FINAL

SCREENING OF EXCAVATION AREA AT 1 GRAM/SEC

** SCREEN2 MODEL RUN ***
** VERSION DATED 92245 ***

jhorn Burn Ground #3 Fugitive Emissions/Excvtn Em Rt=1g/s, Area=26x26=676

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	.148000E-02
SOURCE HEIGHT (M)	=	.0000
LENGTH OF SIDE (M)	=	26.0000
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	RURAL

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** STABILITY CLASS 4 ONLY ***
*** 10-METER WIND SPEED OF 1.50 M/S ONLY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
5.	.0000	0	.0	.0	.0	.00	.00	.00	
100.	3416.	4	1.5	1.5	480.0	.00	7.08	5.11	NO
200.	1400.	4	1.5	1.5	480.0	.00	14.51	8.92	NO
300.	732.3	4	1.5	1.5	480.0	.00	21.59	12.46	NO
400.	457.3	4	1.5	1.5	480.0	.00	28.46	15.62	NO
500.	314.8	4	1.5	1.5	480.0	.00	35.17	18.63	NO
600.	231.3	4	1.5	1.5	480.0	.00	41.76	21.54	NO
700.	178.0	4	1.5	1.5	480.0	.00	48.24	24.35	NO
800.	141.7	4	1.5	1.5	480.0	.00	54.64	27.09	NO
900.	115.9	4	1.5	1.5	480.0	.00	60.96	29.77	NO
1000.	96.94	4	1.5	1.5	480.0	.00	67.21	32.33	NO
1100.	83.64	4	1.5	1.5	480.0	.00	73.41	34.35	NO
1200.	73.09	4	1.5	1.5	480.0	.00	79.54	36.31	NO
1300.	64.57	4	1.5	1.5	480.0	.00	85.63	38.21	NO
1400.	57.56	4	1.5	1.5	480.0	.00	91.67	40.07	NO
1500.	51.72	4	1.5	1.5	480.0	.00	97.67	41.87	NO
1600.	46.80	4	1.5	1.5	480.0	.00	103.62	43.64	NO
1700.	42.60	4	1.5	1.5	480.0	.00	109.54	45.36	NO
1800.	38.99	4	1.5	1.5	480.0	.00	115.42	47.05	NO
1900.	35.85	4	1.5	1.5	480.0	.00	121.27	48.71	NO
2000.	33.11	4	1.5	1.5	480.0	.00	127.09	50.33	NO
2100.	30.70	4	1.5	1.5	480.0	.00	132.88	51.93	NO
2200.	28.57	4	1.5	1.5	480.0	.00	138.64	53.50	NO
2300.	26.67	4	1.5	1.5	480.0	.00	144.37	55.05	NO
400.	24.97	4	1.5	1.5	480.0	.00	150.08	56.57	NO
2500.	23.44	4	1.5	1.5	480.0	.00	155.76	58.07	NO
2600.	22.06	4	1.5	1.5	480.0	.00	161.42	59.55	NO
2700.	20.80	4	1.5	1.5	480.0	.00	167.05	61.01	NO
2800.	19.67	4	1.5	1.5	480.0	.00	172.66	62.45	NO

2900.	18.63	4	1.5	1.5	480.0	.00	178.25	63.87	NO
3000.	17.68	4	1.5	1.5	480.0	.00	183.82	65.26	NO
3500.	14.01	4	1.5	1.5	480.0	.00	211.38	71.62	NO
4000.	11.46	4	1.5	1.5	480.0	.00	238.52	77.63	NO
4500.	9.598	4	1.5	1.5	480.0	.00	265.28	83.34	NO
5000.	8.192	4	1.5	1.5	480.0	.00	291.70	88.81	NO
5500.	7.098	4	1.5	1.5	480.0	.00	317.83	94.07	NO
6000.	6.229	4	1.5	1.5	480.0	.00	343.68	99.14	NO
6500.	5.524	4	1.5	1.5	480.0	.00	369.29	104.05	NO
7000.	4.942	4	1.5	1.5	480.0	.00	394.67	108.81	NO
7500.	4.457	4	1.5	1.5	480.0	.00	419.83	113.44	NO
8000.	4.046	4	1.5	1.5	480.0	.00	444.80	117.95	NO
8500.	3.695	4	1.5	1.5	480.0	.00	469.58	122.35	NO
9000.	3.392	4	1.5	1.5	480.0	.00	494.18	126.65	NO
9500.	3.128	4	1.5	1.5	480.0	.00	518.62	130.86	NO
10000.	2.897	4	1.5	1.5	480.0	.00	542.91	134.97	NO
15000.	1.606	4	1.5	1.5	480.0	.00	778.55	169.75	NO
20000.	1.059	4	1.5	1.5	480.0	.00	1004.10	199.73	NO
25000.	.7668	4	1.5	1.5	480.0	.00	1222.15	226.60	NO
30000.	.5900	4	1.5	1.5	480.0	.00	1434.24	251.21	NO
40000.	.3990	4	1.5	1.5	480.0	.00	1844.24	291.04	NO
50000.	.2983	4	1.5	1.5	480.0	.00	2239.28	326.24	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 5. M:

16.	.1205E+05	4	1.5	1.5	480.0	.00	.24	1.55	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

017382

****
*** SCREEN DISCRETE DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
10.	.0000	0	.0	.0	.0	.00	.00	.00	
15.	.0000	0	.0	.0	.0	.00	.00	.00	
20.	.1070E+05	4	1.5	1.5	480.0	.00	.53	1.70	NO
50.	5967.	4	1.5	1.5	480.0	.00	3.12	3.04	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	.1205E+05	16.	0.

3000.	.8664E+05	6	1.0	1.0	10000.0	.00	91.52	27.02	NO
3500.	.7021E+05	6	1.0	1.0	10000.0	.00	105.25	29.02	NO
4000.	.5852E+05	6	1.0	1.0	10000.0	.00	118.78	30.88	NO
4500.	.4984E+05	6	1.0	1.0	10000.0	.00	132.11	32.61	NO
5000.	.4318E+05	6	1.0	1.0	10000.0	.00	145.29	34.24	NO
5500.	.3792E+05	6	1.0	1.0	10000.0	.00	158.31	35.79	NO
6000.	.3369E+05	6	1.0	1.0	10000.0	.00	171.20	37.27	NO
6500.	.3021E+05	6	1.0	1.0	10000.0	.00	183.97	38.68	NO
7000.	.2731E+05	6	1.0	1.0	10000.0	.00	196.62	40.03	NO
7500.	.2495E+05	6	1.0	1.0	10000.0	.00	209.17	41.19	NO
8000.	.2293E+05	6	1.0	1.0	10000.0	.00	221.62	42.31	NO
8500.	.2118E+05	6	1.0	1.0	10000.0	.00	233.98	43.38	NO
9000.	.1966E+05	6	1.0	1.0	10000.0	.00	246.25	44.42	NO
9500.	.1832E+05	6	1.0	1.0	10000.0	.00	258.44	45.43	NO
10000.	.1713E+05	6	1.0	1.0	10000.0	.00	270.55	46.41	NO
15000.	.1010E+05	6	1.0	1.0	10000.0	.00	388.09	54.90	NO
20000.	7126.	6	1.0	1.0	10000.0	.00	500.62	60.31	NO
25000.	5443.	6	1.0	1.0	10000.0	.00	609.44	64.87	NO
30000.	4369.	6	1.0	1.0	10000.0	.00	715.28	68.84	NO
40000.	3140.	6	1.0	1.0	10000.0	.00	919.93	74.50	NO
50000.	2432.	6	1.0	1.0	10000.0	.00	1117.14	79.20	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 5. M:

16.	.2277E+08	6	1.0	1.0	10000.0	.00	.12	.83	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

u17383

****
*** SCREEN DISCRETE DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
10.	.0000	0	.0	.0	.0	.00	.00	.00	
15.	.0000	0	.0	.0	.0	.00	.00	.00	
20.	.2037E+08	6	1.0	1.0	10000.0	.00	.26	.90	NO
50.	.1178E+08	6	1.0	1.0	10000.0	.00	1.55	1.56	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	.2277E+08	16.	0.

11/13/95
14:43:55

** SCREEN2 MODEL RUN ***
* VERSION DATED 92245 ***

horn Burning Ground No. 3 Fugitive Emissions/Excavation

0017384

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	1.00000
SOURCE HEIGHT (M)	=	.0000
LENGTH OF SIDE (M)	=	26.0000
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	RURAL

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
5.	.0000	0	.0	.0	.0	.00	.00	.00	
100.	.7243E+07	6	1.0	1.0	10000.0	.00	3.51	2.54	NO
200.	.4122E+07	6	1.0	1.0	10000.0	.00	7.20	4.27	NO
300.	.2631E+07	6	1.0	1.0	10000.0	.00	10.73	5.79	NO
400.	.1787E+07	6	1.0	1.0	10000.0	.00	14.14	7.20	NO
500.	.1288E+07	6	1.0	1.0	10000.0	.00	17.48	8.54	NO
600.	.9730E+06	6	1.0	1.0	10000.0	.00	20.76	9.83	NO
700.	.7639E+06	6	1.0	1.0	10000.0	.00	23.99	11.05	NO
800.	.6245E+06	6	1.0	1.0	10000.0	.00	27.17	12.09	NO
900.	.5216E+06	6	1.0	1.0	10000.0	.00	30.32	13.09	NO
1000.	.4437E+06	6	1.0	1.0	10000.0	.00	33.43	14.05	NO
1100.	.3847E+06	6	1.0	1.0	10000.0	.00	36.51	14.92	NO
1200.	.3375E+06	6	1.0	1.0	10000.0	.00	39.57	15.75	NO
1300.	.2991E+06	6	1.0	1.0	10000.0	.00	42.60	16.56	NO
1400.	.2673E+06	6	1.0	1.0	10000.0	.00	45.61	17.35	NO
1500.	.2408E+06	6	1.0	1.0	10000.0	.00	48.59	18.12	NO
1600.	.2183E+06	6	1.0	1.0	10000.0	.00	51.56	18.87	NO
1700.	.1990E+06	6	1.0	1.0	10000.0	.00	54.51	19.60	NO
1800.	.1824E+06	6	1.0	1.0	10000.0	.00	57.44	20.31	NO
1900.	.1680E+06	6	1.0	1.0	10000.0	.00	60.35	21.02	NO
2000.	.1554E+06	6	1.0	1.0	10000.0	.00	63.25	21.69	NO
2100.	.1449E+06	6	1.0	1.0	10000.0	.00	66.13	22.28	NO
2200.	.1355E+06	6	1.0	1.0	10000.0	.00	69.00	22.84	NO
2300.	.1271E+06	6	1.0	1.0	10000.0	.00	71.86	23.40	NO
2400.	.1195E+06	6	1.0	1.0	10000.0	.00	74.70	23.95	NO
2500.	.1127E+06	6	1.0	1.0	10000.0	.00	77.53	24.48	NO
2600.	.1065E+06	6	1.0	1.0	10000.0	.00	80.35	25.01	NO
2700.	.1008E+06	6	1.0	1.0	10000.0	.00	83.16	25.53	NO
2800.	.9568E+05	6	1.0	1.0	10000.0	.00	85.96	26.04	NO
2900.	.9095E+05	6	1.0	1.0	10000.0	.00	88.74	26.54	NO

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

017385

017386

FINAL

SCREENING OF STP AT 1 GRAM/SEC

11/13/95
14:24:16

** SCREEN2 MODEL RUN ***
** VERSION DATED 92245 ***

ghorn Burning Ground No.3 Soil Treatment Plant

017387

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	POINT
EMISSION RATE (G/S)	=	1.00000
STACK HEIGHT (M)	=	12.2000
STK INSIDE DIAM (M)	=	.6100
STK EXIT VELOCITY (M/S)	=	8.1000
STK GAS EXIT TEMP (K)	=	350.0000
AMBIENT AIR TEMP (K)	=	293.0000
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	RURAL
BUILDING HEIGHT (M)	=	.0000
MIN HORIZ BLDG DIM (M)	=	.0000
MAX HORIZ BLDG DIM (M)	=	.0000

BUOY. FLUX = 1.203 M**4/S**3; MOM. FLUX = 5.109 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

* TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
15.	.1441E-09	1	3.0	3.0	960.0	20.29	4.96	2.55	NO
100.	99.81	1	2.5	2.5	800.0	21.91	27.00	14.22	NO
200.	114.2	3	2.5	2.6	800.0	21.85	23.78	14.30	NO
300.	114.8	3	1.5	1.5	480.0	28.29	34.60	20.84	NO
400.	104.5	3	1.0	1.0	320.0	36.33	45.18	27.33	NO
500.	98.54	4	1.5	1.5	480.0	28.13	36.43	18.85	NO
600.	95.36	4	1.5	1.5	480.0	28.13	42.96	21.69	NO
700.	88.00	4	1.5	1.5	480.0	28.13	49.40	24.46	NO
800.	85.11	4	1.0	1.0	320.0	36.09	55.99	27.64	NO
900.	80.50	4	1.0	1.0	320.0	36.09	62.26	30.25	NO
1000.	75.10	4	1.0	1.0	320.0	36.09	68.47	32.81	NO
1100.	69.48	4	1.0	1.0	320.0	36.09	74.62	34.80	NO
1200.	64.29	4	1.0	1.0	320.0	36.09	80.73	36.73	NO
1300.	59.56	4	1.0	1.0	320.0	36.09	86.79	38.61	NO
1400.	55.28	4	1.0	1.0	320.0	36.09	92.80	40.44	NO
1500.	51.41	4	1.0	1.0	320.0	36.09	98.78	42.22	NO
1600.	47.91	4	1.0	1.0	320.0	36.09	104.72	43.97	NO
1700.	48.81	6	1.0	1.1	10000.0	37.50	55.41	20.81	NO
1800.	49.67	6	1.0	1.1	10000.0	37.50	58.32	21.49	NO
900.	50.22	6	1.0	1.1	10000.0	37.50	61.21	22.15	NO
2000.	50.52	6	1.0	1.1	10000.0	37.50	64.08	22.80	NO
2100.	50.30	6	1.0	1.1	10000.0	37.50	66.95	23.36	NO
2200.	49.96	6	1.0	1.1	10000.0	37.50	69.80	23.90	NO
2300.	49.52	6	1.0	1.1	10000.0	37.50	72.64	24.43	NO

2400.	49.01	6	1.0	1.1	10000.0	37.50	75.47	24.96	NO
2500.	48.43	6	1.0	1.1	10000.0	37.50	78.28	25.47	NO
2600.	47.80	6	1.0	1.1	10000.0	37.50	81.09	25.98	NO
2700.	47.13	6	1.0	1.1	10000.0	37.50	83.88	26.48	NO
2800.	46.44	6	1.0	1.1	10000.0	37.50	86.67	26.97	NO
900.	45.72	6	1.0	1.1	10000.0	37.50	89.44	27.45	NO
000.	44.99	6	1.0	1.1	10000.0	37.50	92.21	27.93	NO
3500.	41.02	6	1.0	1.1	10000.0	37.50	105.90	29.87	NO
4000.	37.44	6	1.0	1.1	10000.0	37.50	119.39	31.67	NO
4500.	34.27	6	1.0	1.1	10000.0	37.50	132.70	33.36	NO
5000.	31.48	6	1.0	1.1	10000.0	37.50	145.85	34.96	NO
5500.	29.03	6	1.0	1.1	10000.0	37.50	158.86	36.48	NO
6000.	26.87	6	1.0	1.1	10000.0	37.50	171.73	37.93	NO
6500.	24.96	6	1.0	1.1	10000.0	37.50	184.48	39.31	NO
7000.	23.27	6	1.0	1.1	10000.0	37.50	197.13	40.65	NO
7500.	21.77	6	1.0	1.1	10000.0	37.50	209.66	41.79	NO
8000.	20.44	6	1.0	1.1	10000.0	37.50	222.10	42.89	NO
8500.	19.24	6	1.0	1.1	10000.0	37.50	234.45	43.96	NO
9000.	18.17	6	1.0	1.1	10000.0	37.50	246.71	44.98	NO
9500.	17.19	6	1.0	1.1	10000.0	37.50	258.89	45.98	NO
10000.	16.30	6	1.0	1.1	10000.0	37.50	271.00	46.94	NO
15000.	10.55	6	1.0	1.1	10000.0	37.50	388.49	55.36	NO
20000.	7.751	6	1.0	1.1	10000.0	37.50	501.00	60.73	NO
25000.	6.079	6	1.0	1.1	10000.0	37.50	609.79	65.26	NO
30000.	4.974	6	1.0	1.1	10000.0	37.50	715.62	69.21	NO
40000.	3.654	6	1.0	1.1	10000.0	37.50	920.25	74.84	NO
50000.	2.873	6	1.0	1.1	10000.0	37.50	1117.45	79.52	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 15. M:

241.	117.2	3	2.0	2.0	640.0	24.27	28.36	17.05	NO

NASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

017388

****
*** SCREEN DISCRETE DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
25.	.8908E-02	1	3.0	3.0	960.0	20.29	7.82	4.01	NO
50.	26.01	1	3.0	3.0	960.0	20.29	14.56	7.56	NO
75.	80.91	1	3.0	3.0	960.0	20.29	20.86	10.88	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	117.2	241.	0.

017389

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

Longhorn Burning Ground No.3 Soil Treatment Plant
p
1.00000
12.2000
.610000
8.10000
350.000
293.000
.000000
R
n
n
n
1
y
15.00,50000.00
y
25.000000
50.000000
75.000000
0.000000E+00

y

017390

FINAL

SCREENING OF WORST-CASE TRICHLOROETHYLENE AND METHYLENE CHLORIDE EMISSIONS

11/09/95
15:19:51

*** SCREEN2 MODEL RUN ***
** VERSION DATED 92245 ***

017391

02 Soil Excavation, Cont.= TCE, Class=3, 2m/s, 30 cub. yds/hr, 0.54 g/s

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	.240000E-02
SOURCE HEIGHT (M)	=	1.0000
LENGTH OF SIDE (M)	=	15.0000
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	RURAL

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** STABILITY CLASS 3 ONLY ***
*** 10-METER WIND SPEED OF 2.00 M/S ONLY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1000.	13.64	3	2.0	2.0	640.0	1.00	102.32	61.51	NO
1100.	11.46	3	2.0	2.0	640.0	1.00	111.67	67.07	NO
1200.	9.780	3	2.0	2.0	640.0	1.00	120.93	72.60	NO
1300.	8.452	3	2.0	2.0	640.0	1.00	130.12	78.08	NO
1400.	7.384	3	2.0	2.0	640.0	1.00	139.24	83.53	NO
1500.	6.512	3	2.0	2.0	640.0	1.00	148.29	88.95	NO
1600.	5.790	3	2.0	2.0	640.0	1.00	157.28	94.33	NO
1700.	5.184	3	2.0	2.0	640.0	1.00	166.22	99.69	NO
1800.	4.672	3	2.0	2.0	640.0	1.00	175.10	105.02	NO
1900.	4.234	3	2.0	2.0	640.0	1.00	183.92	110.32	NO
2000.	3.857	3	2.0	2.0	640.0	1.00	192.70	115.60	NO
2100.	3.529	3	2.0	2.0	640.0	1.00	201.44	120.86	NO
2200.	3.243	3	2.0	2.0	640.0	1.00	210.13	126.10	NO
2300.	2.991	3	2.0	2.0	640.0	1.00	218.78	131.31	NO
2400.	2.768	3	2.0	2.0	640.0	1.00	227.39	136.51	NO
2500.	2.570	3	2.0	2.0	640.0	1.00	235.96	141.69	NO
2600.	2.393	3	2.0	2.0	640.0	1.00	244.49	146.85	NO
2700.	2.234	3	2.0	2.0	640.0	1.00	252.99	152.00	NO
2800.	2.092	3	2.0	2.0	640.0	1.00	261.46	157.13	NO
2900.	1.962	3	2.0	2.0	640.0	1.00	269.89	162.24	NO
3000.	1.845	3	2.0	2.0	640.0	1.00	278.29	167.34	NO
3500.	1.395	3	2.0	2.0	640.0	1.00	319.86	192.62	NO
4000.	1.095	3	2.0	2.0	640.0	1.00	360.78	217.60	NO
4500.	.8841	3	2.0	2.0	640.0	1.00	401.13	242.31	NO
5000.	.7305	3	2.0	2.0	640.0	1.00	440.97	266.79	NO
5500.	.6148	3	2.0	2.0	640.0	1.00	480.35	291.06	NO
6000.	.5254	3	2.0	2.0	640.0	1.00	519.32	315.14	NO
6500.	.4550	3	2.0	2.0	640.0	1.00	557.92	339.05	NO
7000.	.3989	3	2.0	2.0	640.0	1.00	596.16	362.80	NO

7500.	.3537	3	2.0	2.0	640.0	1.00	634.09	386.41	NO
8000.	.3169	3	2.0	2.0	640.0	1.00	671.71	409.89	NO
8500.	.2869	3	2.0	2.0	640.0	1.00	709.04	433.24	NO
9000.	.2622	3	2.0	2.0	640.0	1.00	746.11	456.48	NO
9500.	.2419	3	2.0	2.0	640.0	1.00	782.93	479.60	NO
0000.	.2249	3	2.0	2.0	640.0	1.00	819.52	502.62	NO
000.	.1438	3	2.0	2.0	640.0	1.00	1174.42	728.14	NO
000.	.1112	3	2.0	2.0	640.0	1.00	1514.00	947.22	NO
25000.	.9136E-01	3	2.0	2.0	640.0	1.00	1842.23	1161.62	NO
30000.	.7787E-01	3	2.0	2.0	640.0	1.00	2161.41	1372.36	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1000. M:

1000.	13.64	3	2.0	2.0	640.0	1.00	102.32	61.51	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

017392

****
*** SCREEN DISCRETE DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1370.	7.682	3	2.0	2.0	640.0	1.00	136.51	81.90	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	13.64	1000.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

11/09/95
15:25:55

*** SCREEN2 MODEL RUN ***
** VERSION DATED 92245 ***

02 Soil Excavation, Cont.= TCE, Class=3, 5m/s, 30 cub. yds/hr, 0.54 g/s

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	.240000E-02
SOURCE HEIGHT (M)	=	1.0000
LENGTH OF SIDE (M)	=	15.0000
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	RURAL

017393

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** STABILITY CLASS 3 ONLY ***
*** 10-METER WIND SPEED OF 5.00 M/S ONLY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1000.	5.456	3	5.0	5.0	1600.0	1.00	102.32	61.51	NO
1100.	4.585	3	5.0	5.0	1600.0	1.00	111.67	67.07	NO
1200.	3.912	3	5.0	5.0	1600.0	1.00	120.93	72.60	NO
1300.	3.381	3	5.0	5.0	1600.0	1.00	130.12	78.08	NO
1400.	2.954	3	5.0	5.0	1600.0	1.00	139.24	83.53	NO
1500.	2.605	3	5.0	5.0	1600.0	1.00	148.29	88.95	NO
1600.	2.316	3	5.0	5.0	1600.0	1.00	157.28	94.33	NO
1700.	2.074	3	5.0	5.0	1600.0	1.00	166.22	99.69	NO
1800.	1.869	3	5.0	5.0	1600.0	1.00	175.10	105.02	NO
1900.	1.694	3	5.0	5.0	1600.0	1.00	183.92	110.32	NO
2000.	1.543	3	5.0	5.0	1600.0	1.00	192.70	115.60	NO
2100.	1.412	3	5.0	5.0	1600.0	1.00	201.44	120.86	NO
2200.	1.297	3	5.0	5.0	1600.0	1.00	210.13	126.10	NO
2300.	1.196	3	5.0	5.0	1600.0	1.00	218.78	131.31	NO
2400.	1.107	3	5.0	5.0	1600.0	1.00	227.39	136.51	NO
2500.	1.028	3	5.0	5.0	1600.0	1.00	235.96	141.69	NO
2600.	.9572	3	5.0	5.0	1600.0	1.00	244.49	146.85	NO
2700.	.8938	3	5.0	5.0	1600.0	1.00	252.99	152.00	NO
2800.	.8366	3	5.0	5.0	1600.0	1.00	261.46	157.13	NO
2900.	.7850	3	5.0	5.0	1600.0	1.00	269.89	162.24	NO
3000.	.7381	3	5.0	5.0	1600.0	1.00	278.29	167.34	NO
3500.	.5579	3	5.0	5.0	1600.0	1.00	319.86	192.62	NO
4000.	.4379	3	5.0	5.0	1600.0	1.00	360.78	217.60	NO
4500.	.3537	3	5.0	5.0	1600.0	1.00	401.13	242.31	NO
5000.	.2922	3	5.0	5.0	1600.0	1.00	440.97	266.79	NO
5500.	.2459	3	5.0	5.0	1600.0	1.00	480.35	291.06	NO
6000.	.2100	3	5.0	5.0	1600.0	1.00	519.32	315.14	NO
6500.	.1817	3	5.0	5.0	1600.0	1.00	557.92	339.05	NO
7000.	.1589	3	5.0	5.0	1600.0	1.00	596.16	362.80	NO

7500.	.1403	3	5.0	5.0	1600.0	1.00	634.09	386.41	NO
8000.	.1249	3	5.0	5.0	1600.0	1.00	671.71	409.89	NO
8500.	.1119	3	5.0	5.0	1600.0	1.00	709.04	433.24	NO
9000.	.1009	3	5.0	5.0	1600.0	1.00	746.11	456.48	NO
9500.	.9155E-01	3	5.0	5.0	1600.0	1.00	782.93	479.60	NO
10000.	.8346E-01	3	5.0	5.0	1600.0	1.00	819.52	502.62	NO
15000.	.4021E-01	3	5.0	5.0	1600.0	1.00	1174.42	728.14	NO
20000.	.2413E-01	3	5.0	5.0	1600.0	1.00	1514.00	947.22	NO
25000.	.1679E-01	3	5.0	5.0	1600.0	1.00	1842.23	1161.62	NO
30000.	.1312E-01	3	5.0	5.0	1600.0	1.00	2161.41	1372.36	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1000. M:

1000.	5.456	3	5.0	5.0	1600.0	1.00	102.32	61.51	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

017394

****
*** SCREEN DISCRETE DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1370.	3.073	3	5.0	5.0	1600.0	1.00	136.51	81.90	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	5.456	1000.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

11/09/95
15:26:24

*** SCREEN2 MODEL RUN ***
** VERSION DATED 92245 ***

02 Soil Excavation, Cont.= TCE, Class=4, 3m/s, 30 cub. yds/hr, 0.54 g/s

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	.240000E-02
SOURCE HEIGHT (M)	=	1.0000
LENGTH OF SIDE (M)	=	15.0000
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	RURAL

017395

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** STABILITY CLASS 4 ONLY ***
*** 10-METER WIND SPEED OF 3.00 M/S ONLY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1000.	26.22	4	3.0	3.0	960.0	1.00	67.60	32.23	NO
1100.	22.61	4	3.0	3.0	960.0	1.00	73.79	34.26	NO
1200.	19.75	4	3.0	3.0	960.0	1.00	79.92	36.22	NO
1300.	17.44	4	3.0	3.0	960.0	1.00	86.01	38.12	NO
1400.	15.54	4	3.0	3.0	960.0	1.00	92.04	39.98	NO
1500.	13.96	4	3.0	3.0	960.0	1.00	98.04	41.79	NO
1600.	12.63	4	3.0	3.0	960.0	1.00	103.99	43.55	NO
1700.	11.50	4	3.0	3.0	960.0	1.00	109.91	45.28	NO
1800.	10.52	4	3.0	3.0	960.0	1.00	115.79	46.97	NO
1900.	9.676	4	3.0	3.0	960.0	1.00	121.64	48.63	NO
2000.	8.937	4	3.0	3.0	960.0	1.00	127.45	50.26	NO
2100.	8.285	4	3.0	3.0	960.0	1.00	133.24	51.86	NO
2200.	7.709	4	3.0	3.0	960.0	1.00	139.00	53.43	NO
2300.	7.196	4	3.0	3.0	960.0	1.00	144.73	54.98	NO
2400.	6.737	4	3.0	3.0	960.0	1.00	150.43	56.50	NO
2500.	6.324	4	3.0	3.0	960.0	1.00	156.11	58.00	NO
2600.	5.951	4	3.0	3.0	960.0	1.00	161.77	59.48	NO
2700.	5.613	4	3.0	3.0	960.0	1.00	167.40	60.94	NO
2800.	5.306	4	3.0	3.0	960.0	1.00	173.01	62.38	NO
2900.	5.026	4	3.0	3.0	960.0	1.00	178.60	63.80	NO
3000.	4.769	4	3.0	3.0	960.0	1.00	184.17	65.20	NO
3500.	3.780	4	3.0	3.0	960.0	1.00	211.72	71.56	NO
4000.	3.092	4	3.0	3.0	960.0	1.00	238.85	77.57	NO
4500.	2.589	4	3.0	3.0	960.0	1.00	265.61	83.29	NO
5000.	2.210	4	3.0	3.0	960.0	1.00	292.03	88.76	NO
5500.	1.915	4	3.0	3.0	960.0	1.00	318.15	94.02	NO
6000.	1.680	4	3.0	3.0	960.0	1.00	344.00	99.10	NO
6500.	1.490	4	3.0	3.0	960.0	1.00	369.61	104.01	NO
7000.	1.333	4	3.0	3.0	960.0	1.00	394.98	108.77	NO

7500.	1.202	4	3.0	3.0	960.0	1.00	420.14	113.40	NO
8000.	1.092	4	3.0	3.0	960.0	1.00	445.11	117.91	NO
8500.	.9968	4	3.0	3.0	960.0	1.00	469.89	122.31	NO
9000.	.9151	4	3.0	3.0	960.0	1.00	494.49	126.61	NO
9500.	.8440	4	3.0	3.0	960.0	1.00	518.93	130.82	NO
0000.	.7816	4	3.0	3.0	960.0	1.00	543.21	134.93	NO
5000.	.4335	4	3.0	3.0	960.0	1.00	778.83	169.71	NO
20000.	.2856	4	3.0	3.0	960.0	1.00	1004.37	199.71	NO
25000.	.2069	4	3.0	3.0	960.0	1.00	1222.42	226.58	NO
30000.	.1590	4	3.0	3.0	960.0	1.00	1434.50	251.19	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1000. M:

1000.	26.22	4	3.0	3.0	960.0	1.00	67.60	32.23	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

017396

****
*** SCREEN DISCRETE DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1370.	16.08	4	3.0	3.0	960.0	1.00	90.24	39.43	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	26.22	1000.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

11/09/95
15:27:08

*** SCREEN2 MODEL RUN ***
** VERSION DATED 92245 ***

02 Soil Excavation, Cont.= MEC, Class=4, 6m/s, 30 cub. yds/hr, 0.54 g/s

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	.240000E-02
SOURCE HEIGHT (M)	=	1.0000
LENGTH OF SIDE (M)	=	15.0000
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	RURAL

017397

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** STABILITY CLASS 4 ONLY ***
*** 10-METER WIND SPEED OF 6.00 M/S ONLY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1000.	13.11	4	6.0	6.0	1920.0	1.00	67.60	32.23	NO
1100.	11.30	4	6.0	6.0	1920.0	1.00	73.79	34.26	NO
1200.	9.875	4	6.0	6.0	1920.0	1.00	79.92	36.22	NO
1300.	8.720	4	6.0	6.0	1920.0	1.00	86.01	38.12	NO
1400.	7.772	4	6.0	6.0	1920.0	1.00	92.04	39.98	NO
1500.	6.982	4	6.0	6.0	1920.0	1.00	98.04	41.79	NO
1600.	6.317	4	6.0	6.0	1920.0	1.00	103.99	43.55	NO
1700.	5.749	4	6.0	6.0	1920.0	1.00	109.91	45.28	NO
1800.	5.262	4	6.0	6.0	1920.0	1.00	115.79	46.97	NO
1900.	4.838	4	6.0	6.0	1920.0	1.00	121.64	48.63	NO
2000.	4.468	4	6.0	6.0	1920.0	1.00	127.45	50.26	NO
2100.	4.143	4	6.0	6.0	1920.0	1.00	133.24	51.86	NO
2200.	3.855	4	6.0	6.0	1920.0	1.00	139.00	53.43	NO
2300.	3.598	4	6.0	6.0	1920.0	1.00	144.73	54.98	NO
2400.	3.368	4	6.0	6.0	1920.0	1.00	150.43	56.50	NO
2500.	3.162	4	6.0	6.0	1920.0	1.00	156.11	58.00	NO
2600.	2.976	4	6.0	6.0	1920.0	1.00	161.77	59.48	NO
2700.	2.807	4	6.0	6.0	1920.0	1.00	167.40	60.94	NO
2800.	2.653	4	6.0	6.0	1920.0	1.00	173.01	62.38	NO
2900.	2.513	4	6.0	6.0	1920.0	1.00	178.60	63.80	NO
3000.	2.385	4	6.0	6.0	1920.0	1.00	184.17	65.20	NO
3500.	1.890	4	6.0	6.0	1920.0	1.00	211.72	71.56	NO
4000.	1.546	4	6.0	6.0	1920.0	1.00	238.85	77.57	NO
4500.	1.295	4	6.0	6.0	1920.0	1.00	265.61	83.29	NO
5000.	1.105	4	6.0	6.0	1920.0	1.00	292.03	88.76	NO
5500.	.9575	4	6.0	6.0	1920.0	1.00	318.15	94.02	NO
6000.	.8402	4	6.0	6.0	1920.0	1.00	344.00	99.10	NO
6500.	.7451	4	6.0	6.0	1920.0	1.00	369.61	104.01	NO
7000.	.6667	4	6.0	6.0	1920.0	1.00	394.98	108.77	NO

7500.	.6012	4	6.0	6.0	1920.0	1.00	420.14	113.40	NO
8000.	.5458	4	6.0	6.0	1920.0	1.00	445.11	117.91	NO
8500.	.4984	4	6.0	6.0	1920.0	1.00	469.89	122.31	NO
9000.	.4575	4	6.0	6.0	1920.0	1.00	494.49	126.61	NO
9500.	.4220	4	6.0	6.0	1920.0	1.00	518.93	130.82	NO
0000.	.3908	4	6.0	6.0	1920.0	1.00	543.21	134.93	NO
000.	.2167	4	6.0	6.0	1920.0	1.00	778.83	169.71	NO
20000.	.1428	4	6.0	6.0	1920.0	1.00	1004.37	199.71	NO
25000.	.1034	4	6.0	6.0	1920.0	1.00	1222.42	226.58	NO
30000.	.7950E-01	4	6.0	6.0	1920.0	1.00	1434.50	251.19	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1000. M:

1000.	13.11	4	6.0	6.0	1920.0	1.00	67.60	32.23	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

017398

****
*** SCREEN DISCRETE DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1370.	8.038	4	6.0	6.0	1920.0	1.00	90.24	39.43	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	13.11	1000.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

10/03/95
09:05:21

*** SCREEN2 MODEL RUN ***
*** VERSION DATED 92245 ***

-02 Soil Excavation, Cont.= MEC, Class=3, 2m/s, 30 cub. yds/hr, 2.752 g/s

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	.122310E-01
SOURCE HEIGHT (M)	=	1.0000
LENGTH OF SIDE (M)	=	15.0000
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	RURAL

017399

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** STABILITY CLASS 3 ONLY ***
*** 10-METER WIND SPEED OF 2.00 M/S ONLY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1000.	69.51	3	2.0	2.0	640.0	1.00	102.32	61.51	NO
1100.	58.41	3	2.0	2.0	640.0	1.00	111.67	67.07	NO
1200.	49.84	3	2.0	2.0	640.0	1.00	120.93	72.60	NO
1300.	43.07	3	2.0	2.0	640.0	1.00	130.12	78.08	NO
1400.	37.63	3	2.0	2.0	640.0	1.00	139.24	83.53	NO
1500.	33.19	3	2.0	2.0	640.0	1.00	148.29	88.95	NO
1600.	29.50	3	2.0	2.0	640.0	1.00	157.28	94.33	NO
1700.	26.42	3	2.0	2.0	640.0	1.00	166.22	99.69	NO
1800.	23.81	3	2.0	2.0	640.0	1.00	175.10	105.02	NO
1900.	21.58	3	2.0	2.0	640.0	1.00	183.92	110.32	NO
2000.	19.65	3	2.0	2.0	640.0	1.00	192.70	115.60	NO
2100.	17.98	3	2.0	2.0	640.0	1.00	201.44	120.86	NO
2200.	16.52	3	2.0	2.0	640.0	1.00	210.13	126.10	NO
2300.	15.24	3	2.0	2.0	640.0	1.00	218.78	131.31	NO
2400.	14.11	3	2.0	2.0	640.0	1.00	227.39	136.51	NO
2500.	13.10	3	2.0	2.0	640.0	1.00	235.96	141.69	NO
2600.	12.20	3	2.0	2.0	640.0	1.00	244.49	146.85	NO
2700.	11.39	3	2.0	2.0	640.0	1.00	252.99	152.00	NO
2800.	10.66	3	2.0	2.0	640.0	1.00	261.46	157.13	NO
2900.	10.00	3	2.0	2.0	640.0	1.00	269.89	162.24	NO
3000.	9.404	3	2.0	2.0	640.0	1.00	278.29	167.34	NO
3500.	7.108	3	2.0	2.0	640.0	1.00	319.86	192.62	NO
4000.	5.579	3	2.0	2.0	640.0	1.00	360.78	217.60	NO
4500.	4.506	3	2.0	2.0	640.0	1.00	401.13	242.31	NO
5000.	3.723	3	2.0	2.0	640.0	1.00	440.97	266.79	NO
5500.	3.133	3	2.0	2.0	640.0	1.00	480.35	291.06	NO
6000.	2.677	3	2.0	2.0	640.0	1.00	519.32	315.14	NO
6500.	2.319	3	2.0	2.0	640.0	1.00	557.92	339.05	NO
7000.	2.033	3	2.0	2.0	640.0	1.00	596.16	362.80	NO
7500.	1.802	3	2.0	2.0	640.0	1.00	634.09	386.41	NO

8000.	1.615	3	2.0	2.0	640.0	1.00	671.71	409.89	NO
8500.	1.462	3	2.0	2.0	640.0	1.00	709.04	433.24	NO
9000.	1.336	3	2.0	2.0	640.0	1.00	746.11	456.48	NO
9500.	1.233	3	2.0	2.0	640.0	1.00	782.93	479.60	NO
0000.	1.146	3	2.0	2.0	640.0	1.00	819.52	502.62	NO
000.	.7328	3	2.0	2.0	640.0	1.00	1174.42	728.14	NO
000.	.5665	3	2.0	2.0	640.0	1.00	1514.00	947.22	NO
25000.	.4656	3	2.0	2.0	640.0	1.00	1842.23	1161.62	NO
30000.	.3968	3	2.0	2.0	640.0	1.00	2161.41	1372.36	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1000. M:

1000.	69.51	3	2.0	2.0	640.0	1.00	102.32	61.51	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

017400

****
*** SCREEN DISCRETE DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1370.	39.15	3	2.0	2.0	640.0	1.00	136.51	81.90	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	69.51	1000.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

*** SCREEN2 MODEL RUN ***
*** VERSION DATED 92245 ***

-02 Soil Excavation, Cont.= MEC, Class=3, 5m/s, 30 cub. yds/hr, 2.752 g/s

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	.122310E-01
SOURCE HEIGHT (M)	=	1.0000
LENGTH OF SIDE (M)	=	15.0000
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	RURAL

017401

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** STABILITY CLASS 3 ONLY ***
*** 10-METER WIND SPEED OF 5.00 M/S ONLY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1000.	27.80	3	5.0	5.0	1600.0	1.00	102.32	61.51	NO
1100.	23.37	3	5.0	5.0	1600.0	1.00	111.67	67.07	NO
1200.	19.94	3	5.0	5.0	1600.0	1.00	120.93	72.60	NO
1300.	17.23	3	5.0	5.0	1600.0	1.00	130.12	78.08	NO
1400.	15.05	3	5.0	5.0	1600.0	1.00	139.24	83.53	NO
1500.	13.27	3	5.0	5.0	1600.0	1.00	148.29	88.95	NO
1600.	11.80	3	5.0	5.0	1600.0	1.00	157.28	94.33	NO
1700.	10.57	3	5.0	5.0	1600.0	1.00	166.22	99.69	NO
1800.	9.524	3	5.0	5.0	1600.0	1.00	175.10	105.02	NO
1900.	8.631	3	5.0	5.0	1600.0	1.00	183.92	110.32	NO
2000.	7.862	3	5.0	5.0	1600.0	1.00	192.70	115.60	NO
2100.	7.194	3	5.0	5.0	1600.0	1.00	201.44	120.86	NO
2200.	6.610	3	5.0	5.0	1600.0	1.00	210.13	126.10	NO
2300.	6.097	3	5.0	5.0	1600.0	1.00	218.78	131.31	NO
2400.	5.642	3	5.0	5.0	1600.0	1.00	227.39	136.51	NO
2500.	5.239	3	5.0	5.0	1600.0	1.00	235.96	141.69	NO
2600.	4.878	3	5.0	5.0	1600.0	1.00	244.49	146.85	NO
2700.	4.555	3	5.0	5.0	1600.0	1.00	252.99	152.00	NO
2800.	4.264	3	5.0	5.0	1600.0	1.00	261.46	157.13	NO
2900.	4.000	3	5.0	5.0	1600.0	1.00	269.89	162.24	NO
3000.	3.761	3	5.0	5.0	1600.0	1.00	278.29	167.34	NO
3500.	2.843	3	5.0	5.0	1600.0	1.00	319.86	192.62	NO
4000.	2.231	3	5.0	5.0	1600.0	1.00	360.78	217.60	NO
4500.	1.802	3	5.0	5.0	1600.0	1.00	401.13	242.31	NO
5000.	1.489	3	5.0	5.0	1600.0	1.00	440.97	266.79	NO
5500.	1.253	3	5.0	5.0	1600.0	1.00	480.35	291.06	NO
6000.	1.070	3	5.0	5.0	1600.0	1.00	519.32	315.14	NO
6500.	.9261	3	5.0	5.0	1600.0	1.00	557.92	339.05	NO
7000.	.8100	3	5.0	5.0	1600.0	1.00	596.16	362.80	NO
7500.	.7150	3	5.0	5.0	1600.0	1.00	634.09	386.41	NO

8000.	.6363	3	5.0	5.0	1600.0	1.00	671.71	409.89	NO
8500.	.5703	3	5.0	5.0	1600.0	1.00	709.04	433.24	NO
9000.	.5144	3	5.0	5.0	1600.0	1.00	746.11	456.48	NO
9500.	.4666	3	5.0	5.0	1600.0	1.00	782.93	479.60	NO
.0000.	.4253	3	5.0	5.0	1600.0	1.00	819.52	502.62	NO
5000.	.2049	3	5.0	5.0	1600.0	1.00	1174.42	728.14	NO
)000.	.1230	3	5.0	5.0	1600.0	1.00	1514.00	947.22	NO
25000.	.8555E-01	3	5.0	5.0	1600.0	1.00	1842.23	1161.62	NO
30000.	.6686E-01	3	5.0	5.0	1600.0	1.00	2161.41	1372.36	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1000. M:

1000.	27.80	3	5.0	5.0	1600.0	1.00	102.32	61.51	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

017402

****
*** SCREEN DISCRETE DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1370.	15.66	3	5.0	5.0	1600.0	1.00	136.51	81.90	NO

WASH= MEANS NO CALC MADE (CONC = 0.0)
)WASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	27.80	1000.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

10/03/95
09:08:24

*** SCREEN2 MODEL RUN ***
*** VERSION DATED 92245 ***

9-02 Soil Excavation, Cont.= MEC, Class=4, 3m/s, 30 cub. yds/hr, 2.752 g/s

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	.122310E-01
SOURCE HEIGHT (M)	=	1.0000
LENGTH OF SIDE (M)	=	15.0000
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	RURAL

017403

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** STABILITY CLASS 4 ONLY ***
*** 10-METER WIND SPEED OF 3.00 M/S ONLY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1000.	133.6	4	3.0	3.0	960.0	1.00	67.60	32.23	NO
1100.	115.2	4	3.0	3.0	960.0	1.00	73.79	34.26	NO
1200.	100.6	4	3.0	3.0	960.0	1.00	79.92	36.22	NO
1300.	88.88	4	3.0	3.0	960.0	1.00	86.01	38.12	NO
1400.	79.22	4	3.0	3.0	960.0	1.00	92.04	39.98	NO
1500.	71.17	4	3.0	3.0	960.0	1.00	98.04	41.79	NO
1600.	64.38	4	3.0	3.0	960.0	1.00	103.99	43.55	NO
1700.	58.60	4	3.0	3.0	960.0	1.00	109.91	45.28	NO
1800.	53.63	4	3.0	3.0	960.0	1.00	115.79	46.97	NO
1900.	49.31	4	3.0	3.0	960.0	1.00	121.64	48.63	NO
2000.	45.54	4	3.0	3.0	960.0	1.00	127.45	50.26	NO
2100.	42.22	4	3.0	3.0	960.0	1.00	133.24	51.86	NO
2200.	39.29	4	3.0	3.0	960.0	1.00	139.00	53.43	NO
2300.	36.67	4	3.0	3.0	960.0	1.00	144.73	54.98	NO
2400.	34.33	4	3.0	3.0	960.0	1.00	150.43	56.50	NO
2500.	32.23	4	3.0	3.0	960.0	1.00	156.11	58.00	NO
2600.	30.33	4	3.0	3.0	960.0	1.00	161.77	59.48	NO
2700.	28.61	4	3.0	3.0	960.0	1.00	167.40	60.94	NO
2800.	27.04	4	3.0	3.0	960.0	1.00	173.01	62.38	NO
2900.	25.61	4	3.0	3.0	960.0	1.00	178.60	63.80	NO
3000.	24.30	4	3.0	3.0	960.0	1.00	184.17	65.20	NO
3500.	19.27	4	3.0	3.0	960.0	1.00	211.72	71.56	NO
4000.	15.76	4	3.0	3.0	960.0	1.00	238.85	77.57	NO
4500.	13.20	4	3.0	3.0	960.0	1.00	265.61	83.29	NO
5000.	11.26	4	3.0	3.0	960.0	1.00	292.03	88.76	NO
5500.	9.760	4	3.0	3.0	960.0	1.00	318.15	94.02	NO
6000.	8.564	4	3.0	3.0	960.0	1.00	344.00	99.10	NO
6500.	7.595	4	3.0	3.0	960.0	1.00	369.61	104.01	NO
7000.	6.796	4	3.0	3.0	960.0	1.00	394.98	108.77	NO
7500.	6.128	4	3.0	3.0	960.0	1.00	420.14	113.40	NO

8000.	5.563	4	3.0	3.0	960.0	1.00	445.11	117.91	NO
8500.	5.080	4	3.0	3.0	960.0	1.00	469.89	122.31	NO
9000.	4.663	4	3.0	3.0	960.0	1.00	494.49	126.61	NO
9500.	4.301	4	3.0	3.0	960.0	1.00	518.93	130.82	NO
0000.	3.983	4	3.0	3.0	960.0	1.00	543.21	134.93	NO
5000.	2.209	4	3.0	3.0	960.0	1.00	778.83	169.71	NO
000.	1.456	4	3.0	3.0	960.0	1.00	1004.37	199.71	NO
25000.	1.054	4	3.0	3.0	960.0	1.00	1222.42	226.58	NO
30000.	.8103	4	3.0	3.0	960.0	1.00	1434.50	251.19	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1000. M:

1000.	133.6	4	3.0	3.0	960.0	1.00	67.60	32.23	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

017404

****
*** SCREEN DISCRETE DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1370.	81.93	4	3.0	3.0	960.0	1.00	90.24	39.43	NO

WASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	133.6	1000.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

10/03/95
09:09:12

*** SCREEN2 MODEL RUN ***
*** VERSION DATED 92245 ***

-02 Soil Excavation, Cont.= MEC, Class=4, 6m/s, 30 cub. yds/hr, 2.752 g/s

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	.122310E-01
SOURCE HEIGHT (M)	=	1.0000
LENGTH OF SIDE (M)	=	15.0000
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	RURAL

017405

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** STABILITY CLASS 4 ONLY ***
*** 10-METER WIND SPEED OF 6.00 M/S ONLY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1000.	66.81	4	6.0	6.0	1920.0	1.00	67.60	32.23	NO
1100.	57.61	4	6.0	6.0	1920.0	1.00	73.79	34.26	NO
1200.	50.32	4	6.0	6.0	1920.0	1.00	79.92	36.22	NO
1300.	44.44	4	6.0	6.0	1920.0	1.00	86.01	38.12	NO
1400.	39.61	4	6.0	6.0	1920.0	1.00	92.04	39.98	NO
1500.	35.58	4	6.0	6.0	1920.0	1.00	98.04	41.79	NO
1600.	32.19	4	6.0	6.0	1920.0	1.00	103.99	43.55	NO
1700.	29.30	4	6.0	6.0	1920.0	1.00	109.91	45.28	NO
1800.	26.81	4	6.0	6.0	1920.0	1.00	115.79	46.97	NO
1900.	24.66	4	6.0	6.0	1920.0	1.00	121.64	48.63	NO
2000.	22.77	4	6.0	6.0	1920.0	1.00	127.45	50.26	NO
2100.	21.11	4	6.0	6.0	1920.0	1.00	133.24	51.86	NO
2200.	19.64	4	6.0	6.0	1920.0	1.00	139.00	53.43	NO
2300.	18.34	4	6.0	6.0	1920.0	1.00	144.73	54.98	NO
2400.	17.17	4	6.0	6.0	1920.0	1.00	150.43	56.50	NO
2500.	16.11	4	6.0	6.0	1920.0	1.00	156.11	58.00	NO
2600.	15.16	4	6.0	6.0	1920.0	1.00	161.77	59.48	NO
2700.	14.30	4	6.0	6.0	1920.0	1.00	167.40	60.94	NO
2800.	13.52	4	6.0	6.0	1920.0	1.00	173.01	62.38	NO
2900.	12.81	4	6.0	6.0	1920.0	1.00	178.60	63.80	NO
3000.	12.15	4	6.0	6.0	1920.0	1.00	184.17	65.20	NO
3500.	9.633	4	6.0	6.0	1920.0	1.00	211.72	71.56	NO
4000.	7.878	4	6.0	6.0	1920.0	1.00	238.85	77.57	NO
4500.	6.598	4	6.0	6.0	1920.0	1.00	265.61	83.29	NO
5000.	5.631	4	6.0	6.0	1920.0	1.00	292.03	88.76	NO
5500.	4.880	4	6.0	6.0	1920.0	1.00	318.15	94.02	NO
6000.	4.282	4	6.0	6.0	1920.0	1.00	344.00	99.10	NO
6500.	3.797	4	6.0	6.0	1920.0	1.00	369.61	104.01	NO
7000.	3.398	4	6.0	6.0	1920.0	1.00	394.98	108.77	NO
7500.	3.064	4	6.0	6.0	1920.0	1.00	420.14	113.40	NO

8000.	2.781	4	6.0	6.0	1920.0	1.00	445.11	117.91	NO
8500.	2.540	4	6.0	6.0	1920.0	1.00	469.89	122.31	NO
9000.	2.332	4	6.0	6.0	1920.0	1.00	494.49	126.61	NO
9500.	2.150	4	6.0	6.0	1920.0	1.00	518.93	130.82	NO
0000.	1.992	4	6.0	6.0	1920.0	1.00	543.21	134.93	NO
5000.	1.104	4	6.0	6.0	1920.0	1.00	778.83	169.71	NO
000.	.7278	4	6.0	6.0	1920.0	1.00	1004.37	199.71	NO
0000.	.5271	4	6.0	6.0	1920.0	1.00	1222.42	226.58	NO
30000.	.4052	4	6.0	6.0	1920.0	1.00	1434.50	251.19	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1000. M:

1000.	66.81	4	6.0	6.0	1920.0	1.00	67.60	32.23	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

017406

****
*** SCREEN DISCRETE DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1370.	40.96	4	6.0	6.0	1920.0	1.00	90.24	39.43	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	66.81	1000.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

017407

APPENDIX D

SCREENING CRITERIA FOR METEOROLOGICAL DATA

SCREENING CRITERIA FOR METEOROLOGICAL DATA

PARAMETER	SCREENING CRITERIA
Wind Speed	> 20 m/s (1 hour average) Unchanged for 12 or more consecutive hours (within ±0.5 m/s)
Wind Direction	Any reported with calm or no wind speed Same 10° sector for 18 or more consecutive hours
Air Temperature	> 45°C < -35°C > +5° or -5° change/1 hour Unchanged for 12 or more consecutive hours (within ±0.5°C)
Dew Point	> air temperature at that hour (same location) > +3°C or < -3°C change/1 hour Unchanged for 12 or more consecutive hours (within 0.5°C) = air temperature for 12 or more consecutive hours (within 0.1°C)
Pressure	> 1,096 mb (sea level) < 940 mb (sea level) > + 6 or < -6 mb change/3 hours
Rainfall	> 15 cm/24 hours < 5 cm/3 months

Source: U.S. EPA. 1983. Quality Assurance Handbook for Air Pollution Measurement Systems: Volume IV, Meteorological Measurements. EPA-60/4-82-060. Research Triangle Park, North Carolina. February.

APPENDIX E

U.S. EPA TO-14

COMPENDIUM OF METHODS FOR THE DETERMINATION OF TOXIC ORGANIC COMPOUNDS IN AMBIENT AIR

APPENDIX F

METHOD 25A

DETERMINATION OF TOTAL GASEOUS ORGANIC CONCENTRATIONS USING A FLAME IONIZATION ANALYZER

APPENDIX G

METHOD 2

DETERMINATION OF STACK GAS VELOCITY AND VOLUMETRIC FLOW RATE (TYPE S PITOT TUBE)

APPENDIX H

FIELD SAMPLING DATA SHEET

SCREENING CRITERIA FOR METEOROLOGICAL DATA

PARAMETER	SCREENING CRITERIA
Wind Speed	> 20 m/s (1 hour average) Unchanged for 12 or more consecutive hours (within ±0.5 m/s)
Wind Direction	Any reported with calm or no wind speed Same 10° sector for 18 or more consecutive hours
Air Temperature	> 45°C < -35°C > +5° or -5° change/1 hour Unchanged for 12 or more consecutive hours (within ±0.5°C)
Dew Point	> air temperature at that hour (same location) > +3°C or < -3°C change/1 hour Unchanged for 12 or more consecutive hours (within 0.5°C) = air temperature for 12 or more consecutive hours (within 0.1°C)
Pressure	> 1,096 mb (sea level) < 940 mb (sea level) > + 6 or < -6 mb change/3 hours
Rainfall	> 15 cm/24 hours < 5 cm/3 months

Source: U.S. EPA. 1983. Quality Assurance Handbook for Air Pollution Measurement Systems: Volume IV, Meteorological Measurements. EPA-60/4-82-060. Research Triangle Park, North Carolina. February.

CALCULATIONS FOR TARGET COMPOUND EMISSIONS ASSOCIATED WITH SOIL AND SOURCE MATERIAL EXCAVATIONS

017415

1. Calculation of Saturation Vapor Concentration (Csat)

Equation 1

$$Csat = (Kd \times S \times n_m) \times (S \times 0_m)$$

Kd = soil/water partition coefficient (L/kg)
Kd = Koc x foc
S = Solubility (mg/L)
n_m = Soil moisture content (kg-water/kg-soil)
0_m = Soil moisture content (L-water/kg-soil -mL/g)

Calculation of Csat for Methylene Chloride

Step 1 - Calculation of Kd

Koc := 8.8

foc := .02

Kd := Koc x foc

Kd = 0.176 **L/kg**

Calculation of Csat

Kd = 0.176

$S := 2.0 \times 10^4$

$N_m := 0.12$

$0_m := 0.12$

$Csat := (Kd \times S \times N_m) + (S \times 0_m)$

Csat $2.822 \cdot 10^3$ **mg Methylene chloride / kg**

CALCULATIONS FOR TARGET COMPOUND EMISSIONS ASSOCIATED WITH SOIL AND SOURCE MATERIAL EXCAVATIONS

(CONTINUED)

Calculation of Saturation Vapor Concentration (Csat)

Equation 1

$$Csat = (Kd \times S \times n_m) \times (S \times 0_m)$$

Kd = soil/water partition coefficient (L/kg)
Kd = Koc x foc
S = Solubility (mg/L)
n_m = Soil moisture content (kg-water/kg-soil)
0_m = Soil moisture content (L-water/kg-soil -mL/g)

Calculation of Csat for Trichloroethylene

Step 1 - Calculation of Kd

Koc := 126

foc := .02

Kd := Koc x foc

Kd = 2.52 **L/kg**

Calculation of Csat

Kd = 2.52

$S := 1.1 \times 10^3$

$n_m := 0.12$

$0_m := 0.12$

Csat := (Kd x S x n_m) + (S x 0_m)

Csat = 464.64 **mg Trichloroethylene / kg**

Complete and detailed calculations of vapor emission rates for the target compounds are provided in Appendix C. Assumptions and input parameters employed in these emission equations are discussed in the following paragraphs.

2. Pore Space Emissions of VOCs from Soil and Source Material Excavation

For soil saturated with trichloroethylene, the pore space emission rate (Er_{ps}) is defined as:

Equation 2

$$Erps = \frac{P\ MW\ 10^6\ E_a\ Q\ ExC}{RT}$$

where:

P	=	Vapor pressure of each chemical (mmHg)
MW	=	Chemical molecular weight (g/mole)
E_a	=	Air filled porosity (dimensionless)
Q	=	Excavation rate (m^3 of soil/day)
ExC	=	Soil-to-atmosphere exchange constant (dimensionless)
R	=	Universal gas constant (mmHg-cm^3/g-mole)
T	=	Temperature (°K)
10^6	=	Conversion factor (cm^3/m^3)

For unsaturated soils, the pore space emission rate Erps is defined as:

Equation 3

$$Erps = M\ x\ 0.33/tsv$$

where:

M	=	Total mass in grams of contaminant in a given volume of soil.
tsv	=	Time in seconds to excavate a given volume of soil.

The following assumptions were made in the estimation of pore space emissions.

- The value of air filled porosity (E_a) employed in all calculation is 0.35. This value is recommended by the Superfund Exposure Assessment Manual (SEAMs) for compacted soils.

- The volume of saturated soil which is used to estimate the excavation rate (Q = volume of soil excavated divided by the time from the start of excavation in seconds) is the volume of saturated soil expected to be excavated in one hour. A typical excavation rate of 30CY/hr was used. Therefore, Q is equal to 0.006 meters/sec. The total volume of saturated soil to be excavated is 11,000 m^3.

- The volume of unsaturated soil which is used to estimate the excavation rate (Q = volume of soil excavated divided by the time from the start of excavation in seconds) is the volume of saturated soil expected to be excavated in one hour. A typical excavation rate of 30 CY/hr was used. Therefore, Q is equal to 0.006 meters/sec. The total volume of unsaturated soil to be excavated is 27,230 m^3.

- The value of the soil-to-atmosphere exchange constant (ExC) is 0.33. This is the default supplied by the EPA's documentation for the excavation model.

- The temperature employed in the emission rate model is 299°K (78.5°F). This temperature is approximately the daily maximum average for the site area (NOAA, 1990).

- The average depth of excavation was calculated to be 3.7 meters. This depth was calculated based on the four most contaminated trichloroethylene sample depths (4 feet, 6 feet, 14 feet, and 18 feet) and the three most contaminated methylene chloride sample depths (10 feet,14 feet, and 18 feet). The averages of the trichloroethylene and methylene chloride depths were then averaged to calculate the overall average excavation depth.

- Time of excavation for saturated and unsaturated soils is one hour = 3600 seconds..

3. Diffusion of VOCs from Soil and Source Material Excavation

The emission rate in saturated and unsaturated soils due to diffusion is:

Equation 4

$$ER_{diff} = \frac{C \; 10{,}000 \; SA}{\frac{Ea}{K_{eq} \; k_g} + \left(\frac{\pi t}{D_e \; K_{eq}}\right)^{1/2}}$$

where:

C	=	Chemical concentration in soil (mg/Kg)
SA	=	Emitting surface area (m^2)
E_a	=	Air filled porosity (dimensionless)
K_{eq}	=	Equilibrium coefficient (dimensionless)
k_g	=	Gas-phase mass transfer coefficient (cm/sec)
D_e	=	Effective diffusivity in air (cm^2/sec)
t	=	time of excavation (sec)
π	=	3.1416

The following assumptions and variables are used in the estimation of emissions for diffusion (Er_{diff}):

- The average historical soil concentrations listed in Table 4-1 were used for the target compound concentrations in soil.

- The emitting surface area (SA) used in the unsaturated and saturated soil calculations is 6.2 m^2. This value was determined in each case by dividing the total soil volume by the average depth (3.7 m) and the number of hours to complete the excavation at a typical excavation rate of 30 CY/hr. For example, for saturated soils, the total soil volume is 11,000 m^3. At an excavation rate of 30 CY/hr (23 m^3/hr), the total time of excavation is approximately 480 hours. The exposed emitting surface area on an hourly basis is therefore (11,000/3.7) m^3, or 2,973 m^3, divided by 480 hours. This equals 6.2 m^2/hr.

- K_{eq} is the chemical specific equilibrium coefficient which is dependent on Henry's Law Constant and temperature (K_{eq} = H/RT). Calculated K_{eq} values are provided in Appendix C.

- The value of the gas-phase mass transfer coefficient (k_g) is 0.15 cm/sec. This value is supplied in the EPA's documentation for the excavation model.

- Effective diffusivity in air (De) values were estimated for each chemical included in emission calculations. The formula for calculating De is:

Equation 5

$$D_e = D_a \, x \, E_a^{3.33} / E_t^2$$

where:

D_a	=	Diffusivity of a chemical in air (cm^2/sec)
E_a	=	Air filled porosity (dimensionless) = 0.35
E_t	=	Total porosity = 0.35

Values for Da were obtained from the U.S. EPA's Air/Superfund National Technical Guidance Study Series.

FINAL

FIELD SAMPLING DATA SHEET

A. General Information

- Site Name/Location: _____
- Sampling Date: _____
- Shipping Date: _____
- Sampling Station ID: _____
- Canister ID: _____
- Canister Cleaning Certification: _____
- Sampler No.: _____
- Field Operator: _____

B. Sampling Information

- Type of Sample: _____
- Sampling Flow Rate, cm^3/min: _____
- Clock time
  Start, Hrs: ____ Stop, Hrs: ____ Min Elapsed: ____
- Pressure Gauge Reading
  Start, mm Hg: ____ Stop, mm Hg: ____
- Ambient Temperature
  Start, °C: ____ Stop, °C: ____
- Barometric Pressure
  Start, mm Hg: ____ Stop, mm Hg: ____

FINAL

FIELD SAMPLING DATA SHEET

C. Laboratory Information

- Data Received: _____
- Received By: _____
- Analysis Method: _____
- Date of Analysis: _____
- Analyzed By: _____
- Results: _____

_____

_____

D. Comments

_____

_____

_____

DEPARTMENT OF THE ARMY
U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE
ABERDEEN PROVING GROUND, MARYLAND 21010-5422

017423

REPLY TO
ATTENTION OF

APR 22 1996

MCHB-DC-EHR (40)

MEMORANDUM FOR District Engineer, U.S. Army Engineering District, Tulsa, ATTN: CESWT-PP-EA/Ms. Jonna Polk, Post Office Box 61, Tulsa, OK 74121-0061

SUBJECT: Review of the Laboratory Data Validation Report for the Phase 2, Group 2 Sites, Remedial Investigation at the Longhorn Army Ammunition Plant (LHAAP), Karnack, TX, March 1996

1. The U.S. Army Center for Health Promotion and Preventive Medicine reviewed the subject document on behalf of the Office of The Surgeon General. A comment and recommendation is enclosed.

2. The scientists reviewing this document were Mr. Mark A. Dossey, Environmental Health Risk Assessment and Risk Communication Program; Mr. Curtis Oliver, Chromatographic Analysis Division; and Ms. Angel D. Christman, Radiologic, Classic and Clinical Chemistry Division. Our point of contact is Mr. Dossey at DSN 584-7282 or commercial (410) 612-7282.

FOR THE COMMANDER:

Arthur P. Lee

Encl

ARTHUR P. LEE, P.E.
MAJ, MS
Program Manager, Environmental Health Risk Assessment and Risk Communication

CF:
HQDA (DASG-HS-PE) (w/o encl)
CDR, USAMEDCOM, ATTN: MCHO-CL-P (w/encl)
CDR, CEMRD, ATTN: CEMRD-ET-EH (w/encl)
CDR, USAEC, ATTN: SFIM-AEC-IRP (w/encl)
CDR, LHAAP, ATTN: SMCLO-EN (w/encl)

Readiness thru Health

Specific Comment

017424

1. Page 21, Table 3.2-2, C. Oliver

LHAAP Phase 2, Group 2 Sites RI Primary and QC Results, Ground Water and Surface Water Analysis Explosive Compounds

Comment: The qualifier for 1,3,5 - Trinitrobenzene for the primary sample of 16WW08 is not consistent with the result.

Recommendation: Change the qualifier to "J" if the result found is actually 0.68 ug/L.

Encl

Barry R. McBee, *Chairman*
R. B. "Ralph" Marquez, *Commissioner*
John M. Baker, *Commissioner*
Dan Pearson, *Executive Director*

017425

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

April 29, 1996

CERTIFIED MAIL
P 836 900 434
RETURN RECEIPT REQUESTED

James A. McPherson, Commander's Representative
Longhorn/Louisiana Army Ammunition Plant
Attn: SIOLH-CR
P.O. Box 30058
Shreveport, LA 71130-0058

Re: Longhorn Army Ammunition Plant -
Group 4, Wastewater Sumps

Dear Mr. McPherson:

During the April 2, 1996 project managers' meeting at the Longhorn Army Ammunition Plant (LHAAP), Army and Thiokol Corporation staff raised a number of questions regarding closure and remediation of the wastewater sumps (Group 4). As requested by the Army, Texas Natural Resource Conservation Commission (TNRCC) staff have discussed the various issues in question, and offer the following comments:

Question #1: Can the Army separate the RCRA and non-RCRA sumps for the purposes of closure of the sumps?

Comment: The approved Closure Plan does not distinguish between RCRA and non-RCRA sumps. The Army may submit an amended Closure Plan for TNRCC review and approval, and may identify which sumps must meet RCRA closure standards, and which sumps must only meet those requirements of 30 TAC §335.8 that do not apply to hazardous waste facilities. The Army must submit documentation to support its decision for each sump. This documentation should include dates used (*i.e.*, whether the sump received hazardous waste after November 19, 1980), wastes which were managed in the sumps (*i.e.*, hazardous waste or non-hazardous waste; and if hazardous, whether the hazardous waste was listed or exhibited a 40 CFR Subpart C characteristic), and the hazardous waste determination for wastes currently present in each sump.

Question #2: Can wastes removed from the sumps during closure be stored, treated and disposed in the CERCLA units (*i.e.*, the soil and wastewater treatment units being constructed at Burning Ground No. 3 and/or Landfills 12 and 16)?

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017426

Comment: The approved Closure Plan generally calls for waste classification and subsequent disposal of hazardous waste off-site. The non-hazardous wastes may be treated and disposed in the CERCLA units, providing that the Army, EPA, and TNRCC CERCLA project managers concur that this activity would not be inconsistent with the Records of Decision for the proposed units. The hazardous wastes must be managed in facilities which have permits or other authorization for management of hazardous waste, or are exempt from the permit requirement (i.e., 30 TAC §335.69). Section 120(I) of CERCLA and Provision II.B. of the Federal Facility Agreement for LHAAP clearly indicate that hazardous wastes from the sumps closure must comply with all RCRA requirements, including permit requirements. The treatment units which are being constructed for treatment of CERCLA wastes and the landfills which are being investigated and remediated under CERCLA do not have permits for management of hazardous waste under RCRA. It is possible that certain portions of the CERCLA waste treatment facility could be exempt from the permit requirement in accordance with 30 TAC §335.69, but hazardous waste (including residue from treatment of listed hazardous waste) may not be disposed in the CERCLA landfills.

Question #3: Can the sumps construction materials be declared "debris" and placed in the CERCLA landfills?

Comment: The approved closure plan calls for decontaminating the sumps and leaving them in place, or removing them and disposing of them off-site if they cannot be decontaminated of hazardous waste residue. The Army may submit an amended Closure Plan for TNRCC review and approval which specifies that if construction materials from the RCRA sumps are treated to the standards specified in 40 CFR §268.45(c), they may be declared non-hazardous wastes and disposed on-site (*i.e.*, in the CERCLA landfills, providing that the Army, EPA, and TNRCC CERCLA project managers concur that this activity would not be inconsistent with the Records of Decision for the proposed units). The Army should pay particular attention to the specific requirements found in 40 CFR §268.45(c) (*e.g.*, the requirement to remove at least 0.6 cm of the surface layer and the definition of "clean debris surface" if the abrasive blasting method of treatment is to be proposed), and ensure that the amended closure plan provides adequate provisions for compliance with these requirements. Additionally, the state's requirements for waste classification and disposal of non-hazardous solid waste would still apply (*e.g.*, 30 TAC §335 Subchapter R - "Waste Classification").

Question #4: Can the sumps be left in place under the TNRCC Risk Reduction rules?

Comment: The approved closure plan includes the options of decontaminating the sumps and leaving them in place, or removing them and disposing of them off-site if they cannot be adequately decontaminated. Non-RCRA sumps (see comment to question #1) may be left in place if they satisfy the requirements of 30 TAC 335 Subchapter S. The RCRA sumps would still have to meet RCRA closure standards (*i.e.*, either be removed or decontaminated). The Army may use risk reduction standard No. 2 in 30 TAC 335 Subchapter S to demonstrate that the sumps have been

017427

"decontaminated". In accordance with our previous agreement, all other remediation/corrective action including soil and ground water investigation and remediation will be conducted in accordance with the terms and conditions of the Federal Facility Agreement.

Question #5: Can the filter press portion of the pilot wastewater treatment plant ("PWTP") be used to dewater wastes from the sumps?

Comment: The approved closure plan calls for treating non-hazardous wastewater in the PWTP and shipping hazardous wastes to a permitted off-site disposal facility. In order for hazardous wastes to be treated in the PWTP, the Army must comply with the requirements of 30 TAC §335.69 for that unit. Assuming that the PWTP is a tank system, 30 TAC §335.69 also requires that the Army comply with 40 CFR Part 265 Subpart J, except 40 CFR §265.197(c) and §265.200. Our records indicate that the PWTP is not currently in compliance with 40 CFR §265.191 ("Assessment of existing tank system's integrity") and §265.193 ("Containment and detection of releases"). Additionally, Provisions #1 and #3 of the TNRCC Order, effective December 4, 1995, require that the PWTP be closed and that the Army cease discharging hazardous waste to the PWTP without authorization. A closure plan for the PWTP was approved by TNRCC on March 4, 1996, but we have not yet received a closure certification for this unit. All of the above requirements must be met before the PWTP can be used for storage or treatment of hazardous waste.

As we discussed during the April project managers' meeting, the Army will need to submit an amended closure plan for TNRCC review and approval if any changes to the approved closure plan are made. We will attempt to review and respond to any proposed amendments submitted by the Army as quickly as our work load allows; however, it is recommended that the Army ensure that it has received **written** concurrence or approval from the appropriate TNRCC staff prior to deviating from the approved closure plan (including the closure schedule), in order to prevent violation of the TNRCC order or solid waste rules. If you have any further questions regarding this matter please call me at (512) 239-2483.

Sincerely,

Michael Moore
Assistant Project Manager (MC-143)
RI/FS II Unit
Superfund Investigation Section
Pollution Cleanup Division

cc: Chris Villarreal, EPA Region 6 (6SF-AT)
Jonna Polk, COE Tulsa District (CESWT-PP-EA)

Monthly Manager's Meeting
Longhorn Army Ammunition Plant
May 7, 1996
Dallas, TX

017428

1. The following is a list of participants:

Ira Nathan - LHAAP
Darrell Chinn - LHAAP
Ghassan Khoury - EPA
Bud Jones - TNRCC
Dudley Beene - Eastern Area Office, USACE
Ken Kebbell - Tulsa District, USACE
Randel Mead - Tulsa District, USACE
Glen Turney - OHM Corp.
David Tolbert - LHAAP
Chris Villarreal - EPA
Diane Poteet - TNRCC
Jim Carter - Eastern Area Office, USACE
Jonna Polk - Tulsa District, USACE
Cliff Murray - Tulsa District, USACE
Cyril Onewokae - HQ, IOC

2. The following is a list of topics discussed:

Opening Remarks and Review and Transmittal of Meeting Minutes: On behalf of LHAAP, Ira Nathan and David Tolbert welcomed all attendees to the May 1996 Monthly Manager's Meeting held at EPA's office in Dallas, TX. The April 1996 meeting minutes were reviewed and accepted without revision or comment.

Restoration Advisory Board (RAB): Only 4 applications were received by LHAAP in response to the public meeting held to discuss formation of the RAB. Due to the very small number of applicants, which is not sufficient to staff a RAB, LHAAP has notified the TNRCC, EPA, and all applicants that a RAB cannot be formed.

Sumps Removal: Waste disposal and sampling issues concerning the Group 4 Sumps Removal Project were discussed. LHAAP submitted a letter on 11 April to Lila Beckly with the TNRCC requesting that LHAAP be allowed to deviate from the approved closure plan in order to dispose of sump material and the contents of any sump on Landfill 16 (as long as it is under RRS 2 standards) as a cost saving measure. In order to do this, it would be necessary for LHAAP to re-classify the status of the sumps from RCRA to CERCLA for waste disposal purposes. A response from the TNRCC is expected in approximately four weeks. During this time, sampling and analysis of the sump contents will proceed. Following completion of the CDAP and SSHP by OHM in late May, sampling of sump contents will begin. A meeting will be held prior to any sampling activities at LHAAP to review sampling procedures to ensure that TNRCC technical and regulatory requirements are met.

Burning Grounds: Jim Carter (EAO) reported that parts and equipment for the groundwater treatment unit and storage tanks have begun to arrive on site and that deliveries will be complete in 4-6 weeks. Operational testing of the system is expected to commence in late June or early July. Covers for the pre and post treated soil stockpiles have also been ordered. The soil treatment unit is still expected on-site and to be operational by this August.

Group 1 Risk Assessment (RA) and Final RI Report: EPA stated that additional 0-6" surface soil samples and possibly additional groundwater and subsurface soil samples may be required to make the RA acceptable. EPA and TNRCC risk assessors will meet at LHAAP to tour the Group 1 sites and to develop specific plans that address data gaps. Due to the delay in finalizing the RA , the scheduled submission of the Final RI Report and Draft Proposed Plan may be delayed. The Group 1 schedule will be re-evaluated after the RA meeting at LHAAP.

Landfill 16 Work plan TNRCC and EPA Review Comments: OHM, Tulsa District, and Eastern Area Office representatives reviewed work plan revisions made in response to TNRCC and EPA comments. Nearly all regulator comments were adequately addressed. TNRCC proposed one additional meeting to resolve outstanding issues and finalize the work plan.

LHAAP Future Land Use Letter: TNRCC will submit an official agency request to the Army for a determination of future land use at LHAAP.

Perimeter Well Quarterly Sampling and Analysis Report: Prior to submission to the group, the report findings were reviewed. Based on the absence of any contamination, the group recommended that the perimeter well's sampling schedule be changed from quarterly to bi-annually. As a result, the Perimeter well report was withheld to make this change and will be submitted at a later date.

Landfill 16 TCRA Groundwater Control System Update: Pumping of the two well groundwater extraction system is continuing as scheduled. The TCRA Design Analysis Report will be submitted on 15 April. In order to expedite the decision-making process, the group agreed to a shortened review period and to meet at the end of May at Sverdrup's office to review data, address comments, and agree on an appropriate action.

Landfill 16 "Yellow Water": General discussion; LHAAP stated that regardless of whether the yellow color is toxic or not they want to ensure that the color is removed during the treatment process prior to discharge in Harrison Bayou. DOW Environmental has been tasked to evaluate the effect of mixing LF-16 and BG-3 waters on the groundwater treatment system and to conduct treatability and aquatic bio-toxicity (if required by the TNRCC) studies.

Monthly Meeting Schedule: The next monthly managers meeting will be held on 4 June, in conjunction with the next TRC, at LHAAP. The TRC will be held on the morning of the 4th and the managers meeting will be held in afternoon.

Barry R. McBee, *Chairman*
R. B. "Ralph" Marquez, *Commissioner*
John M. Baker, *Commissioner*
Dan Pearson, *Executive Director*

017430

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

May 13, 1996

CERTIFIED MAIL
P 836 901 705
RETURN RECEIPT REQUESTED

James A. McPherson, Commander's Representative
Longhorn/Louisiana Army Ammunition Plant
Attn: SIOLH-CR
P.O. Box 30058
Shreveport, LA 71130-0058

Re: Longhorn Army Ammunition Plant
Future Land Use Determination

Dear Mr. McPherson:

In response to the Army's request, which was made at the May 7, 1996 project manager's meeting, the Texas Natural Resource Conservation Commission (TNRCC) is providing this letter regarding future land use determination. During the January 1996 project managers' meeting in Tulsa, Oklahoma, and in a letter to the Army dated January 25, 1996 regarding comments on the Group 1 Risk Assessment, the TNRCC requested that future land use scenarios at the Longhorn Army Ammunition Plant be established in order to facilitate the remedial investigation (RI) process in accordance with state and federal regulations. TNRCC regulations found at 30 TAC §335.8 (a) (2) and §335.563 (e) require that for sites subject to 30 TAC Subchapter K (state "superfund"), media cleanup levels be based on a future residential land use unless a person demonstrates, to the satisfaction of the Executive Director, that another land use scenario is appropriate. A discussion regarding criteria for justifying alternate land use is presented in Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (EPA/540/1-89/002) (RAGS), Chapter 6, Section 6.2.2.

Supporting documentation, using the above-referenced TNRCC regulations and EPA guidance, regarding the anticipated future land use at the site must be submitted for consideration by the Superfund Investigation Section so that we can reach agreement on this issue. Until such time that an agreement is reached, the future land use is considered by default to be residential.

This supporting documentation may include, but is not limited to, letters/communications from the city planners and the Census Bureau which have information on population growth and projections, copies of comprehensive community master plan, and copies of applicable zoning laws and maps. The accessibility of the site to existing public utilities, current institutional controls in place at the site, and the site's relative location to residential, industrial, commercial, urban, suburban, agricultural and

017431

recreational areas can be documented as well. Historical information can be used to document past use of the site. The EPA's directive on "Land use in the CERCLA Remedy Selection Process," which has also been provided to the Army, presents additional information for considering land use in making remedy selection decisions under CERCLA at National Priorities List (NPL) sites.

If you have any further questions regarding this matter please call me at (512) 239-2502.

Sincerely,

Diane R. Poteet

Diane R. Poteet
Project Manager (MC-143)
RI/FS II Unit
Superfund Investigation Section
Pollution Cleanup Division

cc: Chris Villarreal, EPA Region 6 (6SF-AT)
Jonna Polk, COE Tulsa District (CESWT-PP-EA)

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

017432

May 15, 1996

CERTIFIED MAIL: RETURN RECEIPT REQUESTED - P 373 363 907

James A. McPherson, Commander's Representative
Longhorn/Louisiana Army Ammunition Plants
Attn: SIOLH-CR
P.O. Box 30058
Shreveport, LA 71130-0058

Re: Longhorn Army Ammunition Plant
Interim Remedial Action - Landfills 12 & 16 Caps
Draft Final Project Work Plans and
Interim Remedial Action - Burning Ground No. 3
Final Air Monitoring Plan

Dear Mr. McPherson:

In accordance with the Federal Facility Agreement for the Longhorn Army Ammunition Plant, the Environmental Protection Agency (EPA) has reviewed the April 30, 1996 Draft Final Project Work Plans for the Interim Remedial Action - Landfills 12 & 16 Caps (work plans). Based upon this review, the EPA has no additional comments on the work plans. All of the EPA's previous comments on the draft work plans have been adequately addressed.

The EPA has also reviewed the April 16, 1996 Final Air Monitoring Plan for the Interim Remedial Action - Burning Ground No. 3 (air monitoring plan). Based upon this review, the EPA has no additional comments on the air monitoring plan. All of the EPA's previous comments on the draft air monitoring plan have been adequately addressed.

If you have any questions about this or any other matter, please contact me at (214) 665-6758.

Sincerely,

Chris G. Villarreal

Chris G. Villarreal
Remedial Project Manager
Superfund Division

Recycled/Recyclable • *Printed with Vegetable Oil Based Inks on 100% Recycled Paper (40% Postconsumer)*

017433

cc: David Tolbert - via facismile
Longhorn/Louisana Army Ammunition Plant
P.O. Box 30058
Shreveport, LA 71130-0058

Jonna Polk
Tulsa District Core of Engineers
P.O. Box 61
CESWT-PP-E
Tulsa, OK 74121-0061

Alvie Nichols
Texas Natural Resource Conservation Commission
Pollution Cleanup Division
Superfund Engineering Section MC144
P.O. Box 13087
Austin, Texas 78711-3087

Barry R. McBee, *Chairman*
R. B. "Ralph" Marquez, *Commissioner*
John M. Baker, *Commissioner*
Dan Pearson, *Executive Director*

017434

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

May 16, 1996

CERTIFIED MAIL
P 836 901 727
RETURN RECEIPT REQUESTED

James A. McPherson, Commander's Representative
Longhorn/Louisiana Army Ammunition Plant
Attn: SIOLH-CR
P.O. Box 30058
Shreveport, LA 71130-0058

Re: Longhorn Army Ammunition Plant
Group 1 Sites
Draft Final Remedial Investigation Report

Dear Mr. McPherson:

The Texas Natural Resource Conservation Commission (TNRCC) staff has completed their review of the above referenced document, which was received on April 16, 1996. Our comments are enclosed. If you have any questions or comments regarding this matter please call me at (512) 239-2502.

Sincerely,

Diane R. Poteet

Diane R. Poteet
Project Manager (MC-143)
RI/FS II Unit
Superfund Investigation Section
Pollution Cleanup Division

enclosure

cc: Chris Villarreal, EPA Region 6 (6SF-AT)
Jonna Polk, COE Tulsa District (CESWT-PP-EA)

Longhorn Army Ammunition Plant - Group 1 Sites
Draft Final Remedial Investigation Report
TNRCC Comments

017435

No.	Subject	Comment
1	General	In accordance with the Federal Facility Agreement VIII.G.5., the TNRCC requests that the Army provide responses to our comments provided on November 14, 1995 regarding the Group 1.
2	Background Concentrations	In the Environmental Protection Agency's (EPA's) comments dated November 1, 1995, Comment #7 under Special Comments, the request was made that Upper Conference Levels (UCLs) be used for comparison purposes and not ranges for metal concentrations. In our comment letter, dated November 14, 1995, we concurred with EPA's comments. The relevancy of this issue has been discussed in several past meetings, and we again support the use of UCLs. In particular, the use of ranges for arsenic are inappropriate because the upper maximum concentration was established to be 7.0 mg/kg.
3	Typos	a. Page 8-6, last sentence referenced "Appendix ?" for the location of all groundwater grab samples data. There is no Appendix ?. b. Page 8-8, the second to last sentence needs a period instead of a comma to end it. c. Please check for other errors.

END

Barry R. McBee, *Chairman*
R. B. "Ralph" Marquez, *Commissioner*
John M. Baker, *Commissioner*
Dan Pearson, *Executive Director*

017436

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

May 17, 1996

CERTIFIED MAIL
P 836 901 072
RETURN RECEIPT REQUESTED

James A. McPherson, Commander's Representative
Longhorn/Louisiana Army Ammunition Plant
Attn: SIOLH-CR
P.O. Box 30058
Shreveport, LA 71130-0058

Re: Longhorn Army Ammunition Plant
Group 2 - Interim Remedial Action at Landfill Sites 12 &16
Draft Final Project Work Plans

Dear Mr. McPherson:

The Texas Natural Resource Conservation Commission (TNRCC) staff has completed their review of the above referenced document, which was received on May 2, 1996. Our comments are enclosed. If you have any questions or comments regarding this matter please call me at (512) 239-2502.

Sincerely,

Diane R. Poteet

Diane R. Poteet
Project Manager (MC-143)
RI/FS II Unit
Superfund Investigation Section
Pollution Cleanup Division

enclosure

cc: Chris Villarreal, EPA Region 6 (6SF-AT)
Jonna Polk, COE Tulsa District (CESWT-PP-EA)

Draft Final Project Work Plans
Interim Remedial Action - Landfills 12 & 16 Caps
Longhorn Army Ammunition Plant Superfund Site

Superfund Engineering Section's Comments (Alvie L. Nichols)

Comments to the April 30, 1996 document

No.	Section / Page	Comment
4	Section 7.8.3 and 7.9.3 / Page 22 and 26	ROD states that liners will include a sodium bentonite geocomposite liner and a geosynthetic membrane liner. Explain difference from the GCL/FML mentioned in this Work Plan. Also provide cross-section drawing of landfill cap. USACE response stated that Paragraph 3.2 of the Feb 15, 1996 plans discuss the liner system alternatives. **This response is not adequate. Any differences from the ROD require an explanation. Also, several terms seem to be mixed between the plans and the specs, but may have the same meaning (e.g. Geosynthetic liner, geocomposite liner, geomembrane, flexible membrane liner, etc.) Please clarify terms for consistency, and use only one term if possible.**
2	Fig 3-1/ Page 7	Clayey coversoil? **This comment was provided to generate discussion in the monthly manager's meeting on 3/26/96. There is conflict between Project Specifications (Appendix G), Section 02221, paragraph 2.1.1 and the US Army Corps of Engineers Checklist for Landfill Cover Design Omaha District (May 1993), Page 11 and 12. The conflict is between the Specifications for coversoil and topsoil. Also notice that the definitions of coversoil and topsoil between the two are different. Please review this Checklist and resolve.**
4	Section 6.4.2/Page 14	"Storm water that falls within the exclusion zones will be contained within the bermed areas and allowed to evaporate". Discuss in more detail. Where are these exclusion zones? USACE response was that "exclusion zones will surround the areas where treated contaminated soil is stockpiled, and where it is placed prior to being covered by the cap." **Exclusion zones are supposed to be areas of highest contamination. Please resolve.**
5	Landfill Drawings	All Final Plans require Professional Engineer's seal and signature. Refer to Texas Engineering Practice Act for specific requirements. **In addition, §131.138 (8) of this Act (Rev.1-01-96) specifies requirements for non-final documents.**

017437

No.	Section / Page	Comment
7	Landfill Drawings LHAAP 16 Final Grading Plan (Sheet C17)	Please show the perimeter drainage around the new landfills and the drainage route to Central Creek and Harrison Bayou. etc. Show locations/dimensions of Storm water berms. Also show plans for drainage, drain swales, etc. USACE response was "changes will be made in revised Draft Final plans". **Where are these plans? Are they the same as the Draft Final Project Work Plans? If so, then these comments have not been adequately addressed in this submittal. Many of these comments still apply.**
8	Landfill Drawings (Sheet C17)	Need to show 100 year floodplain boundary. What are the contingency plans for the 100 year flood? {Ref: 40 CFR 264.18(b)} **Arrow points to the side of the landfill. Boundary still not shown.**
13	Fig 7-7/Page 28	Between station 7 and 9 there is over 100 ft with 0 slope. All landfills must have some slope throughout to eliminate ponding. Also show additional cross-sections of the landfills to fully describe landfill slopes and show areas of highest slopes with erosion protection. **USACE responses showed cross-sections but did tell what the slopes will be. This comment still applies.**
14	Section 7.14, Page 33	For monitoring wells that will be plugged and abandoned. How will you dispose of well casing, etc. Where is the P&A task identified on the Timeline? USACE response was that P& A will be added to the schedule in Figure 6-1. **Figure 6-1 still does not show the P&A. This comment still applies. If P&A is not shown as a separate "Act Descrip" on the timeline, an explanation of which "Act Descrip" includes P&A would be adequate.**

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ADDITIONAL COMMENTS (Issues discussed at the March 26, 1996 meeting)

No.	Section / Page	Comment
1A	Appendix F, Page 2, Section 1.2 Disposal Methods	Change spec to state that no construction materials shall be within 3 feet of the subgrade.
2A	Appendix G, Section 02444 Subgrade Layer	What are the other standards?: Hydraulic conductivity shall be no more than 10^{-5} cm/sec, no rocks larger than 2 inches and rolled smooth Also provide specifications for "select waste:" What depth? No construction debris?.
3A	Appendix H Sheet C-18	40 Mil Geomembrane conflicts w/ Sheet C-20. Please clarify.
4A	Appendix H Sheet C-20	TNRCC considers 40 mil appropriate, and 20 mil to thin to reliably weld. In addition the Corps of Engineers Checklist states this requirement (Page 19). Justify why 20 mil Geomembrane is adequate. In the cross-section drawing please provide all layers of landfill cap system including "select waste," "regular waste" and select fill above the cover soil.

017439

FINAL PROJECT WORK PLANS

017440

REMOVAL AND CLOSURE OF WASTEWATER SUMPS
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Prepared for:

U.S. Army Corps of Engineers
Fort Worth District
280 Miller Road
Bossier City, LA 71112-2505

Prepared by:

OHM Remediation
Services Corp.

225 W. Airtex Boulevard
Houston, Texas 77090
Tel: 713-775-7500 and Fax: 713-775-7639

May 20, 1996

TERC Contract No. DACA56-94-D-0020
Delivery Order No. 0015 - OHM Project No.18675

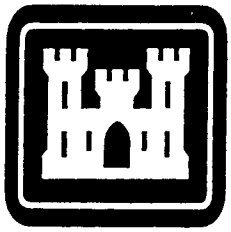
FINAL

017441

SITE WORK PLAN

REMOVAL AND CLOSURE OF WASTEWATER SUMPS LONGHORN ARMY AMMUNITION PLANT (LHAAP) KARNACK, TEXAS

Prepared For



U. S. Army Corps of Engineers
Fort Worth District
280 Miller Road
Bossier City, LA 71112-2505

Prepared By



OHM Remediation Services Corp.
A Subsidiary of OHM Corporation

225 West Airtex Boulevard
Houston, Texas 77090-6627

May 21, 1996

TERC No. DACA56-94-D-0020, D.O. No. 0015
OHM Project No. 18675

FINAL

SITE WORK PLAN

REMOVAL AND CLOSURE OF WASTEWATER SUMPS

LONGHORN ARMY AMMUNITION PLANT (LHAAP)

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ACRONYMS AND ABBREVIATIONS

AJ	Amber Jug
ALARA	As Low As Reasonably Achievable
ARARs	Applicable or Relevant and Appropriate Requirements
BMPs	Best Management Practices (BMPs)
C	Centigrade
CAR	Corrective Action Report
CDAP	Chemical Data Acquisition Plan
CDRL	Contract Data Requirements Lists
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulation
CIH	Certified Industrial Hygienist
COC	Chain-of-Custody
CQCP	Contractor Quality Control Plan
CQCSM	Contractor Quality Control System Manager
CQMP	Contractor Quality Management Plan
CRZ	Contamination Reduction Zone
CWM	Clear Wide Mouth
DO	Delivery Order
DOT	Department of Transportation (US)
DQCR	Daily Quality Control Reports
EC	Emergency Coordinator
EPA	Environmental Protection Agency (US)
ERCP	Emergency Response and Contingency Plan
EZ	Exclusion Zone
FS	Field Sample
GC	Gas Chromatography
GCL	Geocomposite Clay Liner
HE	High Explosive
HSO	Health and Safety Officer
IATA	International Air Transportation Association
IDLH	Immediately Dangerous to Life or Health
LCS	Laboratory Control Sample
LEL	Lower Explosive Limit
LEPC	Local Emergency Planning Committee
LHAAP	Longhorn Army Ammunition Plant
LLDPE	Linear Low-Density Polyethylene
LQMP	Laboratory Quality Management Plan
MS	Matrix Spike
MSD	Matrix Spike Duplicate
MSDS	Material Safety Data Sheets
NCTCOG	North Central Texas Council of Governments

ACRONYMS AND ABBREVIATIONS

OHM	OHM Remediation Services Corporation
OSHA	Occupational safety and Health Administration
OVA	Organic Vapor Analyzers
OZ	Ounce
PARCC	Precision, Accuracy, Representativeness, Comparability, Completeness
PEP	Propellant, Explosives and Pyrotechnics
PID	Photoionization Detector
PM	Project Manager
POC	Point-of-Contact
PPB	Parts per Billion
PPE	Personal Protective Equipment
PPM	Parts per Million
PS	Project Superintendent
PSSO	Project Site Safety Officer
QA	Quality Assurance
QAR	Quality Assurance Representative
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RQ	Reportable Quantity
RT	Recovery Technician
SSHP	Site Safety and Health Plan
SOP	Standard Operating Procedure
SQCR	Sample Quality Control Report
SRM	Standard Reference Material
SVOCs	Semi-Volatile Organic Compounds
SWDL	Southwest Division Laboratory
SWMP	Site Waste Management Plan
SZ	Support Zone
TAL	Target Analyte List (metals)
TAT	Turn-Around-Time
TERC	Total Environmental Restoration Contract
TLV	Threshold Limit Value
TSCA	Toxic Substances Control Act
UNS	United Nations Standards
USACE	United States Army Corps of Engineers
VOCs	Volatile Organic Compounds

FINAL

SITE WORK PLAN
REMOVAL AND CLOSURE OF WASTEWATER SUMPS
LONGHORN ARMY AMMUNITION PLANT (LHAAP)

1.0 INTRODUCTION

The United States Army Corps of Engineers (USACE) has contracted OHM Remediation Services Corp. (OHM) to remove and close wastewater sumps at Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas. The project includes:

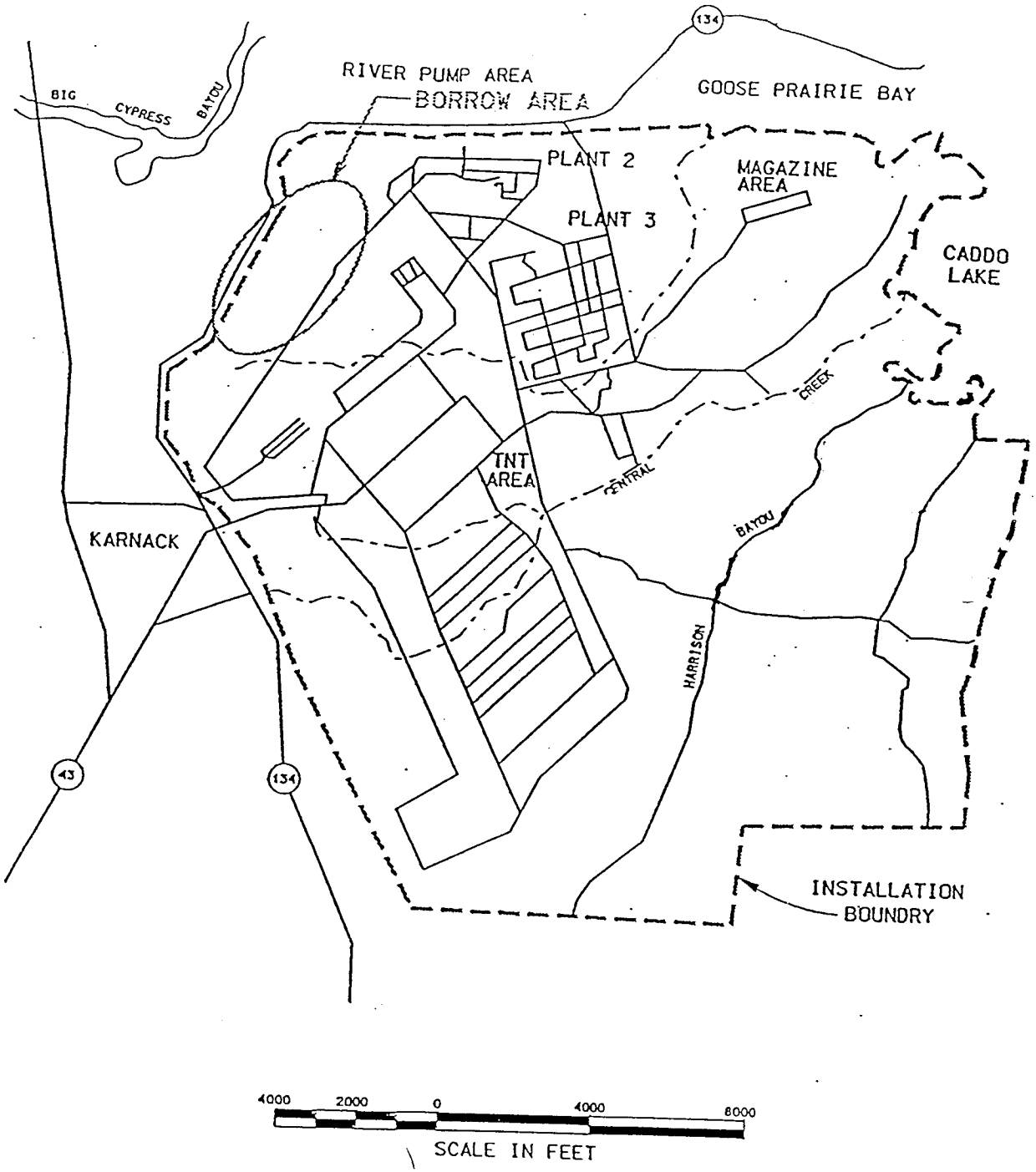
- Sampling and characterization of sump contents,
- Removal and disposition of sump contents,
- Decontamination and disposition of the sump structures,
- Certification of sump closures,
- Additional confirmation sampling as directed by USACE

2.0 SITE INFORMATION

LHAAP is located in central east Texas in the northeast corner of Harrison County 40 miles west of Shreveport, Louisiana, and approximately 14 miles northeast of Marshall, Texas, as shown in **Figure 2-1**. The installation occupies 8,493 acres between State Highways 43 and 134 (western and northern boundaries, respectively) and the western shore of Caddo Lake.

Manufacturing areas at LHAAP were washed down with water to reduce propellant, explosives and pyotechnics (PEP) dusts which would otherwise collect and pose a safety hazard. Water de-activates ignition-sensitive compositions. To dissolve difficult binders, chlorinated solvents were also utilized in the cleanup of manufacturing areas. These solvents and PEP compositions were washed into sumps with large volumes of water. The wastewater sumps typically collect a large volume of water and PEP sludge from building washdown.

017446



OHM Remediation Services Corp. HOUSTON, TEXAS A SUBSIDIARY OF OHM CORPORATION			U.S. ARMY CORPS OF ENGINEERS
			TULSA DISTRICT
DRAWN BY	O.C.GALINDO	5/01/96	
CHECKED BY	W. McCULLOUGH	5/01/96	
FILE:	8X11BOR.DWG	-	
REV. 0	SHEET 1	PROJECT NO. 18675	TERC CONTRACT DACA 56-94-D-0020 SUMP SAMPLING PROJECT
			DELIVERY ORDER 0012 LHAAP, KARNACK, TEXAS

FIGURE 2-1

VICINITY MAP

PREPARED FOR LONGHORN ARMY AMMUNITION PLANT

3.0 PROJECT SCOPE

3.1 Regulatory Requirements

LHAAP offered to perform an approved RCRA closure of these sumps in response to allegations by TNRCC in 1991 that the sumps should be regulated as RCRA hazardous waste tanks. The regulatory requirements for closure of the sumps are described in the Closure Plan dated May, 1995, **Appendix F** and approved by TNRCC. The approved closure procedure includes:

- Sampling and analysis of sump contents,
- Removal and containerization of sump contents,
- Decontamination of sump surfaces,
- Decontamination of equipment,
- Internal visual inspection of sumps,
- Determination of sump disposition,
- Certification of closure actions

All sludge from wastewater treatment operations is listed as an EPA K044 hazardous waste. The sludge in the bottoms of the sumps is considered by LHAAP to be K044 waste as well. This is not to imply that the sludge will be disposed of only as a K044 waste. Other hazardous waste codes and land disposal restrictions will apply to the sludge as appropriate.

A portion of these sumps have contained F-listed solvents. The F-listed designation stems from the historical discharge of compounds such as methylene chloride and 1,1,1-trichloroethane into sumps. F-listed solvents are no longer discharged into process wastewater sumps. The K044 sludge and wastewater from sumps will carry the F001 land disposal restriction if analysis reveals detectable quantities of F-listed solvents.

All manufacturing area sumps will be screened for hazardous constituents. Sumps that are likely to contain unusual hazardous constituents will have additional analyses performed. CDAP, Table 4-1 and Attachment C. Appendix IX of the Closure Plan list analytical methods for all sumps requiring additional analysis.

Most of the sumps are of underground concrete construction that have a potential for release of waste materials into the environment because of the presence of structural joints. Some sumps were "closed" previously and are filled with sand. At least two "closed" sumps were capped with concrete. There is one metal aboveground sump in use. Appendix VIII of the Closure Plan lists the waste sump characteristics.

Sampling will include one water sample, one composite (except for those collected for volatile analysis) sludge sample, and one composite (except for those collected for volatile analysis) of concrete from each sump. A composite sample will be collected from the sand in "closed" sumps. Sampling and analyses are described in the Chemical Data Acquisition Plan (CDAP) in **Appendix D**.

4.0 PRE-CONSTRUCTION SUBMITTALS

OHM will prepare and submit the following documents prior to starting work on-site:

- Site Work Plan (SWP)
- Site Safety and Health Plan (SSHP)
- Contractor Quality Control Plan (CQCP)
- Chemical Data Acquisition Plan (CDAP)
- Site Waste Management Plan (SWMP)

5.0 PROJECT ORGANIZATION

The OHM organization for this project consists of the Management and Support Team in Houston, Texas, and the Field Team at LHAAP, Karnack, Texas. The key personnel are as follows:

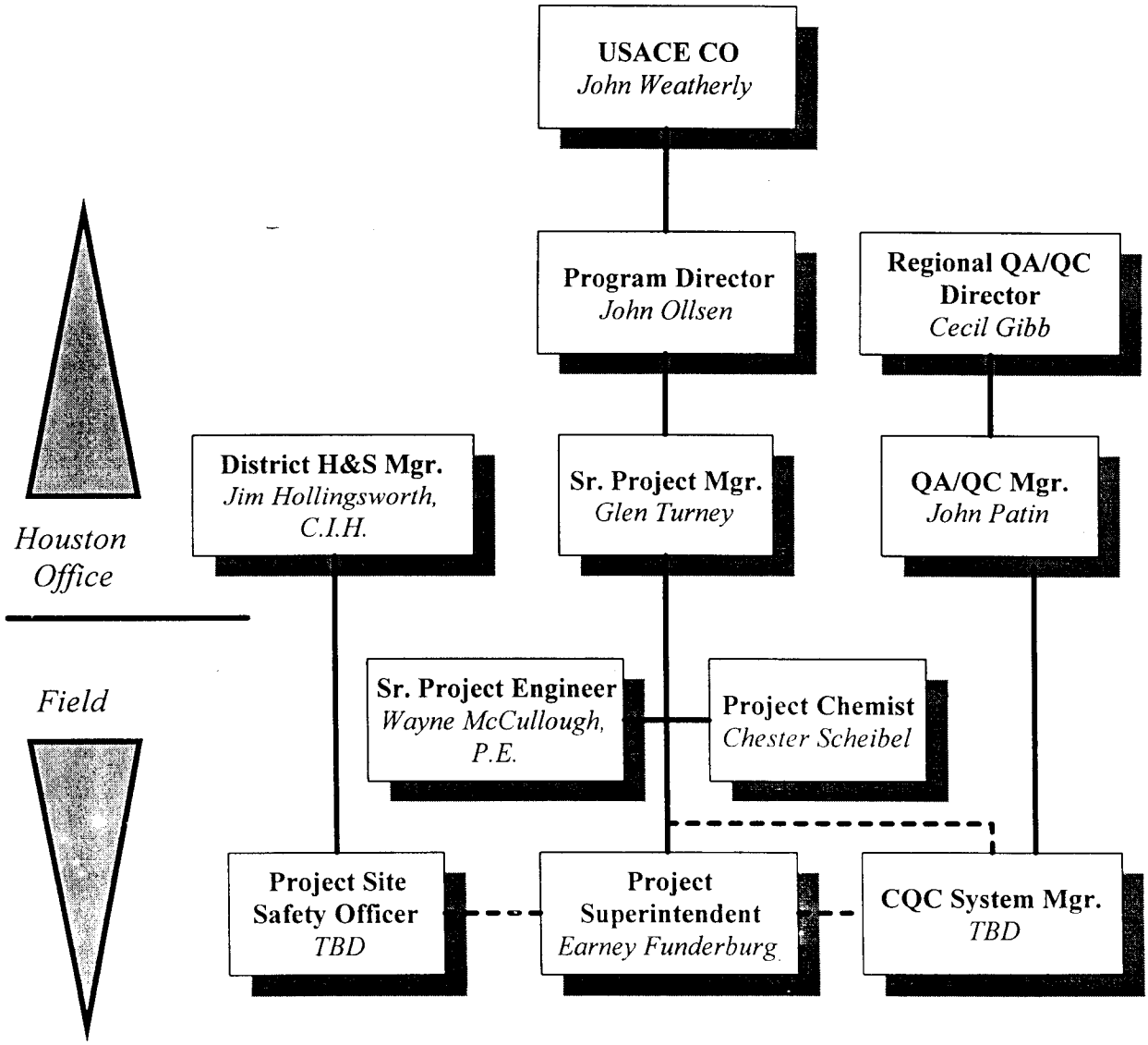
• TERC Program Director	Mr. John Ollsen (Houston)
• Senior Project Manager	Mr. Glen Turney (Houston)
• District Health and Safety Manager	Mr. James Hollingsworth, C.I.H. (Houston)
• QA/QC Manager	Mr. John Patin (Houston)
• Project Chemist	Mr. Chester Scheibel (Houston)
• Engineering Support	(Various as needed) (Houston)
• Senior Project Engineer	Mr. Wayne McCullough (Houston)
• Project Superintendent	Mr. Earney Funderburg (On-site)
• Project Safety Officer	(to be determined) (On-site)
• CQCSM	(to be determined) (On-site)

The organization for the project is illustrated on **Figure 5-1**.

Resumes for the proposed project personnel will be enclosed in **Appendix A** of the Final Site Work Plan for USACE review and approval.

FIGURE 5-1

ORGANIZATION CHART
WASTEWATER SUMPS REMOVAL AND CLOSURE
LONGHORN ARMY AMMUNITION PLANT, KARNACK, TEXAS



6.0 SITE WORK

6.1 Schedule

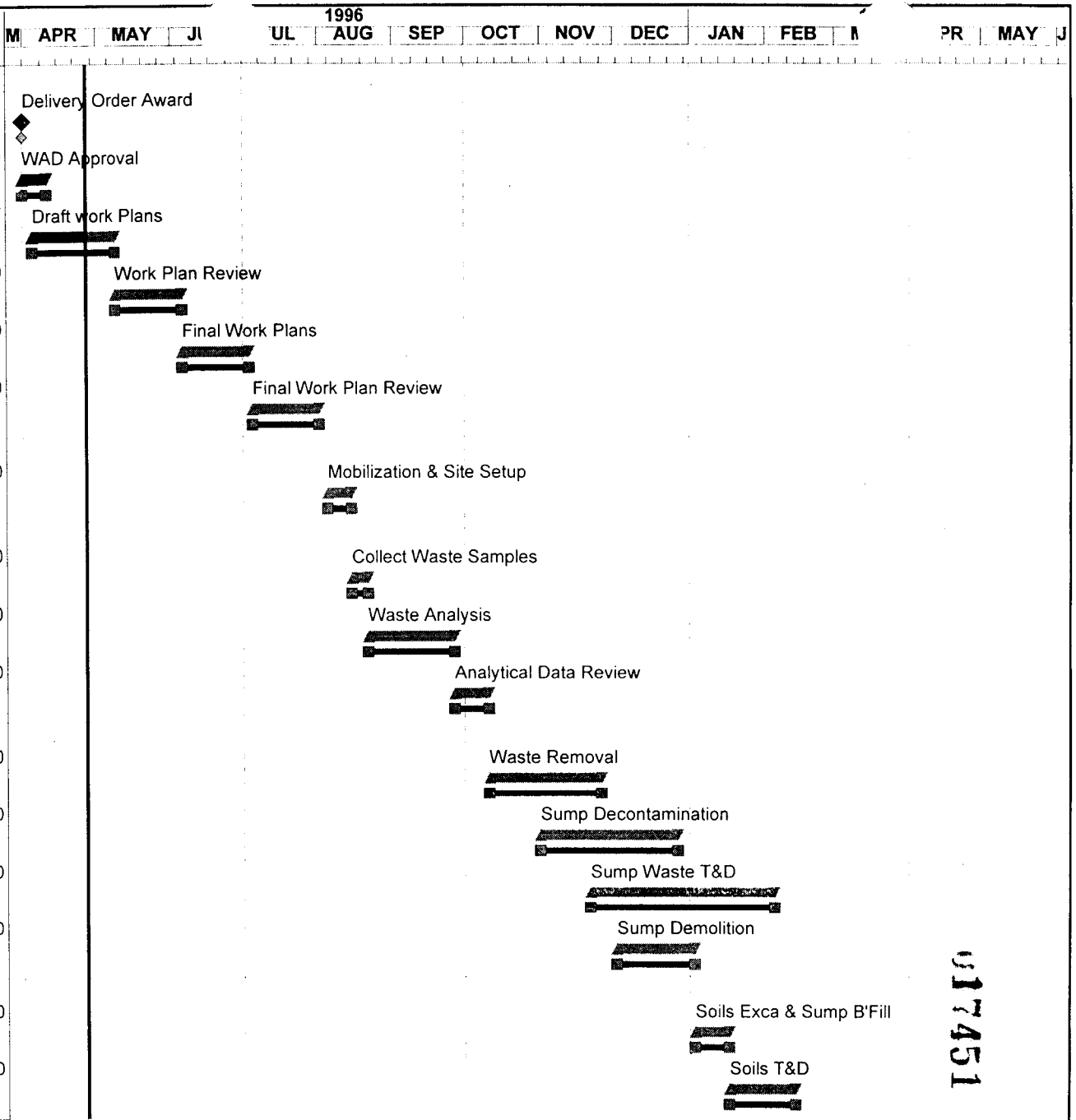
The project schedule is presented as **Figure 6-1**. OHM will normally work 10 hours per day, 4 days per week. Fridays and Saturdays may be worked to make up for lost time due to weather or other circumstances, if approved by USACE.

6.2 Subcontracting Plan

OHM will prepare Requests For Proposals (RFP's) for the following services and equipment:

- Off-site Analytical Laboratory
- Clean Backfill Hauling (Trucking) [may be performed by OHM]
- Fencing (Temporary)
- Ice-blasting (CO_2)
- Roll-off boxes
- Construction equipment not available from OHM inventory
- Hazardous Waste Hauling
- Hazardous Waste Disposal, Including Incineration

Activity ID	Activity Description	Start	Finish	% complete
WAD 01 - Planning				
0000000	Delivery Order Award	01APR96A		100
0000001	WAD Approval	01APR96A	10APR96A	100
0101000	Draft work Plans	05APR96A	08MAY96	67
0101010	Work Plan Review	09MAY96	05JUN96	0
0102000	Final Work Plans	06JUN96	03JUL96	0
0102010	Final Work Plan Review	05JUL96	01AUG96	0
WAD 02 - Mobilization / Site Setup				
0201000	Mobilization & Site Setup	05AUG96	14AUG96	0
WAD 03 - Sump Sampling & Analysis				
0301000	Collect Waste Samples	15AUG96	21AUG96	0
0302010	Waste Analysis	22AUG96	26SEP96	0
0302020	Analytical Data Review	27SEP96	10OCT96	0
WAD 04 - Sump Removals				
0401000	Waste Removal	11OCT96	25NOV96	0
0402010	Sump Decontamination	01NOV96	26DEC96	0
0403000	Sump Waste T&D	21NOV96	04FEB97	0
0402020	Sump Demolition	02DEC96	02JAN97	0
WAD 05 - Soil Removal & Disposal				
0501000	Soils Exca & Sump B'Fill	03JAN97	16JAN97	0
0502000	Soils T&D	17JAN97	13FEB97	0



01451

Project Start	01APR96
Project Finish	17MAR97
Data Date	27APR96
Plot Date	17MAY96

Early Bar
Target Bar
Progress Bar

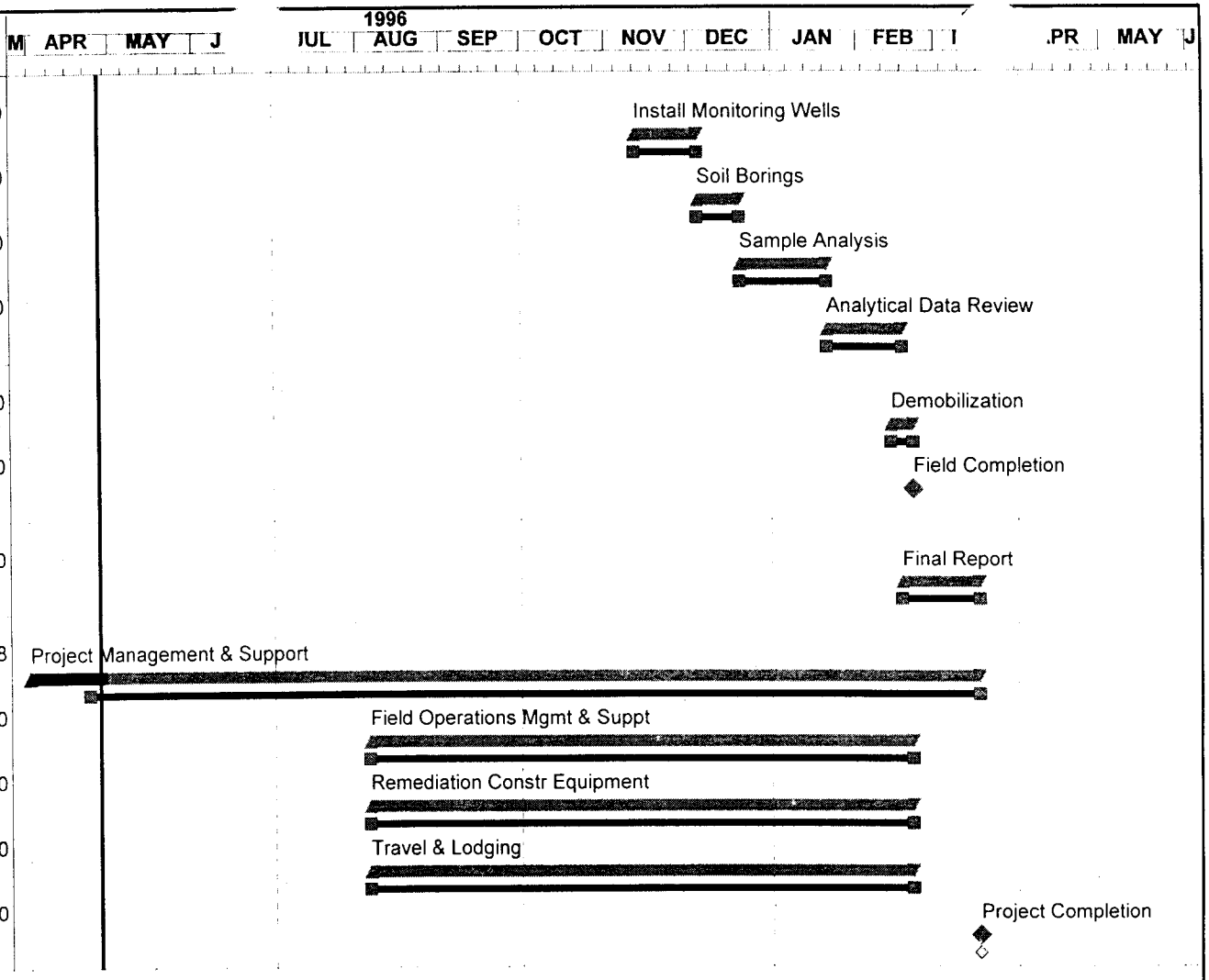
SUMR

OHM Remediation Services Corp

LHAAP Wastewater Sump Removal

OHM Remediation Services Corp.

Activity ID	Activity Description	Start	Finish	% complete
WAD 06 - Additional Investigations				
0601010	Install Monitoring Wells	12NOV96	04DEC96	0
0601020	Soil Borings	05DEC96	19DEC96	0
0602010	Sample Analysis	20DEC96	20JAN97	0
0602020	Analytical Data Review	21JAN97	17FEB97	0
WAD 07 - Demobilization				
0701000	Demobilization	14FEB97	21FEB97	0
0700000	Field Completion		21FEB97	0
WAD 08 - Closure Report				
0801000	Final Report	18FEB97	17MAR97	0
WAD 09 - Administration & Support				
0900010	Project Management & Support	01APR96A	17MAR97	8
0900020	Field Operations Mgmt & Suppt	05AUG96	21FEB97	0
0900030	Remediation Constr Equipment	05AUG96	21FEB97	0
0900040	Travel & Lodging	05AUG96	21FEB97	0
0900000	Project Completion		17MAR97	0



011452

Project Start	01APR96
Project Finish	17MAR97
Data Date	27APR96
Plot Date	17MAY96

Early Bar
Target Bar
Progress Bar

SUMR

OHM Remediation Services Corp

LHAAP Wastewater Sump Removal

OHM Remediation Services Corp.

7.0 CONSTRUCTION WORK TASKS

OHM will provide OHM-owned equipment or rental equipment based on price availability and value to the Government.

7.1 Task 1 - Mobilize

OHM will mobilize key personnel and OHM-owned equipment from the Houston District office. OHM will utilize personnel and equipment present at LHAAP for Delivery Order 0012 (Landfills 12 and 16 Caps) to the maximum extent practical. The temporary office facility established for D.O. 0012 will also be used for this project.

The temporary facilities layout is shown on **Figure 7-1**. A typical decontamination facility is shown on **Figure 7-2**. A typical layout of facilities for removing a sump are shown on **Figure 7-3**.

7.2 Task 2 - Collect Water and Sludge Samples

OHM will verify that the sump contents and the air above the liquids and sludges in the sumps contain no explosive materials. Samples from specific sumps will be analyzed for ignition sensitivity through electrostatic discharge (ESD), impact, friction, or other methods as confirmed with LHAAP or Thiokol personnel. A list of the sumps that require additional testing is included as Table 4-1 of the CDAP in Appendix D.

Two teams, each consisting of one Sample Technologist and one Recovery Technician (RT) will collect a sample of water and a sample of sludge from each sump. Samples of sand will be collected from the "closed" sumps. A Project Chemist will be on site to oversee the sampling activities. Techniques, materials and forms are described in the Chemical Data Acquisition Plan (CDAP) in **Appendix D**.

7.3 Task 3 - Analyze Water and Sludge Samples

Water, sludge and sand samples will be analyzed at an off-site analytical laboratory for:

- Volatile Organic Compounds (VOC)
- Semi-volatile Organic Compounds (SVOC)
- Total Metals (concrete, sludge and sand samples having more than 20 times the TCLP value for any metal will be analyzed for TCLP for that metal)

Contents of specific sumps identified in the Closure Plan for additional analysis will be sampled and analyzed for the following:

- Total Recoverable Petroleum Hydrocarbons (TRPH)
- Cyanide
- Explosives

If required by the selected disposal facility, sump waste to be incinerated will be analyzed for thermal content (BTU).

Analytical methods and related parameters are described in the Chemical Data Acquisition Plan (CDAP) in **Appendix D**.

The Project Chemist will initially review the analytical data, review them with the Senior Project Manager and the Transport & Disposal (T&D) Coordinator, and prepare a report summarizing his findings and recommending appropriate disposal of the sump contents.

FIGURE 7-1 TEMPORARY FACILITIES LAYOUT

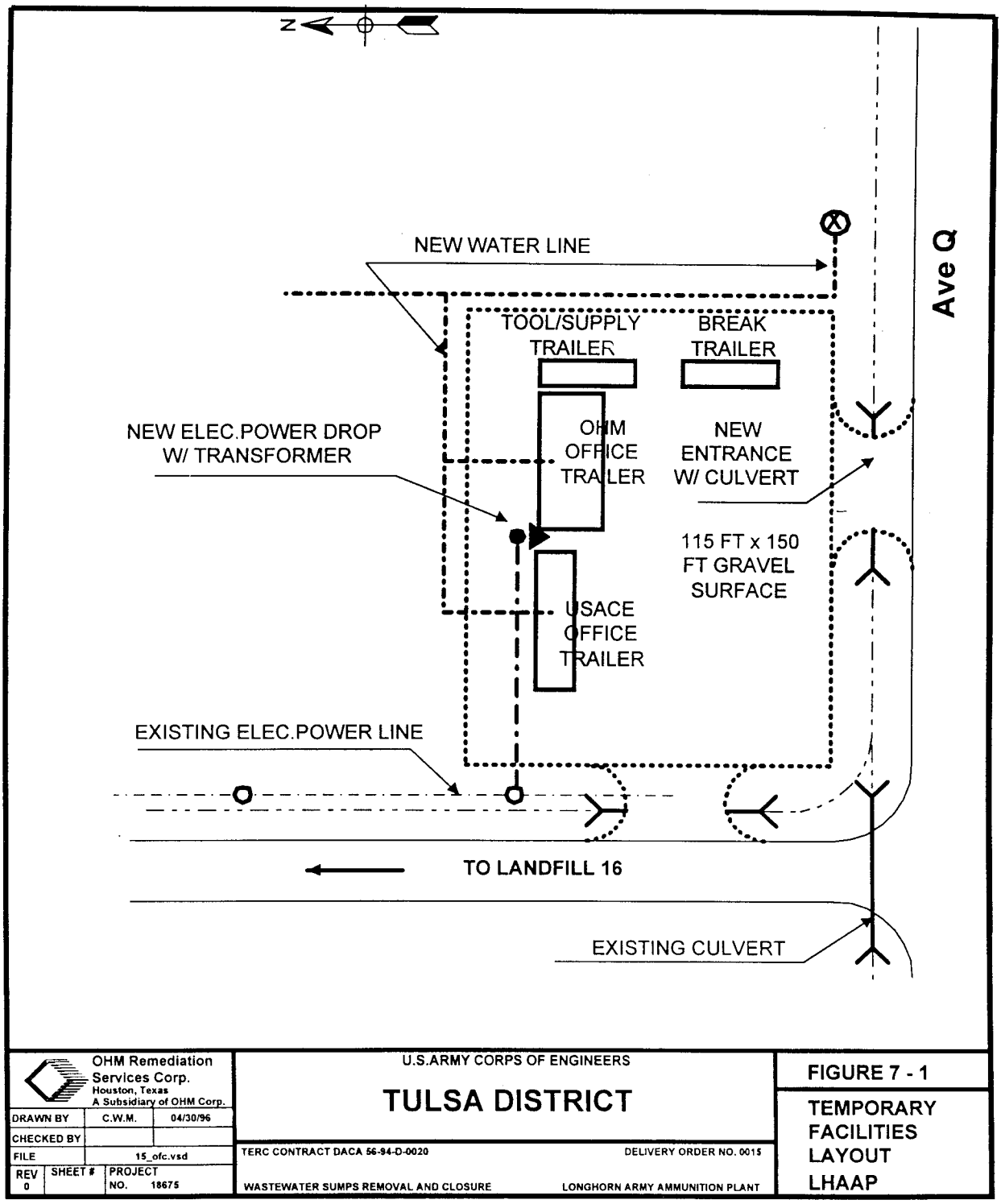


FIGURE 7-2 DECONTAMINATION FACILITY

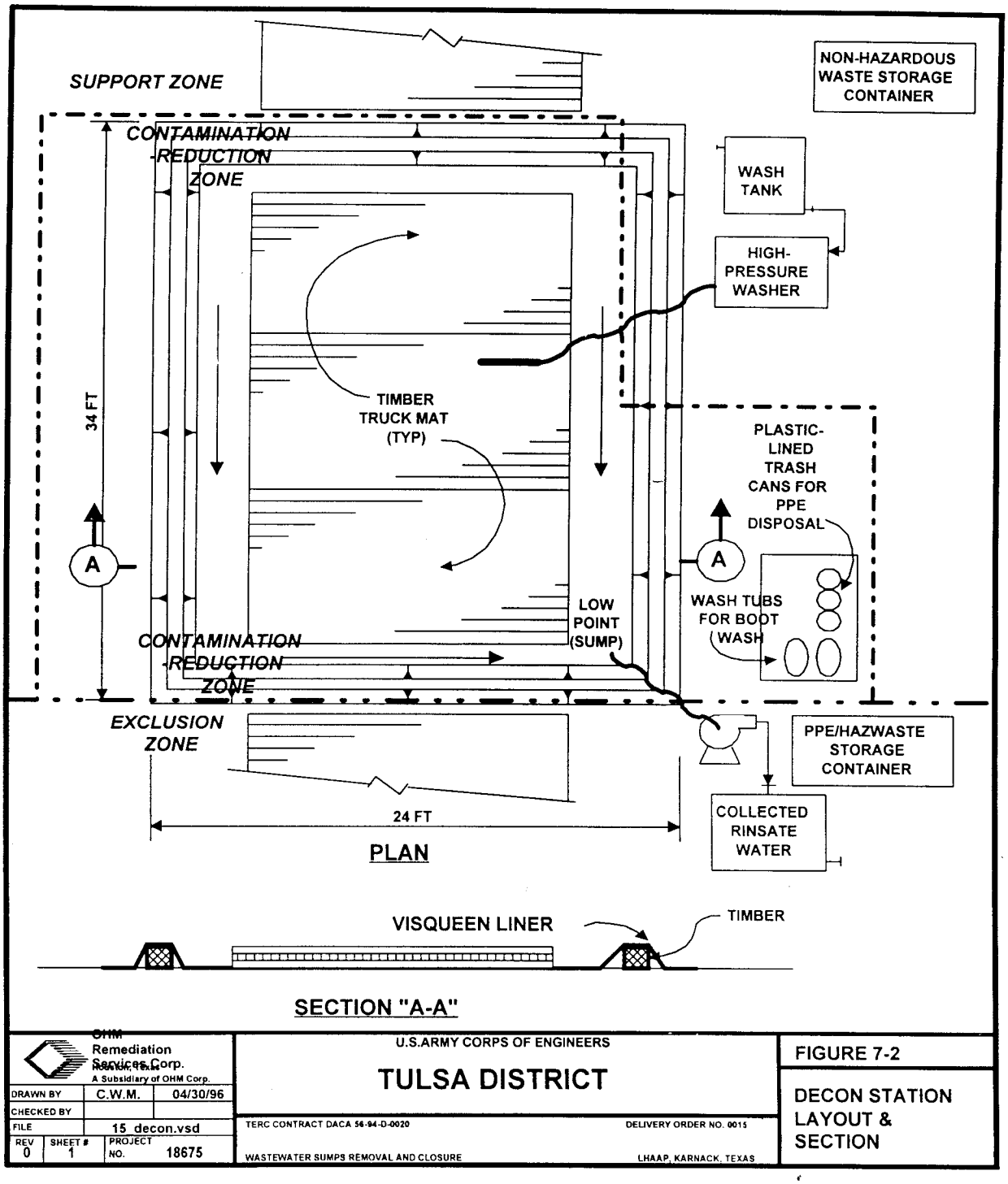
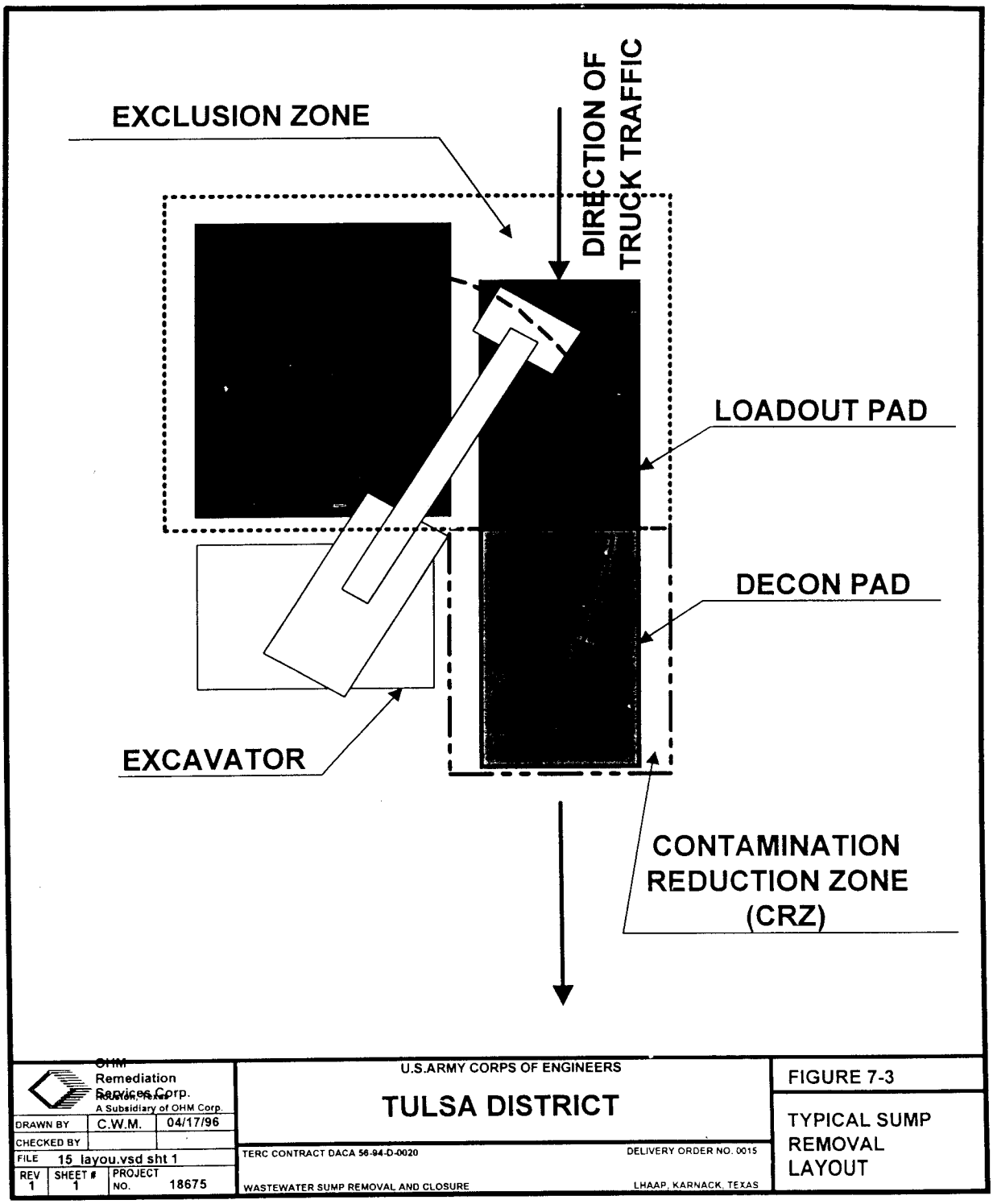


FIGURE 7-3 - TYPICAL SUMP REMOVAL LAYOUT



7.4 Task 4 - Remove Water and Sludge From Sumps

7.4.1 Sub-task 4-1 - Remove Water From Sumps

A trash pump will be used to transfer water from the sumps to trailer-mounted holding tanks. Water will separated by F-wastes, K-wastes, cyanide and decon waters. Sumps will be covered to prevent entry of rainwater. Additionally, any pipes or drains leading to the sumps will be blocked off.

7.4.2 Sub-task 4-2 - Remove Sludge From Sumps

A sludge pump will be used to transfer pumpable sludges from the sumps to drums. Sludges that cannot be pumped will be removed by a combination of backhoe and manual methods. Confined space entry procedures will be used when personnel enter a sump. Drums will be marked and palletized then moved by forklift and truck to a temporary storage area for later disposal.

7.4.3 Sub-task 4-3 - Remove Sand From Sumps

A backhoe will be used to transfer sand from the "closed" sumps to roll-off boxes, as necessary. A hoe-ram or small concrete breaker will be used to break up the concrete caps. The roll-offs will be moved to a temporary staging area pending disposal disposition.

7.5 Task 5 - Remove Sumps

7.5.1 Sub-task 5-1 - Decontaminate Sumps

Sump structures will be decontaminated after removal of water and sludge, by high pressure water or air-blasting with dry ice. Only those with the potential of explosive residue will be cleaned with the dry ice procedure. This task will be performed by personnel working within the sumps using confined space entry procedures. Decon waste will be collected with a HEPA vacuum and drummed for sampling and disposal. Sampling and analysis of the decon water is described in the CDAP in **Appendix D**.

7.5.2 Sub-task 5-2 - Spall Concrete Samples

Samples of the decontaminated concrete sump surface will be spalled from the walls and bottoms of the sumps for analysis as described in the Chemical Data Acquisition Plan (CDAP) in **Appendix D**.

7.5.3 Sub-task 5-3 - Demolish Sumps

Concrete tops, walls and bottoms of sumps determined to be hazardous will be broken-up with a hoe-ram. Hazardous concrete debris will be loaded into roll-off boxes for disposal. Non-hazardous concrete sumps will be left in place and backfilled with clean sand or soil.

The concrete channels leading to the sumps from the buildings will also be demolished and disposed. The outlet of the channel at the building will be closed off and blocked using grout or other appropriate methods.

7.6 Task 6 - Transport and Dispose of Wastes

7.6.1 Sub-task 6-1 - Transport and Dispose of Water

Water removed from sumps and stored in temporary holding tanks will have been sampled and analyzed prior to its disposal. The Closure Plan anticipates deep well injection of all hazardous waste contaminated water. Sampling and analysis are addressed in the CDAP in **Appendix D**. Transportation and disposal are addressed in the Site Waste Management Plan (SWMP) in **Appendix E**.

7.6.2 Sub-task 6-2 - Transport and Dispose of Sludge

Sludge removed from sumps and stored in drums will be disposed of by off-site incineration in accordance with The Closure Plan. The drums will be loaded onto the transporter's trucks with a forklift. Sludges in drums will not be resampled except for disposal profiling as necessary. Transportation and disposal of sludges are addressed in the Site Waste Management Plan (SWMP) in **Appendix E.**

7.6.3 Sub-task 6-3 - Transport and Dispose of Concrete and Sand

Concrete debris and sand from sumps will be stored in roll-off boxes and disposed of as described in the Site Waste Management Plan (SWMP) in **Appendix E.**. The Closure Plan anticipates that some of this concrete debris and sand may be hazardous and the remainder will be non-hazardous. The non-hazardous will be separated from the hazardous in different roll-off boxes. The sand and concrete of similar characterization will be placed in the same container. Roll-off boxes will be picked up by the transportation subcontractor. Sampling and analysis of the concrete debris and sand are addressed in the CDAP in **Appendix D**.

7.7 Task 7 - Decontaminate and Demobilize

Equipment used in sump removal will be decontaminated prior to demobilization from LHAAP. Liquids generated during decontamination will be stored in temporary holding tanks for analysis and disposal as described in the SWMP.

Equipment will be demobilized when it is no longer required. The OHM office trailer and tool/supply trailer will remain on site for use during D.O. 0012 (Landfills 12 and 16 Caps).

7.8 Task 8 - Prepare Closure Report

Upon conclusion of the demobilization, the OHM team will prepare the Closure Report. The Senior Project Engineer will lead the Closure Report activities. During the field work, the Project Superintendent will be responsible for maintaining a daily log of all on-site activities. The log will be submitted to the Senior Project Engineer to provide a detailed history of each field activity for inclusion in the Closure Report. The

Closure Report will also include sampling and analysis results, waste profiles and waste manifests for materials hauled off-site.

Other project management team members from QA/QC, Project Management, Health and Safety, and Contract Administration will provide input to the Senior Project Engineer. The Closure Report will be signed by a Professional Engineer licensed in the State of Texas.

7.9 Task 9 - Remove and Dispose of Soils Adjacent to Sumps

7.9.1 Sub-task 9-1 - Excavate Contaminated Soils Adjacent to Sumps

Where sumps are removed, OHM will also excavate and remove approximately one foot of soil surrounding those sumps. A backhoe will be used to excavate the soil and place it into roll-off boxes. Excavations will be shored as necessary for personnel safety and integrity of adjacent buildings. Sampling of these soils will be in accordance with the CDAP in **Appendix D**. Disposal of these soils is described in the SWMP in **Appendix E.**

7.9.2 Sub-task 9-2 - Backfill Excavations at Removed Sumps

Following the receipt of confirmation sample analysis, excavations will be backfilled using small compactors. The excavations will be left open and secured with a safety fence while awaiting analytical results. Backfill soils will be imported from off-site or from an on-site source if available. The disturbed surface will not be revegetated or otherwise covered.

7.9.3 Sub-task 9-3 - Transport and Dispose of Contaminated Soils Adjacent to Sumps

Contaminated soil will be stored in roll-off boxes and disposed of as described in the Site Waste Management Plan (SWMP) in **Appendix E**. Roll-off boxes will be picked up by the transportation subcontractor. Sampling and analysis of the contaminated soil are addressed in the CDAP in **Appendix D**.

7.10 Task 10 - Confirmation Soil Sampling

USACE may direct confirmation sampling of soils at sumps where the surrounding soils are determined to be hazardous. The sampling will include the soils from the walls and floor of the excavation, as necessary.

The number of samples and the constituents targeted for analysis will depend on the results of analysis of the soils removed from each sump area, and may vary from sump to sump.

APPENDIX A

19471n

017462

APPENDIX A

RESUMES OF KEY PERSONNEL

GLEN R. TURNEY
PROJECT MANAGER

EXPERTISE

Management of multi-disciplinary projects

EXPERIENCE

Mr. Turney specializes in remediation technologies and has over eight years of management and remediation experience. Mr. Turney provides engineering design and project management of hazardous waste treatment and compliance programs. His remediation experience includes biological, extraction, filtration, encapsulation, fixation, risk assessment, volume reduction, and chemical neutralization techniques, and integrates site characterization data with the appropriate remedial technology.

Mr. Turney's on-site experience includes development and execution of approved work plans, development of detailed cost estimates and approved site and spill safety plans, the application of heavy equipment and field construction requirements, performance of assessments and evaluations at hazardous waste sites, waste minimization, and project scheduling.

His supervisory experience includes familiarity with and fulfilling OSHA requirements relative to site work, coordinating transportation and disposal of hazardous wastes, soliciting and receiving bids for services and materials, recommending the lowest qualified bidder, working with a client and/or OSC, acting as Site Safety Officer, and report and estimate preparation.

Specific projects have included the following:

- Currently managing the investigation of multiple sites at a former Air Force Base in new Mexico. The sites include landfills, fuel storage facilities, maintenance buildings, and several other potentially environmentally impacted areas. Project includes a historical records search ad lost allocation/liability reporting.

- Currently managing the removal and remediation of an underground fuel storage tank farm at a naval air station in Corpus Christi, Texas. The tank farm will be replaced by an aboveground system.

- Managed an environmental maintenance and emergency response contract for a major chemical plant in Baytown, Texas. Responsibilities included: project scoping, overall management, technical expertise for various waste treatment and remedial technologies, project tracking and invoicing, and initial contact for on- or off-site responses.

- Managed the excavation, removal, and disposal of several hundred yards of NORM waste from a Texas State Superfund Site. Also removed and crushed or overpacked for disposal over three hundred 55-gallon drums of illegally dumped material at the site.

- Provided technical support for a major petroleum (crude oil) release in the San Jacinto River in Channelview, Texas.

- Managed a sludge dewatering project that facilitated waste volume reduction. Sludges from an open-to-air pond and an API separator were treated using filter pressing techniques in conjunction with chemical addition.

- Managed a contaminated soil excavation and restoration project at a barge dock location on the Houston Ship Channel. Soil excavation, sampling, backfilling, and site closure report activities were performed at a chemical off-loading dock.

- Managed a PCE tank ventilation and decontamination program for a chemical plant in Corpus Christi, Texas. Removed vapors were treated to levels below the required emission standards, and the PCE-containing decontamination fluids were removed for off-site incineration.

- Managed a multi-phase groundwater and soil remediation project in Las Vegas, Nevada. Both soil and groundwater were remediated using biological techniques. The soil was treated in situ and the water was treated in a bioreactor system designed by Mr. Turney.

- Managed a multi-phased, large scale PCB sampling, remediation, and verification project for a Texas-based natural gas company. Directed sampling and verification for PCBs in Texas, New Mexico, Arizona, and Oklahoma and made remediation recommendations.

- Designed and implemented two in situ remedial programs in Colorado for a petroleum jobber. Both programs involved injection of oxygenated, nutrient-amended water into the subsurface.

- Remedial design engineer and project manager on a large-scale groundwater cleanup in Lake Tahoe, Nevada. Implemented a program for diesel fuel remediation in the soil, groundwater, and capillary fringe that included in situ biological remediation. A large, horizontal injection well system was installed in addition to a surface treatment system to facilitate remediation.

- Performed numerous supplemental risk assessments, alternative technology, and remedial program studies.

- Managed a rail car sampling and transfer project in Spring, Texas.

- Managed field analytical laboratory services for mobile laboratory projects.

- Managed numerous multi-phase UST removals, soil remediations, PCB cleanups. Petroleum-contaminated soil biologically treated on site, PCB soil characterized, manifested, and hauled to disposal facility.

- Involved in neutralization of USTs containing ammonium hydroxide that was chemically neutralized with sulfuric acid and discharged to a sanitary sewer.

- Permitted a permanent and a temporary soil thermal treatment recycling facility in Phoenix, Arizona.

- Managed the biological remediation of approximately 10,000 cubic yards of diesel-contaminated soil. The soil was removed from an operating petroleum distribution facility using caisson auger rigs and remediated using a land treatment cell.

ACADEMIC BACKGROUND

B.S., Chemical Engineering, Montana State University, 1987

SPECIALIZED TRAINING

American Institute of Chemical Engineers
LPST Corrective Action Project Manager, Registration No. CAPM00623, 1995
Engineer in Training, Arizona, No. 04751, 1991
Registered Environmental Manager, No. 1033, Nevada, since 1992
Member, Arizona Hazardous Waste Society

EARNEY FUNDERBURG
SITE MANAGER

EXPERTISE

Supervision of multidisciplinary operations personnel at hazardous waste and heavy construction project sites

EXPERIENCE

Mr. Funderburg has over 12 years of supervisory experience in the construction and environmental fields. His field experience includes landfill construction, slurry wall installation, excavation, wastewater treatment plant construction and operation, incinerator construction and operation, and site restoration. Mr. Funderburg also has extensive experience in equipment operation. Mr. Funderburg has supervised numerous projects with responsibility for assisting and managing project operations, direct supervision of field crews, purchasing project material, and client interface.

Currently, Mr. Funderburg is supervising project activities at the Corpus Christi Naval Air Station, a Delivery Order being performed under OHM's Total Environmental Restoration Contract with the U.S. Army Corps of Engineers. This project entails the removal, replacement, and remediation of underground storage tanks (UST) located at the Corpus Christi Army Depot Fuel Farm 216A. Four 13,000-gallon USTs and associated piping will be removed. Soil and groundwater sampling will be performed as required and remediated as necessary to affect closure. Temporary storage tanks will be used to maintain fuel operations. New permanent double-walled aboveground storage tanks (AST) will be installed and will serve as replacement for the UST systems removed.

Mr. Funderburg's prior project experience includes the following:

- Project Manager for the Rocky Mountain Arsenal project conducted under the TERC contract held by Rust Remedial Services, Inc. Responsibilities included client interface, managing the overall budget and schedule for two Delivery Orders, coordinating subcontracts, and overall project production.

- Construction Manager responsible for managing and overseeing all non-incineration operations on a Superfund hazardous waste site. Responsibilities for the project included ensuring all excavations were met within the excavation grades provided by the client; completing excavation and backfilling activities within closed enclosures; coordinating all subcontractors; and overseeing construction and operation of an on-site wastewater treatment plant.

- Project Manager for the overall rehabilitation of an existing earthen dam. Responsibilities included overall management and production, invoicing monthly pay estimates, and interfacing with the U.S. Army Corps of Engineers.

- Material Handling Superintendent responsible for project activities during the construction of concrete foundations for both an incinerator and an ash-handling area. Oversight responsibilities included all backfilling operations and x-sections, construction start-up of an on-site wastewater treatment plant, overall operations of the wastewater treatment plant , and complete construction of a transportable enclosure building for feed preparation to the incinerator.

- General Superintendent during the construction of an earthen dam of approximately 4.5 million cubic yards of dirt. Responsibilities included overall project production; selection of project staffing in the field; communication with all subcontractors; compliance and regulations within the scope of work; coordination of all equipment for maximum production; and interface with the U.S. Army Corps of Engineers.

- General Superintendent during the successful cleanup of 16 contaminated sites. The $22 million project involved the construction of two 100,000-cubic-yard covered landfill cells, the installation of seven slurry walls, and impervious caps at various closure sites; and the excavation and removal of hazardous materials including chemical warfare agents from 16 additional sites. Interfaced with the U.S. Army Corps of Engineers.

- Superintendent/Foreman responsible for the coordination of all excavation and backfilling operations during the construction of incineration operation buildings. Also provided subcontract coordination during the construction of an incinerator to incinerate benzo benzoate. Interfaced with the U.S. Army Corps of Engineers.

- Leadman/Operator responsible for procurement of engineers/surveyors, equipment maintenance, and equipment training.

SPECIALIZED TRAINING

OSHA 40-Hour Training for Hazardous Waste Operations
OSHA 24-Hour Supervisor Training
CPR/First Aid Training
16-Hour Expanded Management Services (EMS) Training
8-Hour Environmental Compliance Regulatory Standards
Confined Space Entry Training
Environmental Awareness Training
RCRA Introduction Training

CHESTER D. SCHEIBEL
PROJECT CHEMIST

EXPERTISE

Analysis of organic/inorganic samples; organic monomers, surfactants, and environmental for pollutants and toxic substances

EXPERIENCE

Mr. Scheibel joined OHM in 1993 with over 20 years of experience in the analysis of environmental samples in various matrices (e.g., water, soil, and sediment) for pollutants and toxic substances. Mr. Scheibel provides quality assurance/quality control of fixed-based laboratory analytical data and reviews analytical data. His responsibilities include quality assurance/quality control of laboratory data from OHM subcontracted laboratories, preparation of purchasing quotations and analytical request forms; data validation; laboratory auditing; interaction with project personnel and regulatory representatives; and assisting in proposal/project report preparation.

During Mr. Scheibel's tenure with OHM, he has supervised a mobile field analytical laboratory and has been the on-site Project Chemist for field projects. Mr. Scheibel's previous experience includes the following:

- Project Manager for an environmental laboratory in Oklahoma. Responsible for pursuing new business opportunities, RFP evaluation, proposal/quotation preparation, and client satisfaction.

- Organic analyst for Analytical Services Corp. (ASC), a wholly owned subsidiary of OHM Corporation. Performed analysis of water, soil, sediment, and oil for pesticides, PCBs, VOAs, and other organics by GC. Maintained equipment and set up computer programs to provide for QA/QC review of analytical data packages. Supervised weekend laboratory operations including the extraction, purification, and analysis of organic/inorganic samples, scheduling, QA/QC of data packages, and analysis of samples by GC for pesticides/PCBs/VOAs by SW 846 methods.

- GC/MS analyst and supervisor for a laboratory in Tennessee. Charged with the operation and maintenance of a Finnigan GC/MS and analysis of water, soil ,ma nd sediment for FOA/BNA (HSL and Priority Pollutants) using EPA CLP and SW 846 protocols. Assembled organic (GC, GC/mS) CLP data packages, prepared GC/MS standards, and performed QA/QC of analytical data.

ACADEMIC BACKGROUND

B.S., Chemistry, University of Wisconsin

SPECIALIZED TRAINING

OSHA 40-Hour Safety Training
OSHA 8-Hour Refresher Training
OHM and Government Procurement Policies and Procedures

PROFESSIONAL AFFILIATIONS

American Chemical Society

CLIFTON WAYNE McCULLOUGH, P.E.
SENIOR PROJECT ENGINEER

EXPERTISE

Civil and structural design and construction, hazardous waste remedial design

EXPERIENCE

Mr. McCullough has 23 years of experience in civil and structural design and construction, including six years in hazardous waste remedial design and remedial action. He has supervisory experience in detail design, specification writing, and drafting. He has been responsible for field inspection of industrial construction and hazardous waste remediation, and for contract administration and construction support.

As a Project Engineer for OHM's Southwest Region, Mr. McCullough is assigned primarily to OHM's Total Environmental Restoration Contract (TERC) for the U.S. Army Corps of Engineers. Mr. McCullough writes work plans for projects on military posts, Bases, and plants. He coordinates the preparation of site Work Plans, Construction Data Acquisition Plans, Health and Safety Plans, and Quality Control Plans. For the POL Storage Area Remediation project being performed at Fort Sill, Oklahoma, Mr. McCullough oversees the design of shoring and excavation planning, interfaces with consultants on civil design issues, and writes the project work plans. For the project being performed at Longhorn Army Ammunition Plant in Karnack, Texas, he prepared work plans and oversees the preparation of drawings and specifications. OHM has two delivery orders being conducted at Vance Air Force Base in Enid, Oklahoma for which Mr. McCullough wrote portions of the work plans addressing the use of steel sheetpiles as a groundwater flow barrier.

Examples of other project experience include the following:

- Assisted the Project Manager and Project Superintendent in the preparation of project work plans and in obtaining client approval of materials to be used during project activities at the Bailey Superfund Site in Orange County, Texas.

- Project Engineer for the Brio Superfund Project in Harris County, Texas. Responsible for detailed civil, mechanical, and electrical design, and for specification of site work and preparation of project plans for approval by the client and EPA. The project included the excavation of 75,000 cubic yards of sludge and contaminated soils, water treatment, site perimeter air monitoring, hazardous waste incineration, and on-site disposal of the treated material. All plans and design work complied with the Consent Decree and the requirements of RCRA and CERCLA and were approved by the EPA. Mr. McCullough also assisted in the preparation of bids and cost estimates, writing work plans for hazardous waste remedial action projects, and preparation of plans and specifications for requests for proposals for a non-hazardous waste landfill in north Texas.

- Project Engineer responsible for foundation and structural design, preparation of construction drawings, selection of pre-engineered buildings, and writing specifications for site work on hazardous waste sites including CERCLA Superfund projects.

- Resident Engineer responsible for contract administration and quality assurance during the final phases of remedial construction on an EPA/TWC (now the TNRCC) Bio-Ecology Superfund site in Texas. Observed and reported to the TWC on compliance and progress of the work. The project featured an 80,000 cubic-yard RCRA landfill cell.

- Resident Engineer acting as on-site representative for a Korean oil company. Administered the design and construction contract for an offshore steel and concrete petrochemical transfer facility. The project included piping, electrical, instrumentation, and pumps.

- Structural Project Engineer responsible for teams of civil/structural engineers and draftsmen in the design of large-scale shallow-water petrochemical transfer facilities in the West Indies and Saudi Arabia.

- Senior Project Engineer responsible for construction support of the Naval Facilities Expansion on the island of Diego Garcia. Supervised design of steel and concrete foundations and structures, reviewed design drawings prepared by others for constructability, and supervised material ordering. The project included concrete, concrete admixtures, steel sheet piles, electrical power and lighting systems, plumbing, piping and pumps, HVAC, pre-engineered buildings, and a ship lift.

- Senior Structural Engineer responsible for design and drafting for miscellaneous civil and structural projects at on-shore and offshore petrochemical facilities.

ACADEMIC BACKGROUND

Master of Civil Engineering, University of Houston, 1976
B.S., Civil Engineering, University of Houston, 1969

SPECIALIZED TRAINING

OSHA 40-Hour Training
OSHA 8-Hour Refresher Training
Excavation Safety Course
Construction Quality Management or Contractors (USACE)

PROFESSIONAL REGISTRATION

Professional Engineer, Texas #43059

JAMES A. HOLLINGSWORTH, CIH, CHMM, REM
HEALTH AND SAFETY MANAGER

EXPERTISE

Coordinate and implement project sampling; analytical and QA/QC activities; prepare project-specific health and safety plans, sampling and analysis plans, quality assurance/quality control plans; coordinate project analytical laboratory services; support Technical, Regulatory Compliance, and Health and Safety issue resolution; design and implement treatability studies and assist in training of personnel in Regulatory Compliance and Health and Safety.

EXPERIENCE

As Health and Safety Manager, Mr. Hollingsworth has overseen and directed the Southern Region Health and Safety Program since 1991. As Environmental Manager, Mr. Hollingsworth has coordinated the integration and implementation of environmental, QA/QC and health and safety functions of the Region. To accomplish this objective, Mr. Hollingsworth drew upon his comprehensive experience in these areas as well as his understanding of the EH&S challenges associated with project execution.

Mr. Hollingsworth has attained certification through the American Board of Industrial Hygiene as a Certified Industrial Hygienist and also holds certification as a Master Level CHMM, and registration as a Registered Environmental Manager. Mr. Hollingsworth also has project management experience conducting many types of remedial treatment and environmental construction projects to include P&L responsibility.

Recent objectives accomplished under Mr. Hollingsworth's direction include upgrade and integration of newly acquired remedial and support operations, development and implementation of standard field operating safety procedures, implementation of process safety reviews for new process equipment, integration of health and safety processes with QA/QC and environmental processes, and development of the Region Environmental Protection Manual and Compliance Management Plan. These objectives have been focused on meeting the needs for efficient and successful project operations to provide for project implementation in a manner that is safe and in compliance with applicable regulatory requirements.

Examples of specific project experience are summarized below:

- Project Manager for a six-month project in Houston, Texas involving remediation of contaminated soil, biological treatment of low-level contaminated soils, and RCRA closure of the facility.

- Project Manager on a stabilization project at a southeast Texas refinery that involved the removal of stabilized sludges.

- Project Manager on the closure of a surface impoundment in northern Texas that included stabilization and dewatering of sludge, and construction of a cell for on-site placement of the materials.

- Project Manager on surface impoundment closure which involved on-site stabilization to meet TCLP and unconfined compressive strength performance criteria.

- Project Manager for a plating tank removal, building decontamination and renovation project in Tennessee.
- Project Manager on Brio Superfund Site Demolition project. The project involved dismantling and demolition of a chemical processing and recycling facility, including asbestos removal.
- Site Safety Officer on numerous projects including PCB transformer removal, contaminated soil removal, bioremediation, building decontamination, and demolition.
- Chemist and analytical services coordinator at the Highlands Acid Pit Superfund Site sponsored by the EPA and Texas Water Commission. The project involved the removal and stabilization of approximately 35,000 cubic yards of sludges and solids. This eight-month, $6 million project was completed on schedule and within budget.
- QA/QC and Health & Safety Manager at the Geneva Superfund Project in Houston, Texas ($16 million). The project included demolition of above-ground structures, excavation and removal of approximately 50,000 tons of soil and sludges, stabilization of sludges to meet current regulations, construction of slurry walls, and backfilling of designated areas.
- Stack Sampling Specialist for NUS Corp. Performed ambient and stack gas sampling and data reduction for air emission compliance testing.
- Regional Lab Operations Manager for Texas Environmental Services where his duties included overseeing daily operations of environmental laboratory testing (GC, AA, infrared, etc.).
- Twelve years experience in EPA protocol sampling, testing methods, environmental and health program implementation and project management.

SPECIALIZED TRAINING

OSHA 1910.120 40-Hour Training
OSHA 1910 8-Hour Update Training, Annually
Site Safety Officer Training
Technical Manager Training
Media Training
LDR Training Instructor
Standard Red Cross Training
IH Air Sampling Course
OSHA HAZWOPER Supervisor
Land Disposal Restrictions and TC Rule Training
Hazardous Materials Management Survey
USEPA Waste Testing & Quality Assurance Symposium
DOT Haz. Mat. Transportation
Occup. & Environ. Air Monitoring at Hazardous Waste Sites
RCRA Training
PAP B-900 Training
Lab Manager Training
SSO Training Instructor
Confined Space Entry Training
40-Hour Training Instructor
Sampling Protocols Training
Continuing Education - AIHCE
Comprehensive Review for IH Professionals
Regulatory Awareness
DOT HM-126F

ACADEMIC BACKGROUND

B.S., Marine Science, Lamar University, Beaumont, Texas, 1982

PROFESSIONAL REGISTRATIONS AND/OR CERTIFICATIONS

Certified Industrial Hygienist, ABIH
Master Certified Hazardous Materials Manager, CHMM
Registered Environmental Manager, NREP
American Industrial Hygiene Association (AIHA) - National & Gulf Coast Sections
Hazardous Materials Managers, Inc. - Buffalo Bayou Chapter

REFERENCES

Mr. Gran Townsend, CIH	(713) 875-4661
Ms. Rebecca Eklund, CIH Health and Safety Consultant	(713) 320-9054
Mr. Will Brocker, CIH Rust Remedial Services, Inc.	(205) 995-7878

JAMES A. HOLLINGSWORTH, CIH, CHMM, REM
REGIONAL HEALTH AND SAFETY MANAGER

EXPERTISE

Coordinate and implement project sampling; analytical and QA/QC activities; prepare project-specific health and safety plans, sampling and analysis plans, quality assurance/quality control plans; coordinate project analytical laboratory services; support Technical, Regulatory Compliance, and Health and Safety issue resolution; design and implement treatability studies and assist in training of personnel in Regulatory Compliance and Health and Safety.

EXPERIENCE

As Health and Safety Manager, Mr. Hollingsworth has overseen and directed the Southern District Health and Safety Program since 1991. As Environmental Manager, Mr. Hollingsworth has coordinated the integration and implementation of environmental, QA/QC and health and safety functions of the Region. To accomplish this objective, Mr. Hollingsworth drew upon his comprehensive experience in these areas as well as his understanding of the EH&S challenges associated with project execution.

Mr. Hollingsworth has attained certification through the American Board of Industrial Hygiene as a Certified Industrial Hygienist and also holds certification as a Master Level CHMM, and registration as a Registered Environmental Manager. Mr. Hollingsworth also has project management experience conducting many types of remedial treatment and environmental construction projects to include P&L responsibility.

Recent objectives accomplished under Mr. Hollingsworth's direction include upgrade and integration of newly acquired remedial and support operations, development and implementation of standard field operating safety procedures, implementation of process safety reviews for new process equipment, integration of health and safety processes with QA/QC and environmental processes, and development of the Region Environmental Protection Manual and Compliance Management Plan. These objectives have been focused on meeting the needs for efficient and successful project operations to provide for project implementation in a manner that is safe and in compliance with applicable regulatory requirements.

Examples of specific project experience are summarized below:

- Project Manager for a six-month project in Houston, Texas involving remediation of contaminated soil, biological treatment of low-level contaminated soils, and RCRA closure of the facility.

- Project Manager on a stabilization project at a southeast Texas refinery that involved the removal of stabilized sludges.

- Project Manager on the closure of a surface impoundment in northern Texas that included stabilization and dewatering of sludge, and construction of a cell for on-site placement of the materials.

- Project Manager on surface impoundment closure which involved on-site stabilization to meet TCLP and unconfined compressive strength performance criteria.

- Project Manager for a plating tank removal, building decontamination and renovation project in Tennessee.
- Project Manager on Brio Superfund Site Demolition project. The project involved dismantling and demolition of a chemical processing and recycling facility, including asbestos removal.
- Site Safety Officer on numerous projects including PCB transformer removal, contaminated soil removal, bioremediation, building decontamination, and demolition.
- Chemist and analytical services coordinator at the Highlands Acid Pit Superfund Site sponsored by the EPA and Texas Water Commission. The project involved the removal and stabilization of approximately 35,000 cubic yards of sludges and solids. This eight-month, $6 million project was completed on schedule and within budget.
- QA/QC and Health & Safety Manager at the Geneva Superfund Project in Houston, Texas ($16 million). The project included demolition of above-ground structures, excavation and removal of approximately 50,000 tons of soil and sludges, stabilization of sludges to meet current regulations, construction of slurry walls, and backfilling of designated areas.
- Stack Sampling Specialist for NUS Corp. Performed ambient and stack gas sampling and data reduction for air emission compliance testing.
- Regional Lab Operations Manager for Texas Environmental Services where his duties included overseeing daily operations of environmental laboratory testing (GC, AA, infrared, etc.).
- Twelve years experience in EPA protocol sampling, testing methods, environmental and health program implementation and project management.

SPECIALIZED TRAINING

OSHA 1910.120 40-Hour Training
OSHA 1910 8-Hour Update Training, Annually
Site Safety Officer Training
Technical Manager Training
Media Training
LDR Training Instructor
Standard Red Cross Training
IH Air Sampling Course
OSHA HAZWOPER Supervisor
Land Disposal Restrictions and TC Rule Training
Hazardous Materials Management Survey
USEPA Waste Testing & Quality Assurance Symposium
DOT Haz. Mat. Transportation
Occup. & Environ. Air Monitoring at Hazardous Waste Sites
RCRA Training
PAP B-900 Training
Lab Manager Training
SSO Training Instructor
Confined Space Entry Training
40-Hour Training Instructor
Sampling Protocols Training
Continuing Education - AIHCE
Comprehensive Review for IH Professionals
Regulatory Awareness
DOT HM-126F

ACADEMIC BACKGROUND

B.S., Marine Science, Lamar University, Beaumont, Texas, 1982

PROFESSIONAL REGISTRATIONS AND/OR CERTIFICATIONS

Certified Industrial Hygienist, ABIH
Master Certified Hazardous Materials Manager, CHMM
Registered Environmental Manager, NREP
American Industrial Hygiene Association (AIHA) - National & Gulf Coast Sections
Hazardous Materials Managers, Inc. - Buffalo Bayou Chapter

REFERENCES

Mr. Gran Townsend, CIH (713) 875-4661

Ms. Rebecca Eklund, CIH
Health and Safety Consultant (713) 320-9054

Mr. Will Brocker, CIH
Rust Remedial Services, Inc. (205) 995-7878

JAMES A. HOLLINGSWORTH, CIH, CHMM, REM
DISTRICT HEALTH AND SAFETY MANAGER

EXPERTISE

Coordinate and implement project sampling; analytical and QA/QC activities; prepare project-specific health and safety plans, sampling and analysis plans, quality assurance/quality control plans; coordinate project analytical laboratory services; support Technical, Regulatory Compliance, and Health and Safety issue resolution; design and implement treatability studies and assist in training of personnel in Regulatory Compliance and Health and Safety.

EXPERIENCE

As Health and Safety Manager, Mr. Hollingsworth has overseen and directed the Southern District Health and Safety Program since 1991. As Environmental Manager, Mr. Hollingsworth has coordinated the integration and implementation of environmental, QA/QC and health and safety functions of the Region. To accomplish this objective, Mr. Hollingsworth drew upon his comprehensive experience in these areas as well as his understanding of the EH&S challenges associated with project execution.

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Hazardous Materials Management Survey
USEPA Waste Testing & Quality Assurance Symposium
DOT Haz. Mat. Transportation
Occup. & Environ. Air Monitoring at Hazardous Waste Sites
RCRA Training
PAP B-900 Training
Lab Manager Training
SSO Training Instructor
Confined Space Entry Training
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Ms. Rebecca Eklund, CIH Health and Safety Consultant	(713) 320-9054
Mr. Will Brocker, CIH Rust Remedial Services, Inc.	(205) 995-7878

JOHN W. PATIN
QA/QC MANAGER

EXPERTISE

Implementation and oversight of QA/QC program; preparation of QA/QC plans; ensures full project compliance with health, safety, and environmental regulations and company policies and procedures

EXPERIENCE

Since his employment with OHM, Mr. Patin has managed various remediation projects and closures. Responsibility includes project planning/scheduling, procuring contracts with subcontractors, procuring project materials/equipment, cost control, and implementation of the QA/QC program. Mr. Patin prepared QA/QC and regulatory compliance plans for the Bayou Bonfouca Superfund Project in Slidell, Louisiana and served as QA/QC Manager for the project. He has recently prepared quality assurance/sampling and analysis plans for the Remedial Action Superfund project in Zellwood, Florida, the Brio Remedial Action Superfund Project in Friendswood, Texas, and the Drake Chemical Superfund Site in Lockhaven, Pennsylvania.

Mr. Patin is currently serving as Regional QA/QC Manager for OHM. His major responsibilities include project operations support (i.e., monitoring, auditing, reporting); development and preparation of standard division practices; preparation of QAPPs, WAPs, and SAPs for major projects; bid proposal assistance; implementation of company QA program; and performance of periodic audits at designated project sites. Additional duties include assisting with environmental, health and safety program implementation including health and safety plan development, IH records processing, field assessments and other duties.

Mr. Patin has also served as a Project Manager involved in project planning, scheduling, coordination, and cost control. Individual activities included: project schedule preparation; project cost accounting; management and coordination of all project tasks; procurement of individual contracts; interfacing with federal, state, and local agencies; and development of project plans. Major projects include the following:

- Construction Quality Control Manager at the Bayou Bonfouca Superfund Project in Slidell, Louisiana. Mr. Patin adhered project QC and compliance plans for an on-site groundwater treatment plan. Implemented plans and monitored compliance with all contract plans and specifications.

- Site Safety Officer and QA/QC Officer at the Geneva Superfund Project in Houston, Texas. Responsibilities included implementation of the project health and safety plan, maintenance of on-site health and safety equipment, performing site perimeter and personal air monitoring, implementation of project QA/QC plan, and monitoring compliance with contract plans and specifications.

- Project Manager for the RCRA Pond Closure Project in Ranger, Texas. Mr. Patin managed all phases of this pond closure including on-site disposal of hazardous waste and the on-site RCRA landfill construction.

Prior to current employment, Mr. Patin participated in remedial investigations, feasibility studies, and remedial actions at four Superfund sites located in Texas. Highlights of his previous experience include the following:

- Motco Superfund Project, CERCLA/SARA Feasibility Study - LaMarque, Texas as Site Safety Officer. Performed investigative drilling, monitoring well/piezometer installation; performed all groundwater, surface water, and sediment sampling; prepared technical reports.

- RCRA Plant - Houston, Texas as Site Manager responsible for groundwater monitoring well and recovery system installation and quarterly sampling; monthly auditing of recovery system performance, data management and quarterly/semi-annual groundwater assessment reporting, and preparation of project proposals and work plans.

- RCRA Landfill - Port Arthur, Texas for construction observation and liner quality inspection. Performed investigative drilling, trenching, monitoring well and leachate piezometer installation and sampling; geophysical surveying using terrain conductivity meter and magnetometer.

- Bailey Superfund Project, CERCLA/SARA Remedial Investigation Phases I and II, - Bridge City, Texas. Responsible for groundwater, surface water, and sediment sampling; aquifer pump and slug testing.

- Bio-Ecology Superfund Project, CERCLA/SARA Remediation, Grand Prairie, Texas as Inspector/Auditor for hazardous waste removal and holding cell construction.

- Brio Refining Superfund Project, CERCLA/SARA Phase I and II Remedial Investigations - Friendswood, Texas. Performed investigative trenching, groundwater, surface water, and sediment sampling; soil gas surveying; aquifer testing.

ACADEMIC BACKGROUND

University of Houston, Environmental Sciences courses
Sam Houston State University, Hazardous Waste Management courses
Texas A&M University, Marine Sciences courses

SPECIALIZED TRAINING

Center for Professional Advancement at New Jersey; 40-Hour Hazardous Waste Management Course
OSHA Hazardous Communication and Emergency Response; 40 hours with current 8-hour Refresher
Advanced Red Cross First Aid and CPR Training; current certification
Advanced EPA Level B Health and Safety Training
Project Management Training
Site Safety Officer Training
ISO 9000 QA/QC Training - University of Houston, Clear Lake City, Texas
Regulatory Awareness Training
DOT Hazardous Materials Training
Introduction to RCRA Training

PROFESSIONAL REGISTRATIONS AND/OR AFFILIATIONS

Member, American Society for Testing and Materials

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APPENDIX B

SITE SAFETY AND HEALTH PLAN
(SSHP)

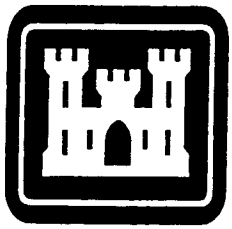
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SITE SAFETY AND HEALTH PLAN

REMOVAL AND CLOSURE OF WASTEWATER SUMPS
LONGHORN ARMY AMMUNITION PLANT (LHAAP)
KARNACK, TEXAS

Prepared For



U. S. Army Corps of Engineers
Fort Worth District
280 Miller Road
Bossier City, LA 71112-2505

Prepared By



OHM Remediation Services Corp.
A Subsidiary of OHM Corporation

225 West Airtex Boulevard
Houston, Texas 77090-6627

May 21, 1996

TERC No. DACA56-94-D-0020, D.O. No. 0015
OHM Project No. 18675

FINAL

017484

SITE SAFETY AND HEALTH PLAN

REMOVAL AND CLOSURE OF WASTEWATER SUMPS
LONGHORN ARMY AMMUNITION PLANT (LHAAP)
KARNACK, TEXAS

Prepared By:

Jim Hollingsworth, CIH, CSP
District Health and Safety Manager

May 21, 1996

TERC No. DACA56-94-D-0020, D.O. No. 0015
OHM Project No. 18675

FINAL

SITE SAFETY AND HEALTH PLAN
LONGHORN ARMY AMMUNITION PLANT (LHAAP)

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ACRONYMS AND ABBREVIATIONS

AJ	Amber Jug
ALARA	As Low As Reasonably Achievable
ARARs	Applicable or Relevant and Appropriate Requirements
BMPs	Best Management Practices (BMPs)
C	Centigrade
CAR	Corrective Action Report
CDAP	Chemical Data Acquisition Plan
CDRL	Contract Data Requirements Lists
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulation
CIH	Certified Industrial Hygienist
COC	Chain-of-Custody
CQCP	Contractor Quality Control Plan
CQCSM	Contractor Quality Control System Manager
CQMP	Contractor Quality Management Plan
CRZ	Contamination Reduction Zone
CWM	Clear Wide Mouth
DO	Delivery Order
DOT	Department of Transportation (US)
DQCR	Daily Quality Control Reports
EC	Emergency Coordinator
EPA	Environmental Protection Agency (US)
ERCP	Emergency Response and Contingency Plan
EZ	Exclusion Zone
FID	Flame Ionization Detector
FML	Flexible Membrane Liner
FS	Field Sample
GC	Gas Chromatography
GCL	Geocomposite Clay Liner
HE	High Explosive
HSO	Health and Safety Officer
IATA	International Air Transportation Association
IDLH	Immediately Dangerous to Life or Health
LCS	Laboratory Control Sample
LEL	Lower Explosive Limit
LEPC	Local Emergency Planning Committee
LHAAP	Longhorn Army Ammunition Plant
LLDPE	Linear Low-Density Polyethylene
LQMP	Laboratory Quality Management Plan
MRD	Missouri River Division - USACE
MS	Matrix Spike
MSD	Matrix Spike Duplicate
MSDS	Material Safety Data Sheets
NCTCOG	North Central Texas Council of Governments

ACRONYMS AND ABBREVIATIONS

OHM	OHM Remediation Services Corporation
OSHA	Occupational Safety and Health Administration
OVA	Organic Vapor Analyzers
OZ	Ounce
PARCC	Precision, Accuracy, Representativeness, Comparability, Completeness
PID	Photoionization Detector
PM	Senior Project Manager
POC	Point-of-Contact
PPB	Parts per Billion
PPE	Personal Protective Equipment
PPM	Parts per Million
PS	Project Superintendent
SSO	Site Safety Officer
QA	Quality Assurance
QAR	Quality Assurance Representative
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
RQ	Reportable Quantity
SCP	Stormwater Control Plan
SSHP	Site Safety and Health Plan
SOP	Standard Operating Procedure
SQCR	Sample Quality Control Report
SRM	Standard Reference Material
SVOCs	Semi-Volatile Organic Compounds
SWDL	Southwest Division Laboratory
SWMP	Site Waste Management Plan
SZ	Support Zone
TAL	Target Analyte List (metals)
TAT	Turn-Around-Time
TERC	Total Environmental Restoration Contract
TLV	Threshold Limit Value
TSCA	Toxic Substances Control Act
UNS	United Nations Standards
USACE	United States Army Corps of Engineers
VOCs	Volatile Organic Compounds

FINAL
SITE SAFETY AND HEALTH PLAN
LONGHORN ARMY AMMUNITION PLANT (LHAAP)

1.0 LONGHORN ARMY AMMUNITION PLANT PROGRAM OVERVIEW

The Longhorn Army Ammunition Plant (LHAAP) Site Safety and Health Plan (SSHP) defines health and safety policy and procedures for the OHM Team performing remedial actions at project sites under the Total Environmental Restoration Contract (TERC). This SSHP incorporates team members' individual health and safety policies and procedures. Each individual team members' safe operating procedures will apply to their project activities, but will comply, at a minimum, with OHM's Health and Safety Procedures Manual. The manual's Table of Contents is attached to this SSHP. The OHM Health and Safety Procedures Manual defines the minimum health and safety requirements for project site activities under this TERC. These procedures ensure that the activities affecting the safety and health protection of work performed are carried out in a controlled, effective, and consistent manner.

The text describes the controls, policies, and procedures to be followed and identifies the responsible personnel and their functions in the performance of the SSHP development and implementation. When another document already addresses a health and safety subject or procedure required to be contained in the SSHP, this plan includes it by reference.

This SSHP for project site activities will be based on the Site Work Plan for the project. The following sections of this SSHP describe the Health and Safety organization, policies, and procedures as well as the basic contents of a SSHP for projects performed.

2.0 SITE SAFETY AND HEALTH PLAN

OHM has developed this Site Safety and Health Plan specifically for the U. S. Army Corps of Engineers' (USACE) remediation project at Longhorn Army Ammunition Plant (LHAAP), located near Karnack in northeast Texas. The SSHP establishes the policies and procedures which protect workers and the public from potential hazards posed by planned project activities at a specific work site. The OHM team considers safety the highest priority during work at a site containing potentially hazardous materials and has established a policy of minimizing exposure which must be upheld on all projects. All project activities will be conducted in a manner that minimizes the probability of injury, accident, or incident occurrence. **All OHM team employees, subcontractors, and visitors are required to be familiar with the SSHP prior to site entry. Compliance with this requirement shall be acknowledged in writing by each person using the form included at the end of this plan.**

The SSHP and all site activities will be in compliance with the following regulations, contract requirements, and guidelines:

- USACE Total Environmental Restoration Contract
- USACE Safety and Health Requirements Manual EM 385-1-1
- United States Department of Labor, OSHA Standards, specifically:

  - 29 CFR 1910 -- General Industry
  - 29 CFR 1910.120 -- Hazardous Waste Operations and Emergency Response
  - 29 CFR 1910.1200 -- Hazard Communication
  - 29 CFR 1926 -- Safety and Health Regulations for Construction
- State-Specific Safety and Health Regulations
- USEPA Standard Operating Safety Guides, July 1988
- NIOSH/OSHA/USCG/USEPA, Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, October 1985 (Revision, Standard Operating Safety Guides (GPO # 9b92963414, 1992)
- OHM's Health and Safety Procedures Manual

Although the SSHP focuses on the specific work activities planned for a project site, it must remain flexible because of the nature of this work. Conditions may change, and unforeseen situations may arise that require deviations from the original plan. This flexibility allows modification by the Project Superintendents and Project Safety Officer to take into account changing site conditions, such as new data on chemical hazards, weather, and changes in scope of work. **Changes to the SSHP must be approved by the Project Safety Officer, Project Health and Safety Manager, and Senior Project Manager or Project Superintendent. This change to the SSHP must be documented in an amendment to the SSHP and forwarded to the Program Health and Safety Manager.**

The SSHP will be based on the project work plan and Site information provided in the delivery order that may include the following:

- Background information on previous site operations requiring remedial actions
- Location and approximate size of the site
- Site description and site map
- Anticipated contaminants and characteristics
- Applicable federal, state, and local regulations and codes
- Applicable Contract Data Requirements Lists (CDRL)

2.1 Scope of Work

The United States Army Corps of Engineers (USACE) has contracted OHM Remediation Services Corporation (OHM) to remove and close wastewater sumps at Longhorn Army Ammunition Plant, Karnack, Texas. The project includes:

- Sampling and characterization of sump contents,
- Removal and disposition of sump contents,
- Decontamination and disposition of the sump structures,
- Certification of sump closures,
- Additional analytical investigations as directed by USACE

The following tasks will be implemented to accomplish the project objectives:

Task 1 - Mobilize
Task 2 - Collect Water and Sludge Samples
Task 3 - Analyze Water and Sludge Samples
Task 4 - Remove Water and Sludge From Sumps
Task 5 - Remove Sumps
Task 6 - Transport and Dispose of Wastes
Task 7 - Decontaminate and Demobilize
Task 8 - Prepare Closure Report
Task 9 - Remove and Dispose of Soils Adjacent to Sumps
Task 10 - Additional Investigations

2.2 Site Information

LHAAP is located in central east Texas in the northeast comer of Harrison County 40 miles west of Shreveport, Louisiana, and approximately 14 miles northeast of Marshall, Texas. The installation occupies 8,493 acres between State Highways 43 and 134 (western and northern boundaries, respectively) and the western shore of Caddo Lake.

Manufacturing areas at LHAAP were washed down with water to reduce propellant, explosives and pyrotechnics (PEP) dusts which would otherwise collect and pose a safety hazard. Water de-activates ignition-sensitive compositions. To dissolve difficult binders, chlorinated solvents were also utilized in the cleanup of manufacturing areas. These solvents and PEP compositions were washed into sumps with large volumes of water. The wastewater sumps collect a large volume of water and PEP sludge from building wash down.

LHAAP offered to perform an approved RCRA closure of these sumps in response to allegations by TNRCC in 1991 that the sumps should be regulated as RCRA hazardous waste tanks. The regulatory requirements for closure of the sumps is described in the Closure Plan dated May, 1995 and approved by TNRCC. The approved closure procedure includes:

- Sampling and analysis of sump contents,
- Removal and containerization of sump contents,
- Decontamination of sump surfaces,
- Decontamination of equipment,
- Internal visual inspection of sumps,
- Determination of sump disposition,
- Certification of closure actions

All sludge from wastewater treatment operations is listed as an EPA K044 hazardous waste. K044 is the USEPA designation for the listed hazardous waste described as wastewater treatment sludges from the manufacturing and processing of explosives. The sludge in the bottoms of the sumps is considered by LHAAP to be K044 waste as well. This is not to imply that the sludge will only be disposed of as a K044 waste. Other hazardous waste codes and land disposal restrictions may apply to the sludge as appropriate

such as sumps which have contained F-listed solvents. The F-listed designation stems from the historical discharge of hazardous waste such as methylene chloride and 1,1,1-trichloroethane into sumps. F-listed solvents are no longer discharged into process wastewater sumps. The K044 sludge and wastewater from sumps will carry the F001 waste code if analysis reveals detectable quantities of F-listed solvents. F001 is the USEPA designation for the listed hazardous waste described as solvent waste that contains any combination of one or more of these or other spent solvents. The types of materials that may be encountered include petroleum and chlorinated hydrocarbons. There is also a low possibility that propellants, explosives or pyrotechnics may be encountered but the potential for encountering these materials will be determined through testing prior to handling these materials.

All manufacturing area sumps will be screened for hazardous constituents. Sumps that are likely to contain unusual hazardous constituents will have additional analyses performed.

Most of the sumps are of underground concrete construction that have a potential for release of waste materials into the environment because of the presence of structural joints. Some sumps were "closed" previously and are filled with sand. At least two "closed" sumps were capped with concrete. There is one metal aboveground sump in use. The Closure Plan lists waste sump characteristics.

3.0 KEY PERSONNEL AND MANAGEMENT

OHM maintains a policy of providing its employees, subcontractors, and authorized visitors with information and procedures in order to protect them and the adjacent community from any adverse effects that might result from work at a job site involving potentially hazardous substances. All personnel involved with this project will follow the health and safety procedures set forth in this plan. Visitors will not be given entry unless they read and agree to comply with this plan. The site safety plan acknowledgment will be signed by all personnel required to enter contaminated work areas.

3.1 Senior Project Manager

The Senior Project Manager (PM) communicates directly with the designated Client Representative and serves as the primary point of contact The PM identifies the operations that will be performed on site and the resources required to perform the task. His responsibilities include project scheduling, cost updating, and overall project direction. The PM approves the SSHP and ensures that adequate resources are available to the Project Superintendent to implement the SSHP.

3.2 District Health and Safety Manager

The District Health and Safety Manager is the OHM Certified Industrial Hygienist (CIH) responsible for development, approval, and implementation of the SSHP. The District Health and Safety Manager will supervise and direct the activities of the Project Safety Officer. The District Health and Safety Manager has the authority to stop unsafe operations, remove unqualified personnel from the work area, and approve changes to the site SSHP.

3.3 Site Safety Officer

OHM designates a Site Safety Officer (SSO) who defines and implements the project safety program and procedures. The SSO is delegated authority by the Project Superintendent to enforce the SSHP. The SSO will conduct the daily safety meetings and interface as required with other site representatives. The SSO performs duties such as confirming personnel are fit for duty, coordinating emergency medical care, conducting a daily safety inspection, and inspecting health and safety equipment. In addition, the SSO is responsible for maintaining safety equipment, posting daily air monitoring results, providing site orientation safety training for all personnel actively involved in site work, and other site safety documentation. The SSO takes the following action(s) when appropriate:

- Orders the immediate shut-down of site activities in case of a medical emergency or unsafe practice.
- Ensures protective clothing and equipment are properly stored and maintained.
- Ensures that the environmental and personnel monitoring operations are ongoing and in accordance with this SSHP.
- Restricts visitors from areas of potential exposure to harmful substances.

A safety log will be kept for all OHM activities. This log will include daily safety meeting topics, training given, air monitoring information, first aid administered, visits of outside personnel, and any incidents of a health and safety nature.

The SSO and/or Project Superintendent has responsibility for implementing and enforcing the site safety program and procedures. He will oversee any personnel monitoring and decide when action levels have been reached which require more stringent personnel protection. The SSO establishes and enforces the protective equipment to be used for various site activities. The SSO will maintain contact with OHM Regional and Corporate CIH.

3.4 Project Superintendent

The Project Superintendent (PS) has responsibility for implementing and enforcing the SSHP and all field activities, and enforces safe work practices by all crew members. He watches for any ill effects on any of the crew members, especially those symptoms caused by heat stress or chemical exposure. The PS oversees the safety of any visitors who enter the site. The PS communicates safety and health responsibilities to site personnel, takes the lead in investigating/reporting accidents, and serves as the primary emergency coordinator during site emergencies.

3.5 Equipment Operators

Equipment operators will be responsible for the maintenance, inspection, and safe operation of their equipment. Operators are responsible for daily inspection of their equipment and assuring it is in safe operating condition.

3.6 Employee Safety Responsibility

Each employee is responsible for his own safety as well as the safety of those around him. The employee shall use all equipment provided in a safe and responsible manner as directed by his Superintendent. All OHM personnel will follow the policies set forth in OHM's Health and Safety Procedures Manual and OHM's Health and Safety Procedures. Health and Safety Procedures relevant to site operations are attached to this SSHP.

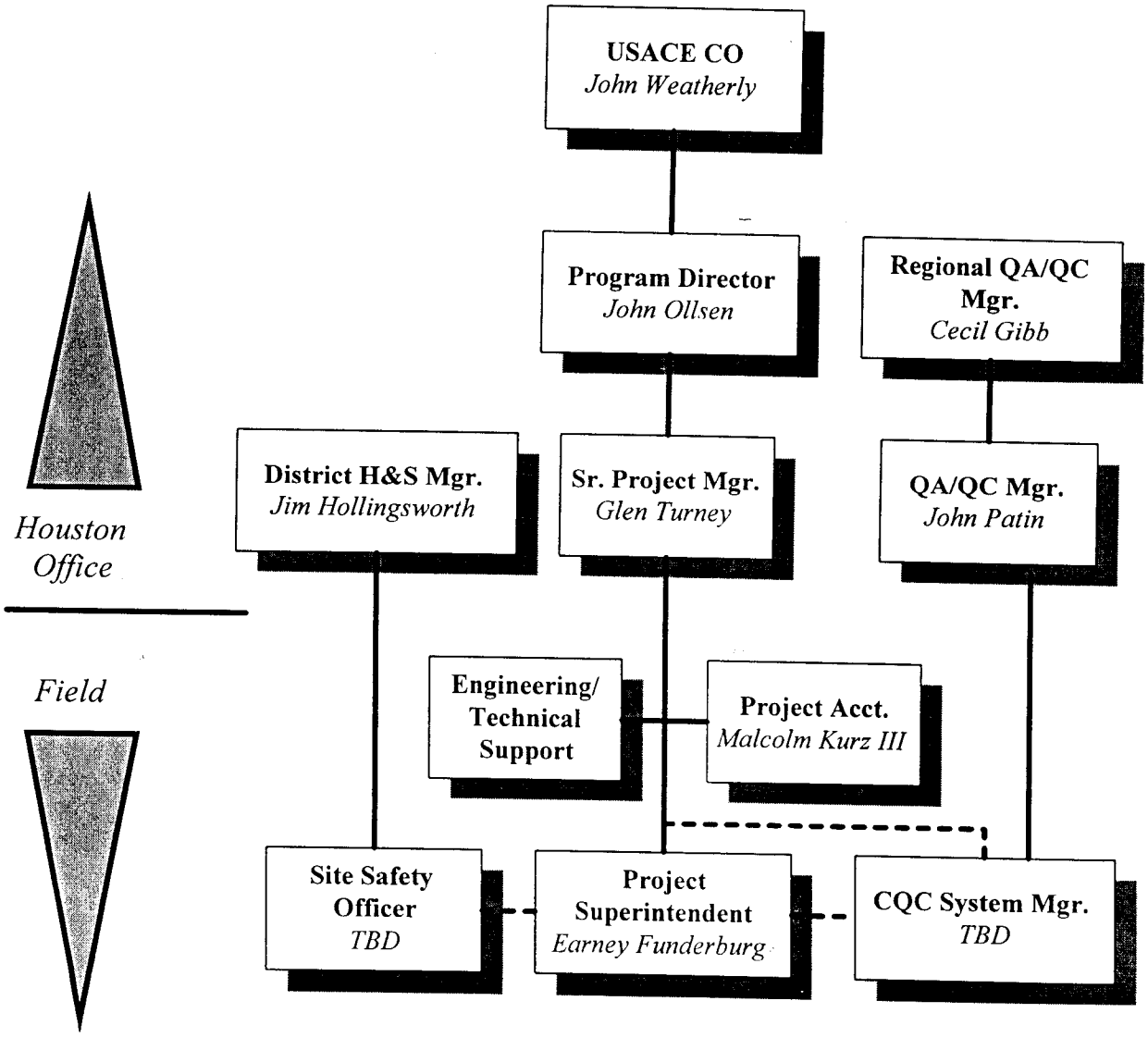
3.7 Responsible OHM Health and Safety Personnel

The following personnel are responsible for health and safety on site **(Figure 4-1)**:

Senior Project Manager:	Glen Turney	(713) 775-7658
Project Superintendent:	Earney Funderburg	(on-site)
Site Safety Officer:	TBD	(on-site)
District Health and Safety Manager & CIH:	Jim Hollingsworth	(713) 775-7672
Contractor Quality Control System Manager:	TBD	(on-site)
Regional QA/QC Manager:	John Patin	(713) 775-7671
Program Director:	John Ollsen	(713) 775-7656
Regional Manager:	Keith Angell	(770) 729-3900

FIGURE 4-1 PROJECT ORGANIZATION CHART

ORGANIZATION CHART
INTERIM REMEDIAL ACTION
LANDFILLS 12 AND 16
LONGHORN ARMY AMMUNITION PLANT, KARNACK, TEXAS



4.0 PROJECT HAZARD ANALYSIS

This section of the SSHP details the chemical, physical, biological, and task-specific hazards posed to site personnel during planned USACE LHAAP project activities. Section 4.1 summarizes the chemical hazards posed by anticipated site contaminants and hazardous chemicals brought to the site. The Site Hazard Communication Program is summarized in Section 4.1.1. Copies of material safety data sheets (MSDS) for each of these chemical hazards are located in the project trailer.

Section 4.2 discusses physical hazards identified with the site including those safety hazards associated with construction, use of heavy equipment, fire hazards, electrical, and physical hazards posed by heat stress, noise, and ionizing radiation. Biological hazards, discussed in Section 4.3, are associated with poison ivy, ticks, and Lyme disease. Section 4.4 discusses the risks and precautions associated with each task identified and in the work plan.

Daily "Tailgate" safety meetings will be held at the start of each shift, prior to the day's remediation activity, in which potential chemical, physical, and biological hazards and preventative safety measures are discussed.

An Activity Hazard Analysis will be developed for each task performed during each major project. This analysis identifies the sequence of work, specific hazards anticipated, and control measures to be implemented to minimize or eliminate each hazard. The Activity Hazard Analysis will be used to augment daily safety meetings intended to heighten safety and hazard awareness on the job.

4.1 Chemical Hazards

The chemical hazards believed to be on site are based on information received from prior site investigations and information provided by the USACE Early Interim Remedial Action Design, July 1995. The chemical hazard descriptions included below for each anticipated site contaminant include: chemical name, accepted safe exposure limit (PEL, TLV, LEL), route of exposure (inhalation, dermal), type of hazard, and signs/symptoms of overexposure.

Chlorinated Hydrocarbons

Chlorinated hydrocarbons are hydrocarbons that include chlorine in their structure. These include trichloroethylene, vinyl chloride, and other similar compounds. Some chlorinated hydrocarbons are irritating and toxic to the central nervous system (CNS). Inhalation of high concentrations have lead to death due to ventricular fibrillation. Chronic exposure may lead to heart, liver, and kidney damage. The liquids are often absorbed through the skin. Although some chlorinated hydrocarbons have a relatively low flash point, most, but not all, burn with difficulty. Other chlorinated hydrocarbons are confirmed human carcinogens. Vapor inhalation may lead to CNS depression. The liquid can cause frostbite. Some chlorinated hydrocarbons such as vinylchloride are flammable gases at room temperature and polymerize on exposure to air or sunlight. Avoid exposure to chlorinated hydrocarbons through engineering controls and wearing PPE.

Methylene chloride

TLV: 50 ppm
STEL (Ceiling): 1000 ppm

Methylene chloride is a colorless, volatile liquid with a sweet odor. It is irritating to the eyes, skin, and respiratory tract. At high concentrations it can cause narcosis (unconsciousness). Methylene chloride is metabolized to carbon monoxide in the body which contributes to much of its toxicity. It can form flammable mixtures with air (forming toxic phosgene when burned) and becomes explosive when mixed with oxygen.

1,1,1-Trichloroethane

PEL: 350 ppm
STEL: 450 ppm

1,1,1-Trichloroethane or methyl chloroform is irritating to eyes, skin, and respiratory tract. Although low in systemic toxicity, methyl chloroform is an anesthetic capable of causing death at high concentrations Like many other solvents, methyl chloroform sensitizes the heart to epinephrine (blood pressure-raising hormone) and may induce cardiac arrhythmias and arrest. Target organs include skin, eyes, central nervous (CNS) and cardiovascular (CVS) systems. Primary entry routes include inhalation and skin contact.

Petroleum Hydrocarbons (as gasoline)

PEL: 300 ppm
STEL: 500 ppm

Petroleum hydrocarbons include gasoline, diesel, crude oil and other similar materials that are typically mixtures of different chemicals. Gasoline is a red or clear, highly volatile liquid with an aromatic (gasoline) odor. Gasoline contains 0.5-5.0 percent benzene. Exposure potential to gasoline is primarily through inhalation and skin absorption. Symptoms include respiratory irritation, headaches, dizziness, nausea, and loss of coordination. Inhalation of automotive gasoline vapors can cause intense burning in throat and lungs, CNS depression, and possible fatal pulmonary edema. Gasoline is a dangerous fire and explosion hazard when exposed to heat and flames. Diesel fuel overexposure may cause an exaggerated sense of well being, excitement, headache, dizziness, incoherent speech, narcosis, central nervous system stimulation, and then depression, respiratory paralysis, respiratory irritation, vomiting, skin cancer, and death. It is a skin irritant and central nervous system depressant with high mist concentrations. It is an environmental hazard and a dangerous fire hazard when exposed to heat, flame, or oxidizers.

Propellants, Explosives and Pyrotechnics

Propellants, explosive and pyrotechnics consist of a wide range of materials or mixtures used by the military that have the capacity for varying degrees of combustion rates and which produce large volumes of gas at high pressures and temperatures. Propellants produce a "controllable" rate of combustion, the resulting gases of which are used to drive projectiles. Explosive materials whose detonation result in uncontrolled combustion creating rapid expansion of gases are used to effect destruction or damage to adjacent objects. Pyrotechnic materials when burned produce varying degrees of color light and or sound. Pyrotechnics are often used in conjunction with propellants and explosives in signal flares and fireworks.

All of these materials present severe fire and explosive hazards and must be handled carefully by

appropriately trained personnel. Many contain oxidizing materials that if mixed with organic materials may cause spontaneous fire or explosion. Others are shock sensitive, friction sensitive or may be ignited or detonated by electrostatic discharge (ESD). And yet others may be toxic. Examples of these materials include nitrobenzene and nitrotoluene.

2,6-dinitrobenzene

PEL: (Skin)1.0 mg/m^3

Dinitrochlorobenzene is a strong irritant and sensitizer causing an allergic reaction (contact dermatitis) in 60 to 80% of individuals who come in contact with it. DNCB is combustible, shock sensitive and can explode if heated.

Nitrobenzene is a deadly poison that can be rapidly absorbed through intact skin. Cyanosis, anemia, and deleterious effects on the central nervous system (CNS) and the cardiovascular system (CVS) can develop following significant occupational exposure to nitrobenzene. Target organs include skin, eyes, blood, liver, kidneys, testicles, and CVS. Primary entry routes include inhalation, skin contact/absorption. Symptoms of occupational exposure to nitrobenzene include headache, vertigo, vomiting, nausea, dizziness, anemia, atoxia, shortness of breath, rapid pulse, and irritation of the skin and eyes. Coma and death may ensue. Chronic exposure produces a reversible anemia.

Nitrotoluenes (as dinitrotoluene)

PEL: 1.5 mg/m^3

Nitrotoluenes are suspected cancer-causing substances. Overexposure symptoms include cyanosis, shortness of breath, headache, unconsciousness, liver damage, and death. Dinitro toluene has an orange to yellow crystalline appearance. It has a vapor density of 6.27 (air = 1) and a specific gravity of 1.5 (water = 1). It is heavier than air and water. Dinitro toluene is flammable.

MSDSs for any additional chemical hazards identified on site or brought onto the site will be obtained and reviewed with all personnel during daily safety meetings. Levels of protection and air monitoring requirements will be based initially on the data provided or obtained prior to remediation work. These requirements may change as additional site characterization is obtained.

The chemical hazard analysis evaluates anticipated chemical hazards on the basis of available data. The hazard analysis rates the magnitude of hazards, or potential hazards, so that the appropriate control measures can be implemented to maintain personnel exposures at as low as reasonably achievable" (ALARA) levels.

OHM's protective equipment requirements combined with the requirement to wash arms, face, and hands before eating or smoking, prevent exposure through these routes. In addition, the Site Safety Officer and Project Superintendent observe and warn the crew members to be aware of the initial symptoms of chemical exposure. The amount of exposure depends primarily on the specific activities undertaken and the care with which the activities are performed. Any crew member will be removed from the work site and placed under watch immediately if these initial symptoms persist:

- Dizziness or stupor

- Nausea, headaches, or cramps
- Irritation of the eyes, nose, or throat
- Euphoria
- Chest pains and coughing
- Rashes or burns

4.1.1 Hazard Communication Program

The purpose of a Hazard Communication or Employee Right-To-Know program is to ensure that the hazards of all chemicals located at this field project site are communicated to all personnel and subcontractors according to 29 CFR 1926.59.

A written hazard communication program has been established for the project and includes the following:

- Container Labeling -- OHM personnel will ensure that all drums and containers are labeled according to contents. These drums and containers will include those from manufacturers and those produced on site by operations. All incoming and outgoing labels shall be checked for identity, hazard warning, and name and address of responsible party.

- MSDSs -- There will be an MSDS located on site for each hazardous chemical used or known to be on site. MSDSs are in the project trailer.

- Employee Information and Training -- Training employees on chemical hazards is accomplished through formal safety training conducted annually and informal safety meetings. Project-specific chemical hazards are communicated to employees through an initial site orientation meeting and during daily safety meetings held at OHM field projects.

The written program is located in the project trailer. At a minimum, employees will be instructed on the following:

- Chemicals and their hazards in the work area.
- How to prevent exposure to these hazardous chemicals.
- What the company has done to prevent workers' exposure to these chemicals .
- Procedures to follow if employees are exposed to these chemicals.
- How to read and interpret labels and MSDSs for hazardous substances found on OHM sites.
- Emergency spill procedures.
- Proper storage and labeling.

When any new hazardous material is introduced or discovered on site, affected employees will be given information on this material at the daily safety meeting. The Project Superintendent will be responsible for seeing that the MSDS on the new chemical or material is available on site.

4.2 Physical Hazards

The physical hazards posed by planned USACE LHAAP project activities include safety hazards, heat stress, and noise. There are numerous physical/safety hazards associated with this project which, if not identified and addressed, could present operational problems as well as accidents and personal injury to the work force. In order to minimize physical hazards, the OHM Team has developed a Health and Safety Procedures Manual which outlines the minimum health and safety requirements for USACE LHAAP project sites to be followed at all times. Failure to follow safety protocols or continued negligence of these policies will result in expulsion of a crew member from the site as well as possible termination of employment.

The OHM SOPs will be on site located in the project trailer.

4.2.1 Safety Hazards

All OHM Team personnel will become familiar with the field activities which will be conducted at the site. All OHM personnel are trained to work safely under various field conditions. In addition, the PS will observe the general work practices of each crew member and equipment operator and enforce safe procedures to minimize safety hazards. Procedures from the OHM Health and Safety Procedures Manual that specifically apply to planned project activities are cross referenced throughout the SSHP. The OHM Health and Safety Procedures Manual will be maintained on site. The following sections are typical safety hazards that may occur at USACE LHAAP project sites along with relevant hazard control procedures.

1. Heavy and Bulky Loads - Intelligent thought shall be exercised before heavy and bulky loads are lifted or handled manually by personnel. Mechanical equipment such as fork-lifts, wheel barrows, hand-trucks, loaders, and cranes shall be utilized when possible and needed.

   Note: Back injuries are real, debilitating, unproductive, and costly to both employees and employers, and sometimes are permanent. Back injury prevention must be given high priority on all project sites. If you think the load you are about to lift is too heavy or bulky, it probably is! Get help or utilize mechanical equipment.

   Employees will make certain the load can be safely handled by considering the size, weight, and shape of the load. No loads over 60 pounds will be lifted. Proper lifting techniques will be utilized: feet will be shoulder width apart, one foot will be placed along side the load, bend at knees, maintain arch in back, keep the load close to the body, lift with legs not the back.

2. Hoisting Accidents - Employees can have suspended loads dropped on them, be caught behind a load and a stationary object, or be crushed or struck by the counterweight. All hoisting will be done by qualified personnel only after safety checks are made of chokes and cables. In addition, no hoisting will take place without a designated signal man present.

3. Heavy Equipment Operation and Inspection - Heavy construction equipment operators present construction safety hazards to operating and ground personnel. OHM has safe operating

procedures (SOP) for the use of heavy construction equipment. Only trained and qualified operators are authorized to operate heavy construction equipment.

The operators are responsible for performing daily equipment inspections on their equipment to identify, take out of service, and correct any equipment defects of non-functioning safety devices that would render the equipment unsafe to operate. Standard safety devices and equipment required to be inspected and functional during use includes the following:

- Seat belts
- Safety glass in enclosed cab
- Braking system
- Back-up alarms
- Portable fire extinguisher
- Horn
- Tires
- Steering and hydraulic systems

Operators are required to wear seat belts when operating equipment and are responsible for the location of ground personnel in their work area. The turning radius of trackhoes is guarded to prevent contact between the equipment counterweight and ground personnel.

4. Bulk Fuel Storage - The bulk fuel storage will be a 2000-gallon tank located near the temporary facilities. At least one 20-pound dry chemical, ABC-type fire extinguisher will be positioned in this area.

5. Flame, Heat, or Spark-Producing Operations - Because of the possibilities of flammable materials being present at this site, flame, heat, or spark-producing operations will be limited. If a case arises where hot work is necessary, it will be performed by OHM SOP on site according to the Hot Work Procedure.

   This procedure requires a hot work permit and will be inspected by the SSO or PS prior to commencing hot work. All combustible materials will be removed from the area before any hot work is started. A fire watch will be posted and the atmosphere will be tested for combustible gases. The hot work permit will be completed by the SSO or PS . The permit will indicate the area, the employees involved, air monitoring results, fire protection systems, and fire department number.

6. High Pressure Washing - Washing or cleaning certain pieces of equipment may require the use of high pressure washers, referred to as lasers. These devices can be hazardous if not used properly. Specific laser safety instructions are provided in Procedure No. 30. The following protective equipment will be worn: safety shoes or boots, metal foot and shin guards, goggles and face shield, hard hat, heavy-duty PVC rain suit, heavy chemical-resistant gloves. Only trained personnel will operate the high pressure washer. The operator must have an assistant to move the hose and back-

up the operator. Other personnel must remain a minimum of 25 feet from the area. The equipment cannot be altered. (Trigger shall never be tied down.) Operator should be changed every hour.

7. Small Quantity Flammable Liquids - Small quantities of flammable liquids will be stored in "safety" cans and labeled according to contents.

8. Electrical Hazards - Overhead power lines, downed electrical wires, and buried cables pose a danger of shock or electrocution if workers contact or sever them during site operations. Electrical equipment used on site may also pose a hazard to workers.

   To help minimize this hazard, low-voltage equipment with ground-fault interrupters and water-tight, corrosion-resistant connecting cables will be used on site. In addition, lightning is a hazard during outdoor operations, particularly for workers handling metal containers or equipment. To eliminate this hazard, weather conditions will be monitored and work will be suspended during electrical storms. An additional electrical hazard involves capacitors that may retain a charge. All such items will be properly grounded before handling. OSHA's standard 29 CFR 1910.137 describes clothing and equipment for protection against electrical hazards.

   Electrical devices and equipment must be de-energized prior to working near them. All extension cords must be kept out of water, protected from crushing, and inspected regularly to ensure structural integrity. Temporary electrical circuits must be protected with ground fault interrupters. Only qualified electricians are authorized to work on electrical circuits.

   Electrical work will only be performed by approved electricians. No electrical work should be done on an energized circuit. Single phase electrical hand tools must be approved by a recognized testing agency, and all exposed non-current carrying metal parts must be grounded or double insulated. Electrical equipment cannot be used if there are deficiencies in the appliance, cord, and plug.

9. Slip/Trip/Fall Hazards - Some areas may have wet surfaces which will greatly increase the possibility of inadvertent slips. Caution must be exercised when using steps and stairs due to slippery surfaces in conjunction with fall hazards.

   Use of handrails when climbing stairs will be enforced, and handrails will remain secure until the support itself is removed and lowered to ground level. Good housekeeping practices are essential to minimize trip hazards. Safety belts or harnesses will be required by personnel working four feet or more above surfaces, including manlifts.

   The work area shall be kept clean and orderly. Tools and debris must be picked up and placed in the proper place to prevent a tripping hazard. Walkways and grating shall be kept in good condition. Spills will be cleaned up immediately. Personnel shall not walk or climb on piping, valves, fittings, or any other equipment not designed as walking surfaces.

10. Ground Personnel - All ground personnel should be constantly aware of the possibility of slips, trips, and falls due to poor and possibly slippery footing in the work areas. Before crossing either in front of or behind a piece of heavy equipment, ground personnel will signal the equipment operator and receive confirmation before moving.

11. Pumping Equipment - Various types of pumps may be used for the removal of materials from ditches, ponds, lagoons, etc. The handling of pressurized hoses that could rupture and violently release liquid materials to the work area will be controlled by inspecting all hose fittings for secure connections [all OPW (camlock) and fittings must be secured with the wire]. All employees must wear splash gear including splash shields when moving or disconnecting pumps and hoses.

12. Head and Back Injuries - As minimum requirements, hard hats and safety glasses will be donned prior to performing any site activities. This requirement will prevent minor injuries caused by bumping one's head while working around and under piping and other process-related structures. At the daily safety meeting, personnel are instructed in proper lifting techniques and reminded not to lift heavy items without assistance.

13. Falling Objects - OHM believes that the dismantlement process as well as other remediation processes can be accomplished without any object, regardless of size, free falling to the ground. All support structures will be slowly lowered to the ground using a grapple and/or skip bucket. No personnel shall work under this equipment at any time. Also, the SSO will ensure that an adequate area is clear of personnel while the equipment is in operation.

14. Heavy Equipment and Vehicle Traffic - The use of heavy equipment for debris removal, excavation, and lifting presents the greatest potential for injury to personnel. In order to minimize these hazards, designated routes will be established for mobilization through the facility, and specific traffic patterns will be established. All trucks will have spotters for backing maneuvers. Those crew members directly involved with spotting for the operator will be the only personnel allowed in the vicinity of the heavy equipment. All other personnel will remain a safe distance away from these operations. Personnel needing to approach heavy equipment while operating will observe the following protocols:

    - Make eye contact with the operator (and spotter).
    - Signal the operator to cease heavy equipment activity.
    - Approach the equipment and inform the operator of intentions.

    OHM will follow all traffic rules. Company vehicles will yield to all bikes, pedestrians, and railroad crossings. All vehicles must come to a complete stop at all railroad crossings. All vehicles must be operated in a safe and legal manner. Motor vehicles that are defective or not operating properly must be reported immediately. Seats beats must be worn while driving. Personnel shall drive at posted speed limits or at speeds consistent with prevailing road, traffic, or weather conditions.

15. Confined Space Entry - No confined spaces are anticipated.

16. Equipment and Hand Tools - All hand tools and power tools shall be in good repair and will be used only for the task for which they were designed. All damaged tools will be tagged "Out of Service." All tools will be kept clean. Sharp tools shall not be carried in pockets. When working, overhead tools will be placed in a holding receptacle or secured when not in use. Tools cannot be thrown or dropped from heights. Only non-sparking tools will be used in flammable or explosive atmospheres. Cheater pipes will not be used.

4.2.2 Heat Stress

With the possible combination of ambient factors such as high air temperature, high relative humidity, low air movement, high radiant heat, and protective clothing, the potential for heat stress is a concern. The potential exists for the following:

- Heat rash
- Heat cramps
- Heat exhaustion
- Heat stroke

Heat stroke, heat cramps, and heat exhaustion are covered in detail during OHM's 40-Hour OSHA 29 CFR 1910.120 pre-employment course. In addition, this information is discussed during safety "tailgate" meetings which are conducted before each workday. Workers are encouraged to increase consumption of water and electrolyte-containing beverages such as Gatorade during warm weather. Water and electrolyte-containing beverages will be provided on site and will be available for consumption during work breaks.

An action level for heat stress has been established at 75°F ambient temperature when site personnel are wearing chemical protective clothing during the performance of field activities. The following work/rest schedule is recommended, with personnel drinking fluids (tepid water and/or electrolyte) at rest periods consistent with their fluid loss:

Ambient Temperature (degrees F)	Work Period (minutes)	Rest Period (minutes)
75 - 80 F	120	15
80 - 85 F	90	15
85 - 90 F	60	15
90 - 95 F	30	15
95 - 100 F	15	15

The above work/rest schedule is only a guideline for use during field activities when personnel are wearing protective clothing. The actual work/rest schedule may be adjusted by conducting pulse monitoring before

and after the work period and/or by performing daily pre/post work shift body weighing if heat stress is not effectively controlled by the previously noted work/rest schedule. The action level for adjusting the work/rest schedule would be 110 beats per minute (bpm), obtained immediately after the work period in a seated, shaded position.

When a person's pulse exceeds 110 bpm, that person is considered to be undergoing heat stress which will require the work period to be reduced in 15-minute intervals while maintaining the same rest period until post work period pulse monitoring is maintained below 110 bpm. In addition, should a person's body weight change at the end of the work day by more than 1.5 percent, the work period must be reduced in 15-minute intervals while maintaining the same rest period until no daily body weight changes greater than 1.5 percent are observed. Fluid replacement is also essential to maintaining body weight.

Field activities in which site personnel are required to wear chemical protective clothing at ambient temperatures higher than 95°F will be avoided whenever feasible by scheduling these activities during the work day to avoid peak ambient temperatures (10 a.m. -- 2 p.m.). Site personnel who have experienced a heat-related illness (heat cramps, heat exhaustion) will be restricted to Level D tasks for a minimum of one day after illness occurrence and will return to tasks requiring chemical protective clothing only with the concurrence of the attending physician. Site personnel will follow OHM's SOP for heat stress prevention (No. 20).

4.2.3 Hearing Conservation Program

On projects where noise levels may exceed a time weighted average (TWA) of 85 dBA (decibels, A-scale), hearing protection will be made available to all exposed employees. Additionally, sound level monitoring will be conducted on site. All OHM personnel have annual audiograms and will be restricted from high noise exposure without appropriate hearing protection when a standard threshold shift is present. OHM's hearing conservation program is in compliance with OSHA regulations found at 29 CFR 1910.95.

4.2.4 Radiation Hazards

The are no radiological hazards expected for this project.

4.3 Activity Hazard Analysis

This activity hazard analysis section of the SSHP identifies the potential hazards posed by tasks performed during each major project phase as well as the hazard control measures required to be implemented to abate these potential hazards. An activity hazard analysis will be performed for each major project phase during site remedial operations. Each major project phase is comprised of specific tasks that pose potential hazards to site personnel. The following is a listing of common potential hazards and accompanying hazard control measures that may be associated with planned project activities.

TASK 1 - ACTIVITY HAZARD ANALYSIS FOR MOBILIZATION		
TASK BREAKDOWN	POTENTIAL HAZARDS	HAZARD CONTROL MEASURES
Equipment/ Facility Set-up	Slips, Trips, Falls	• Clear walkways work areas of equipment, tools, vegetation, excavated material and debris • Mark, identify, or barricade other obstructions
	Handling Heavy Objects	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads
	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition • Keep guards in place during use
	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)
	High/Low Ambient Temperature	• Monitor for Heat/Cold stress in accordance with OHM Health and Safety Procedures Manual

011507

TASK 2 - ACTIVITY HAZARD ANALYSIS FOR SUMP AND CONTAINER SAMPLING		
TASK BREAKDOWN	POTENTIAL HAZARDS	HAZARD CONTROL MEASURES
Sump and Container Sampling	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition • Keep guards in place during use
	Handling Heavy Objects	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads
	Slips, Trips, Falls	• Clear walkways, work areas of equipment, tools, vegetation, excavated material, and debris • Mark, identify, or barricade other obstructions
	Confined Space Entry	• DO NOT ENTER ANY SPACE UNTIL AN ASSESSMENT OF THE HAZARDS HAS BEEN COMPLETED AND ANY REQUIRED PERMITS ISSUED. • Monitor space for LEL/O_2 and toxics, Issue required permits • Restrict entry to trained personnel only • Pre-plan for emergencies • Use the buddy system • Wear required PPE • Follow applicable SOPs
	Inhalation and Contact with Hazardous Substances	• Provide workers proper skin, eye and respiratory protection based on the exposure hazards present (see Section 5.0) • Review hazardous properties of site contaminants with workers before operations begin
	Potential for explosive, propellants or pyrotechnics	• Do not access sumps for sampling until LHAAP has tested sludges for these hazards.
	High/Low Ambient Temperature	• Monitor for Heat/Cold stress in accordance with OHM Health and Safety Procedures Manual

017508

TASK 3 - ACTIVITY HAZARD ANALYSIS FOR ANALYSIS OF WATER AND SLUDGE SAMPLES		
TASK BREAKDOWN	POTENTIAL HAZARDS	HAZARD CONTROL MEASURES
Off-site Anlaysis	Spill, Leakage	• Properly package, label and mark sample shippers • Verify receipt of samples at lab
	Sample Analysis	• Lab to follow Chemical Hygiene Plan as appropriate

011509

TASK 4 - ACTIVITY HAZARD ANALYSIS FOR REMOVING WATER AND SLUDGE FROM SUMPS		
TASK BREAKDOWN	POTENTIAL HAZARDS	HAZARD CONTROL MEASURES
Water/Sludge Pumping	Fire/ Explosion	• Eliminate sources of ignition from the work area • Prohibit smoking • Provide ABC (or equivalent) fire extinguishers in all work, flammable storage areas and with fuel powered generators and compressors • Store flammable liquids in well ventilated areas • Post "NO SMOKING" signs • Store combustible materials away from flammables • Store all compressed gas cylinders upright, caps in place when not in use • Separate Flammables and Oxidizers by 20 feet minimum
	Flammable, Toxic, Oxygen deficient Atmospheres	• Test vessel atmosphere for flammable/toxic vapors, and oxygen deficiency • Obtain Confined Space Entry Permit signed by Supervisor/Safety Officer • De-energize, lock-out and tag all energized equipment • Provide written rescue plan • Review hazardous properties of site contaminants with entrants and safety observer • Review emergency procedures before work commences • Provide safety observer outside vessel • Wear proper level of PPE for the type of atmospheric contaminants • Use body harness, safety belt with tripod winch for possible rescue
	Burns	• Use proper work gloves, face shield/safety goggles, and leather apron to protect workers from skin burns when welding, cutting, and burning
	Inhalation and Contact with Hazardous Substances	• Provide workers proper skin, eye and respiratory protection based on the exposure hazards present (See Section 5.0) • Review hazardous properties of site contaminants with workers before operations begin
	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition • Keep guards in place during use

017510

TASK 5 - ACTIVITY HAZARD ANALYSIS FOR TANK REMOVAL AND CLEANING		
TASK BREAKDOWN	POTENTIAL HAZARDS	HAZARD CONTROL MEASURES
Clearing, Grubbing	Struck By/ Against Heavy Equipment	• Use reflective warning vests worn when exposed to vehicular traffic • Isolate equipment swing areas • Make eye contact with operators before approaching equipment • Understand and review hand signals
	Slips, Trips, Falls	• Clear, walkways of equipment, vegetation, excavated material, tools and debris • Mark, identify, or barricade other obstructions
	Handling Heavy Objects	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads
	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition • Keep guards in place during use
	Contact Dermatitis	• Wear PPE to avoid skin contact with contaminated soil, plants, or other skin irritants
	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period
	High/Low Ambient Temperature	• Monitor for Heat/Cold stress in accordance with OHM Health and Safety Procedures Manual

017511

TASK 5 - ACTIVITY HAZARD ANALYSIS FOR TANK REMOVAL AND CLEANING		
TASK BREAKDOWN	POTENTIAL HAZARDS	HAZARD CONTROL MEASURES
Concrete Demolition	Struck by, Against Heavy Equipment, Flying Debris, Protruding Objects	• Use reflective warning vests when exposed to vehicular traffic • Isolate equipment swing areas • Make eye contact with operators before approaching equipment • Barricade or enclose the demolition area • Restrict entry to the work area to heavy equipment operator(s) and signaler(s) during demolition • Wear hard hats, safety glasses with side shields, and steel-toe safety boots • Understand and review hand signals • Cease operations for electrical storms, high winds
	Slips, Trips, Falls	• Clear, walkways of equipment, vegetation, excavated material, tools and debris • Mark, identify, or barricade other obstructions
	Handling Heavy Objects	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads
	Fire/ Explosion	• Test atmospheres with combustable gas meter when working around flammable materials • Eliminate sources of ignition from the work area • Prohibit smoking • Provide ABC (or equivalent) fire extinguishers for all work and flammable storage areas, fuel powered generators and compressors • Store flammable liquids in well ventilated areas • Post "NO SMOKING" signs • Store combustible materials away from flammables • Store all compressed gas cylinders upright, caps in place when not in use • Separate Flammables and Oxidizers by 20 feet minimum
	Premature structural Collapse	• Barricade or enclose the demolition area • Restrict entry to the work area to heavy equipment operator(s) and signaler(s) during demolition • Wear hard hats, safety glasses with side shields, and steel-toe safety boots • Understand and review posted hand signals

017512

TASK 5 - ACTIVITY HAZARD ANALYSIS FOR TANK REMOVAL AND CLEANING		
TASK BREAKDOWN	POTENTIAL HAZARDS	HAZARD CONTROL MEASURES
Concrete Demolition (continued)	Electrical Shock	• De-energize or shut off utility lines at their source before work begins • Use double insulated or properly grounded electric power-operated tools • Maintain tools in a safe condition • Provide an equipment-grounding conductor program or employ ground-fault circuit interrupters Manual • Use qualified electricians to hook up electrical circuits • Inspect all extension cords daily for structural integrity, ground continuity, and damaged insulation • Cover or elevate electric wire or flexible cord passing through work areas to protect from damage • Keep all plugs and receptacles out of water • Use approved water-proof, weather-proof type if exposure to moisture is likely • Inspect all electrical power circuits prior to commencing work • Follow Lockout-Tagout procedures in accordance with OHM Health and Safety Procedures
	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition • Keep guards in place during use
	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)
	Burns	• Use proper work gloves, face shield/safety goggles, and leather apron to protect workers from skin burns when welding, cutting, and burning
	Inhalation and Contact with Hazardous Substances	• Provide workers proper skin, eye and respiratory protection based on the exposure hazards present (See Section 5 HASP) • Review hazardous properties of site contaminants with workers before operations begin

017513

TASK 5 - ACTIVITY HAZARD ANALYSIS FOR TANK REMOVAL AND CLEANING		
TASK BREAKDOWN	POTENTIAL HAZARDS	HAZARD CONTROL MEASURES
Excavation of Sump	Underground Utilities	• Identify all underground utilities around the excavation site before work commences • Cease work immediately if unknown utility markers are uncovered
	Struck By/ Against Heavy Equipment	• Use reflective warning vests worn when exposed to vehicular traffic • Isolate equipment swing areas • Make eye contact with operators before approaching equipment • Understand and review hand signals
	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition • Keep guards in place during use
	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)
	Excavation Wall Collapse	• Construct diversion ditches or dikes to prevent surface water from entering excavation • Provide good drainage of area adjacent to excavation • Collect ground water/rain water from excavation and dispose of properly • Store excavated material at least 2 feet from the edge of the excavation; prevent excessive loading of the excavation face • Provide sufficient stairs, ladders, or ramps when workers enter excavations over 4 feet in depth • Place ladders no more than 25 feet apart laterally • Treat excavations over 4 feet deep as confined spaces • Complete confined space permit entry procedure • Monitor atmosphere for flammable/toxic vapors, and oxygen deficiency • Slope, bench, shore, or sheet excavations over 5 feet deep if worker entry is required • Assign a competent person to inspect, decide soil classification, proper sloping, the correct shoring, or sheeting • Inspect excavations (when personnel entry is required) daily, whenever conditions change • Provide at least two means of exit for personnel working in excavations.

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TASK 5 - ACTIVITY HAZARD ANALYSIS FOR TANK REMOVAL AND CLEANING		
TASK BREAKDOWN	POTENTIAL HAZARDS	HAZARD CONTROL MEASURES
Excavation of Sump (continued)	Slips, Trips, Falls	• Clear, walkways of equipment, vegetation, excavated material, tools and debris • Mark, identify, or barricade other obstructions
	Handling Heavy Objects	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads
	Inhalation and Contact with Hazardous Substances	• Provide workers proper skin, eye and respiratory protection based on the exposure hazards present (see Section 5.0) • Review hazardous properties of site contaminants with workers before operations begin
	High/Low Ambient Temperature	• Monitor for Heat/Cold stress in accordance with OHM Health and Safety Procedures Manual
Backfilling	Struck By/ Against Heavy Equipment	• Use reflective warning vests worn when exposed to vehicular traffic • Isolate equipment swing areas • Make eye contact with operators before approaching equipment • Understand and review posted hand signals
	Slips, Trips, Falls	• Clear, walkways of equipment, vegetation, excavated material, tools and debris • Mark, identify, or barricade other obstructions
	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition • Keep guards in place during use
	High/Low Ambient Temperature	• Monitor for Heat/Cold stress in accordance with OHM Health and Safety Procedures Manual

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TASK 6 - ACITIVITY HAZARD ANALYSIS FOR DECONTAMINATION AND DEMOBILIZATION		
TASK BREAKDOWN	POTENTIAL HAZARDS	HAZARD CONTROL MEASURES
Heavy Equipment & Vehicles	Slips, Trips, Falls	• Clear walkways, work areas of equipment, vegetation, tools and debris • Mark, identify, or barricade other obstructions
	Struck by, Against Heavy Equipment, Protruding Objects, & Splashes	• Use reflective warning vests when exposed to vehicular traffic • Isolate equipment swing areas • Make eye contact with operators before approaching equipment • Wear hard hats, safety glasses with side shields, or goggles with splash shields and steel-toe safety boots • Understand and review hand signals
	Inhalation and Contact with Hazardous Substances	• Provide workers proper skin, eye and respiratory protection based on the exposure hazards present (See Section 5.0) • Review hazardous properties of site contaminants with workers before operations begin
	Burns	• Use proper gloves, face shield/safety goggles, shin and toe guards, and splash suits to protect workers from skin burns and injury when operating laser (high pressure washers)
	Handling Heavy Objects	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads
	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition • Keep guards in place during use
	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)
	High Ambient Temperature	• Monitor for Heat Stress in accordance with OHM Health and Safety Procedures Manual

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TASK 6 - ACITIVITY HAZARD ANALYSIS FOR DECONTAMINATION AND DEMOBILIZATION		
TASK BREAKDOWN	POTENTIAL HAZARDS	HAZARD CONTROL MEASURES
Demobilization	Slips, Trips, Falls	• Clear walkways work areas of equipment, tools, vegetation, excavated material and debris • Mark, identify, or barricade other obstructions
	Handling Heavy Objects	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads
	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition • Keep guards in place during use
	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)
	High/Low Ambient Temperature	• Monitor for Heat/Cold stress in accordance with OHM Health and Safety Procedures Manual

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TASK 7 - ACTIVITY HAZARD ANALYSIS FOR PREPARATION OF CLOSURE REPORT		
TASK BREAKDOWN	POTENTIAL HAZARDS	HAZARD CONTROL MEASURES
Report Preparation	Slips, Trips, Falls	• Clear walkways, work areas of equipment, tools and debris • Mark, identify, or barricade other obstructions
	Handling Heavy Objects	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads
	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition • Keep guards in place during use
	Ergonomic Hazards	• Maintain good posture • Maintain adequate lighting • Take regular breaks • Avoid repetive motions
	Contact Dermatitis	• Wear PPE to avoid skin contact with contaminated soil, plants, or other skin irritants (See Section 5) • Identify and review poisonous plants with workers

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TASK 8 - ACTIVITY HAZARD ANALYSIS FOR REMOVAL AND DISPOSAL OF SOILS ADJACENT TO SUMPS		
TASK BREAKDOWN	POTENTIAL HAZARDS	HAZARD CONTROL MEASURES
Truck, Equipment Loading	Struck By/ Against Heavy Equipment	• Use reflective warning vests worn when exposed to vehicular traffic • Obey posted speed limits • Isolate equipment swing areas • Make eye contact with operators before approaching equipment • Understand and review hand signals
	Slips, Trips, Falls	• Clear walk ways, work areas of equipment, tools and debris • Mark, identify, or barricade other obstructions
	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition • Keep guards in place during use
	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)
	Caught In/ Between Moving Parts	• Identify and understand parts of equipment which may cause crushing, pinching, rotating or similar motions • Assure guards are in place to protect from these parts of equipment during operation • Provide and use proper work gloves when the possibility of crush, pinch, or other injury may be caused by moving/stationary edges or objects • Maintain all equipment in a safe condition • Keep all guards in place during use • Avoid moving hydraulic, dump or loading equipment
	Handling Heavy Objects	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads
	High Ambient Temperature	• Monitor for Heat Stress in accordance with OHM Health and Safety Procedures Manual

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TASK 9 - ACTIVITY HAZARD ANALYSIS FOR ADDITIONAL INVESTIGATIONS		
TASK BREAKDOWN	POTENTIAL HAZARDS	HAZARD CONTROL MEASURES
Soil and Container Sampling	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition • Keep guards in place during use
	Handling Heavy Objects	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads
	Slips, Trips, Falls	• Clear walkways, work areas of equipment, tools, vegetation, excavated material, and debris • Mark, identify, or barricade other obstructions
	Inhalation and Contact with Hazardous Substances	• Provide workers proper skin, eye and respiratory protection based on the exposure hazards present (see Section 5.0) • Review hazardous properties of site contaminants with workers before operations begin
	High/Low Ambient Temperature	• Monitor for Heat/Cold stress in accordance with OHM Health and Safety Procedures Manual
Liquid Sampling	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition • Keep guards in place during use
	Handling Heavy Objects	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads
	Slips, Trips, Falls	• Clear walkways, work areas of equipment, tools, vegetation, excavated material, and debris • Mark, identify, or barricade other obstructions

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TASK 9 - ACTIVITY HAZARD ANALYSIS FOR ADDITIONAL INVESTIGATIONS		
TASK BREAKDOWN	POTENTIAL HAZARDS	HAZARD CONTROL MEASURES
Liquid Sampling (continued)	Inhalation and Contact with Hazardous Substances	• Provide workers proper skin, eye and respiratory protection based on the exposure hazards present (see Section 5.0) • Review hazardous properties of site contaminants with workers before operations begin
	Splash	• Wear required PPE • Wear appropriate eye protection • Avoid skin contact • Use buddy system
	High/Low Ambient Temperature	• Monitor for Heat/Cold stress in accordance with OHM Health and Safety Procedures Manual

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5.0 SITE CONTROL AND WORK ZONES

To prevent migration of contamination caused through tracking by personnel or equipment, work zones and personal protective equipment are clearly specified prior to beginning operations. OHM has designated work zones as suggested by the NIOSH/OSHA/ USCG/EPA's document titled, "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities." Each work site will be divided into three zones as follows:

- Exclusion or "Hot" Zone
- Contamination Reduction Zone
- Support Zone

A site map will be included in this section of the plan identifying the following (see **Figure 5-1**):

- Exclusion zone
- Work staging areas
- Contamination reduction zone
- Location of alarms
- Location of emergency response equipment
- Site access control points (entrances and exits)
- Evacuation routes
- Location of telephones

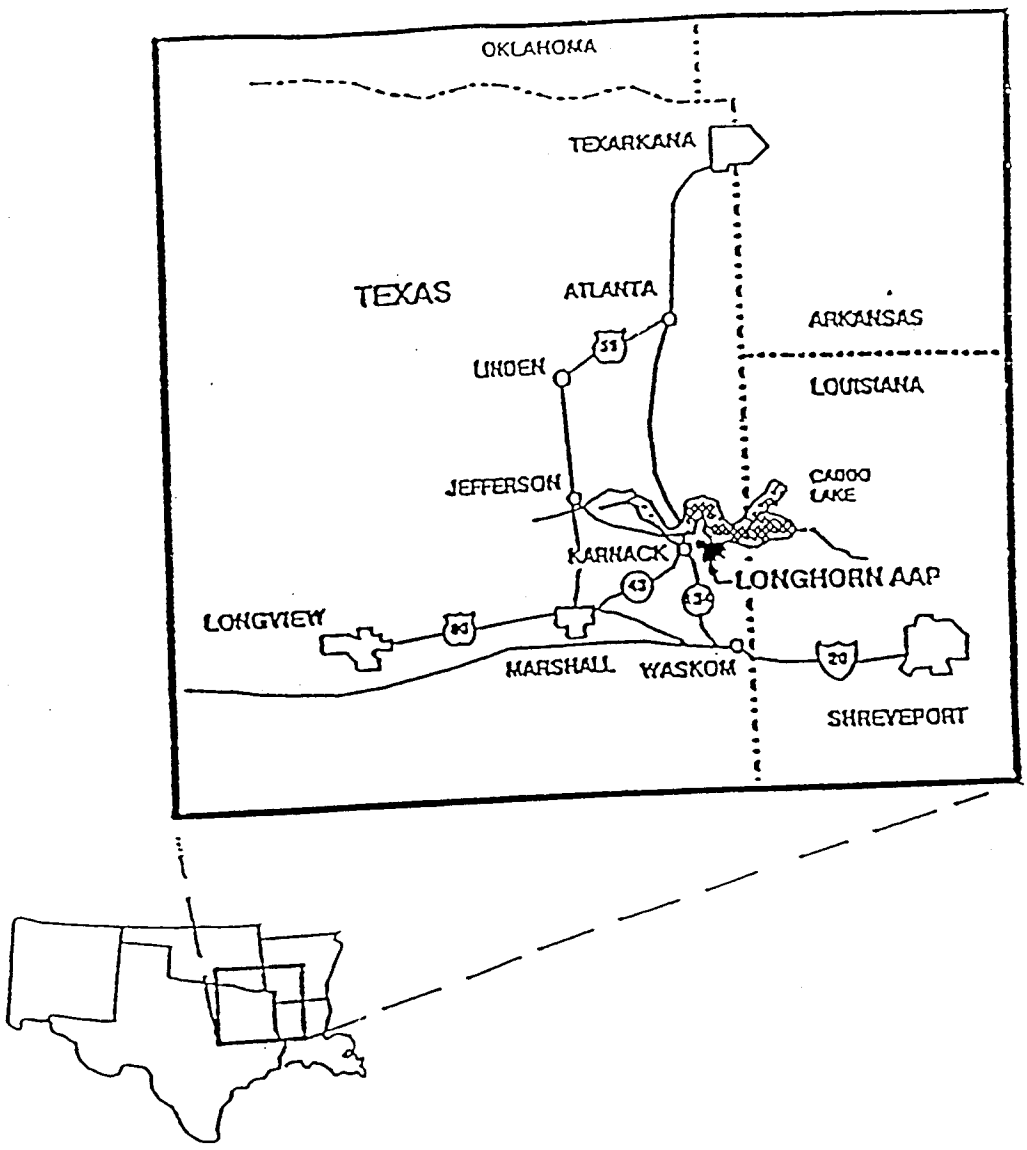
5.1 Exclusion Zone

The Exclusion Zone (EZ) is the area suspected of contamination and presents the greatest potential for worker exposure. Personnel entering the area must wear the mandated level of protection for that area. In certain instances, different levels of protection will be required depending on the tasks performed and air monitoring results obtained within that zone. The EZ will be fenced off with red barricade tape or other equivalent means of demarcation. The EZ boundary will be posted with signs to warn on-site personnel of the construction, safety, and health hazards and to keep unauthorized personnel out of the EZ.

5.2 Contamination Reduction Zone

The Contamination Reduction Zone (CRZ) or transition zone will be established between the EZ and Support Zone. The area will be demarcated with yellow barricade tape or other suitable means of demarcation. In this area, personnel will begin the sequential decontamination process required to exit the EZ. To prevent off-site migration of contamination and for personnel accountability, all personnel will enter and exit the EZ through the CRZ.

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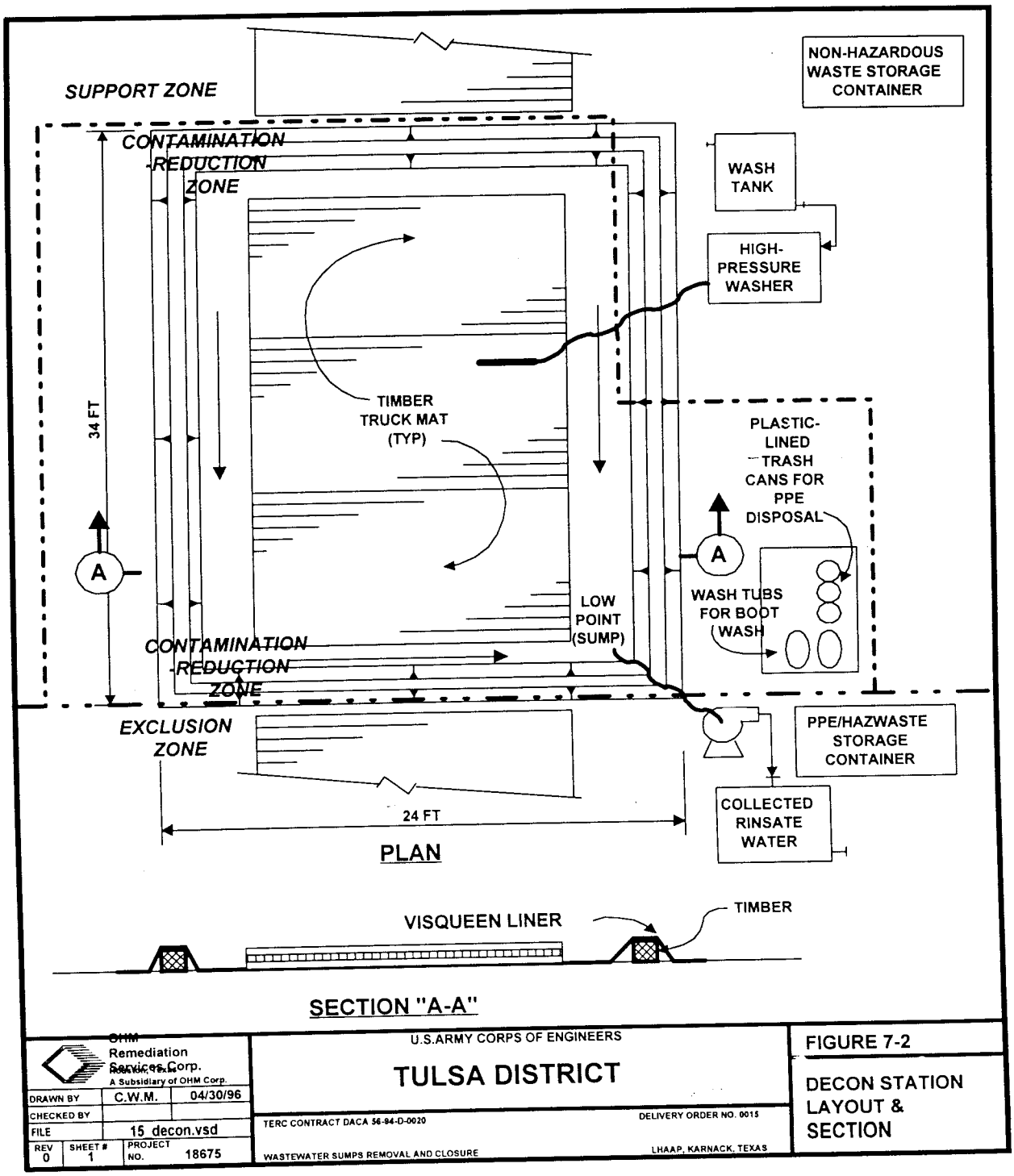
OHM Remediation Services Corp. HOUSTON, TEXAS A SUBSIDIARY OF OHM CORPORATION			U.S. ARMY CORPS OF ENGINEERS
DRAWN BY	O.C.CALINDO	5/01/96	TULSA DISTRICT
CHECKED BY	W. McCULLOUGH	5/01/96	
FILE:	8X11BOR.DWG	-	
REV. 0 / SHEET 1 / PROJECT NO.	18675		TERC CONTRACT DACA 56-94-D-0020 SUMP SAMPLING PROJECT
			DELIVERY ORDER 0012 LHAAP, KARNACK, TEXAS

FIGURE 5-1

SITE MAP

PREPARED FOR LONGHORN ARMY AMMUNITION PLANT

FIGURE 5-2 DECON STATION LAYOUT



5.3 Support Zone

The Support Zone (SZ) serves as a clean control area. Operational support facilities are located within the SZ. Normal work clothing and support equipment are appropriate in this zone. Contaminated equipment or clothing will not be allowed in the SZ. The support facilities should be located upwind of site activities. There will be a clearly marked controlled access point from the SZ into the CRZ and EZ that is monitored closely by the SSO and the PS to ensure proper safety protocols are followed.

5.4 Site Control Log

A log of all personnel visiting, entering, or working on the site will be maintained in the main office trailer. The log will record the date, name, company or agency, and time entering or exiting the site.

5.5 Safe Work Practices

The following items are requirements to protect the health and safety of workers and will be discussed in the safety briefing prior to initiating work on the site.

- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of contamination is prohibited in the EZ and CRZ.
- Hands and face must be washed upon leaving the EZ and before eating, drinking, chewing gum or tobacco, smoking, or other activities which may result in ingestion of contamination.
- A buddy system will be used. Hand signals will be established to maintain communication.
- During site operations, each worker will consider himself as a safety backup to his partner. Off-site personnel provide emergency assistance. All personnel will be aware of dangerous situations that may develop.
- Visual contact will be maintained between buddies on site when performing hazardous duties.
- No personnel will be admitted to the site without the proper safety equipment, training, and medical surveillance certification.
- All personnel must comply with established safety procedures. Any staff member who does not comply with safety policy as established by the SSO or the PS will be immediately dismissed from the site.
- Proper decontamination procedures must be followed before leaving the site.
- All employees and visitors must sign in and out of the site.

5.6 Visitor Access

Visitors should check in immediately upon arrival at the OHM site office. Only authorized visitors will be allowed access to the contaminated areas. **All visitors and subcontractors with access to contaminated areas must submit proof of 40-Hour OSHA "HAZWOPER" training and current medical certification** to OHM staff. Each visitor will be required to provide and wear the necessary protective equipment during the visits and shall be escorted by OHM personnel. All visitors, subcontractors, and personnel will be required to sign a safety plan acknowledgment form to certify that they understand and will comply with the SSHP.

Failure to comply with this site entry procedure will result in expulsion from the site. A visitors log will be kept by the PS or his designee.

5.7 Buddy System

A "Buddy System" will be implemented when conditions represent a risk to personnel which can be either physical or chemical. A buddy system requires that two or three people work as a team, each looking out for the other. "Buddies" must always be in each other's line of sight and should maintain verbal or visual communication. No one must enter into the EZ alone because hazards are likely to exist which could render the employee helpless if rescue were required.

5.8 Site Communications

On-site communications will be established between site work zones and will consist of verbal communications or line of sight observations. Off-site communications will be established in the SZ to summon off-site emergency services and will consist of either on-site cellular telephones or identification of the nearest telephone to the site. Air horns will be available for emergency conditions in the CRZ.

5.9 Health and Safety Inspections

The SSO, PS, and/or his designee will perform regular health and safety inspections. A report including results of the inspection and any corrective actions taken will be filed in the project files, with a copy sent to both the client representative and Project Health and Safety Manager.

5.10 Accident Investigation

An injury that requires only minor first aid need only be recorded on a first aid treatment log which will be maintained on file and available for review. All other injuries or occupational illnesses must be investigated, and the Accident/ Injury Report Form must be completed.

In the case of an injury to an employee that requires medical treatment, the following steps will be followed:

1. Procure medical treatment for employee as described in Section 9.0 of this SSHP.

2. The SSO and PS will investigate the incident and complete an Accident/Injury Report Form.
3. Employer's Report of Injury will be completed and sent to the Workers' Compensation Insurance company within 48 hours of an injury or within 24 hours of a lost time injury or death. A claim for Workers' Compensation benefits must also be submitted.
4. Notify the Client Representative within 24 hours of injury.
5. OSHA Form 200 Log will be updated if the injury is recordable under 29 CFR 1904.
6. A report must be obtained from the physician clearing the employee to resume regular duties, describing modified work acceptable, or removing the employee from work duty.

In the case of a fatal injury or where three or more persons are admitted to the hospital for an overnight stay, OSHA and other appropriate agencies will be notified and an in-depth accident investigation will be conducted in addition to the steps identified above.

6.0 PROTECTIVE EQUIPMENT

This section describes the personal protective equipment (PPE) and respiratory protection required for each type of task for the project. All personnel must wear appropriate protective equipment when activities involve exposure to hazards which cannot be adequately or feasibly controlled by engineering or administrative controls. Respiratory, skin, hand, and foot protection are required when activities are known or suspected to result in inhalation hazards in the form of dusts, mists, fumes, vapors, gases, or when direct contact with hazardous materials may present a dermal contact hazard. The following briefly describes the EPA level categories along with the selection criteria for each protection level.

- Level A: Used when the greatest level of skin, eye, and respiratory protection is needed and consists of a totally encapsulated suit with supplied breathing air (rarely used).
- Level B: Used when the highest level of respiratory protection is needed but a lesser level (less than Level A encapsulated suit) of skin protection is required.
- Level C: Used when criteria for using air purifying respirators are met and a lesser level of skin protection is required.
- Level D: Used only as a work uniform and not in an area with respiratory or skin hazards.

Although the EPA does not designate a Modified Level D, for the purposes of this plan Modified Level D is used when skin protection is required with no respiratory protection. Detailed PPE assignments will be defined for each task. These assignments will be made after an evaluation of existing information is performed. Should the SSO identify site conditions that vary from those evaluated (Section 4.0), additional PPE may be required. Any additional PPE will be prescribed by an approved amendment to the safety plan.

6.1 Protection Level Descriptions

This section lists the minimum requirements for each protection level. Modification to these requirements will be in the task-specific level of protection detailed in Section 6.2.

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6.1.1 Level D

Level D consists of the following:

- Safety glasses with side shields
- Hard hat
- Steel-toed work boots
- Work clothing as prescribed by weather

6.1.2 Modified Level D

Modified Level D consists of the following:

- Safety glasses with side shields
- Hard hat
- Steel-toed work boots
- Nitrile, neoprene, latex, or PVC overboots
- Outer nitrile, neoprene, or PVC gloves over latex sample gloves
- Face shield (when projectiles or splashes pose a hazard)
- Tyvek coveralls for equipment operators that will not come into contact with liquids
- Saran coveralls are required for personnel who are performing tasks which have a potential for exposure to contaminated liquids or sludge

6.1.3 Level C

Level C consists of the following:

- Full-face, air-purifying respirator with appropriate cartridges
- Tyvek coveralls for equipment operators who will not come into contact with liquids
- Saran coveralls are required for RTs who have a potential to be exposed to contaminated liquids or sludge
- Hard hat
- Steel-toed work boots
- Nitrile, neoprene, latex, or PVC overboots
- Nitrile, neoprene, or PVC gloves over latex sample gloves
- Face shield (when projectiles or splashes pose a hazard)

6.1.4 Level B

Level B protection consists of the items required for Level C protection with the exception that an air-supplied respirator is used in place of the air-purifying respirator.

6.1.5 Level A

Level A protection consists of the items required for Level B protection with the addition of a fully-encapsulating, vapor-proof suit capable of maintaining positive pressure.

6.2 Task-Specific Levels of Protection

The levels of protection are specified for each task performed during project remedial activities. The listed level of protection for a given task is the minimum level of protection initially required to perform the task. Where two levels of protection are listed (i.e., Level C/Modified Level D) for a given task, the level of protection listed first is the minimum level of protection specified for the task. The second listed level of protection (i.e., Modified Level D) is the anticipated downgrade in level of protection for the task based on air monitoring results compared to the appropriate action level. In most cases, the higher level of protection (i.e., Level C) is listed first because of the anticipated health hazard posed by the task. Upgrades or downgrades in the minimum level of protection listed will be based on action levels from direct reading instruments, a change in site conditions, or findings from ongoing remedial investigations.
If the level of protection is to be downgraded, personnel will continue to work in the original level of protection until the SSO and PM or PS have discussed air monitoring results and rationale for downgrade with the Project Health and Safety Manager for his approval.

After an agreement has been reached, the PPE may be modified. Level of protection for any task may be upgraded at any time and documented. Any changes in the downgrade/upgrade action levels require an amendment of the SSHP.

Activity	Protection Level
Task 1 - Mobilize	D
Task 2 - Collect Water and Sludge Samples	C
Task 3 - Analyze Water and Sludge Samples	C
Task 4 - Remove Water and Sludge From Sumps	B/C
Task 5 - Remove Sumps	C/D+
Task 6 - Transport and Dispose of Wastes	D+
Task 7 - Decontaminate and Demobilize	D+
Task 8 - Prepare Closure Report	N/A
Task 9 - Remove and Dispose of Soils Adjacent to Sumps	C
Task 10 - Additional Investigations	C

Level C can be downgraded to Modified Level D if the air monitoring (Section 8, OVA/PID/LEL) indicates a reduction in respiratory protection is allowable.

6.3 Breathing Air Quality

Code of Federal Regulations 29 1910.134 states breathing air will meet the requirement of the specification for Grade D breathing air as described in the ANSI/CGA Specification G-7.1-1989. A certificate of analysis

from vendors of breathing air is required to show that the air meets this standard. Breathing air will be contained in cylinders exclusively and will be stationed in the EZ.

6.4 Air-Purifying Respirators

Air-purifying respirators for USACE LHAAP projects will be the full-face MSA "Ultra Twin" full-face respirators, or equivalent. Half-face respirators may be used upon authorization of the District Health and Safety Manager only.

6.5 Respirator Cartridges

The crew members working in Level C will wear respirators equipped with air purifying cartridges approved for the following contaminants:

- Organic vapors <1,000 ppm
- Chlorine gas <10 ppm
- Hydrogen chloride <50 ppm
- Sulfur dioxide <50 ppm
- Dusts, fumes, and mists with a TLV <0.05 mg/m^3
- Asbestos-containing dusts and mists
- Radionuclides

6.6 Cartridge Changes

All cartridges will be changed a minimum of once weekly or more frequently if personnel begin to experience increased inhalation resistance or breakthrough of a chemical warning property. Cartridges will be labeled with the date service began.

6.7 Inspection and Cleaning

Respirators are checked periodically by the SSO or PS and inspected before each use by the wearer. All respirators and associated equipment will be decontaminated and hygienically cleaned after use.

6.8 Fit Testing

Annual respirator fit tests are required of all personnel wearing negative pressure respirators. The test will utilize isoamyl acetate or irritant smoke. The fit test must be for the style and size of the respirator to be used. Additionally, a positive and negative fit test shall be conducted each time a respirator is donned.

6.9 Facial Hair

No personnel who have facial hair which interferes with the respirator's sealing surface will be permitted to wear a respirator.

6.10 Corrective Lenses

Normal eyeglasses cannot be worn under full-face respirators because the temple bars interfere with the respirator's sealing surfaces. For workers requiring corrective lenses, special spectacles designed for use with respirators will be provided.

6.11 Contact Lenses

Contact lenses shall not be worn with any type of respirator.

6.12 Medical Certification

Only workers who have been certified by a physician as being physically capable of respirator usage will be issued a respirator. Personnel unable to pass a respiratory fit test or without medical clearance for respirator use will not be permitted to enter or work in areas on site that require respiratory protection. Employees receive a written physicians opinion that they are fit for general hazardous waste operations as per 29 CFR 1910.120(f)(7).

6.13 Project Respiratory Protection Program

The primary objective of respiratory protection is to prevent employee exposure to atmospheric contamination. When engineering measures to control contamination are not feasible or while they are being implemented, personal respiratory protective devices will be used.

The criteria for determining respirator need have been evaluated and are contained in Sections 4.0 and 8.0 of this SSHP; anticipated levels of respiratory protection are given in Section 6.2. All respirator users will be OSHA trained in proper respirator use and maintenance. The PS and SSO will observe workers during respirator use for signs of stress and will monitor air levels of contaminants to ensure that respiratory protection is sufficient. The District Health and Safety Manager, PS, and SSO will also evaluate this SSHP periodically to determine its continued effectiveness.

All respirators and cartridges used should provide adequate protection against the hazards for which they were designed in accordance with applicable standards. All persons assigned to use respirators will have medical clearance to do so.

The detailed project respiratory protection program is specified in SOP No. 18 of the OHM Health and Safety Procedures Manual.

7.0 DECONTAMINATION PROCEDURES

This section describes the procedures necessary to ensure that both personnel and equipment are free from contamination when they leave the work site. A step-by-step description of decontamination procedures for

Modified Levels D, C, and B has been delineated below.

Air monitoring instruments may be wrapped while using them in the exclusion zone to avoid contamination in very messy conditions. Where conditions are relatively clean, instruments may be wiped down with a damp cloth in the transition zone.

7.1 Personnel Decontamination

Decontamination of personnel shall be performed to ensure that any material which personnel may have contacted in the hot zone is removed in the CRZ. PPE worn during vicinity or peripheral property on-site work activities will not be worn outside the decontamination corridor. All personnel will use the CRZ decontamination sequence listed below during egress from the CRZ.

PPE removed from the decontamination corridor will either be decontaminated or properly bagged to contain any contamination. All used disposable clothing will be placed in polyethylene bags, inventoried, dated, and stored at the property site pending arrangements for appropriate disposal. Water-proof, non-disposable PPE will be properly decontaminated. Decontamination of personnel exiting the EZ will utilize the following steps as appropriate to the specific work area:

Modified Level D

Step 1: Scrub the outerboots with detergent-water solution. Remove and stack boots for drying.
Step 2: Scrub and remove outergloves.
Step 3: Remove hard hat and wipe clean.
Step 4: Remove and discard outersuit.
Step 5: Remove and discard one pair of inner gloves in 55-gallon trash drum (when multiple pairs of inner gloves are used).
Step 6: Remove and discard inner suit (when used).
Step 7: Discard final pair of inner gloves into 55-gallon trash drum.
Step 8: Depart transition zone in work clothes and boots.
Step 9: Wash hands, face, and neck before breaks and lunch.

Level C

Step 1: Scrub the outer boots/booties with a detergent-water solution. Remove and stack boots for drying.
Step 2: Scrub and remove outer gloves.
Step 3: Remove the hard hat and wipe clean.
Step 4: Remove and discard outer suit.
Step 5: Remove and discard one pair of inner gloves into 55-gallon trash drum (when multiple pairs of gloves used).
Step 6: Remove and discard inner suit (when used).
Step 7: Remove respirators and suitably store while on breaks and during lunch. At the end of shift, discard the cartridges and then clean, disinfect, rinse, and air dry the respirator.

Step 8: Discard final pair of inner gloves into 55-gallon trash drum.
Step 9: Depart transition zone in work clothes and boots.
Step 10: Wash hands, face, and neck before breaks and lunch.

Level B

Step 1: Scrub the outer boots with a detergent-water solution. Remove and stack boots for drying.
Step 2: Scrub and remove outer gloves.
Step 3: Remove the hard hat and wipe clean.
Step 4: Remove SCBA unit.
Step 5: Remove and discard outer suit.
Step 6: Remove and discard one pair of inner gloves into 55-gallon trash drum (when multiple pairs of inner gloves used).
Step 7: Remove and discard inner suit (when used).
Step 8: Remove SCBA facepiece and suitably store while on breaks and during lunch.
Step 9: Discard final pair of inner gloves into 55-gallon trash drum.
Step 10: Depart transition zone in work clothes and boots.
Step 11: Wash hands, face, and neck before breaks and lunch.

7.2 Suspected Contamination

Any employee suspected of sustaining skin contact with chemical materials will first use the field wash facilities. Following a thorough washing, the worker will proceed to the decontamination facility. Here, the worker will remove clothing, shower, don clean clothing, and immediately be taken to the First Aid Station.

7.3 Personal Hygiene

Before any eating, smoking, or drinking, personnel will wash hands, arms, neck, and face. Washing facilities with soap will be available in the SZ.

7.4 Equipment Decontamination

All heavy equipment will be water washed or steam cleaned in a designated decontamination area prior to leaving the site and before exiting a defined EZ. Tools and small equipment will be water washed prior to leaving the EZ.

7.5 Waste Handling

Decontamination of equipment will be performed at the decon facilities. Personal protective equipment will be decontaminated in plastic bins. All liquids will be collected and pumped into a storage tank located on site.

All liquids and disposable clothing will be treated as contaminated waste and disposed of properly.

Contaminated clothing will be placed in a drum lined with a polyethylene bag. Waste water generated on site will be stored until ready for disposal. Temporary waste storage areas will be set up by each EZ during the work day. This waste will then be moved to the main storage area until ready for disposal. All waste containers will be properly labeled and stored consistent with regulatory requirements. Decontamination water will be contained and captured utilizing submersible pumps and/or vacuum units.

8.0 AIR MONITORING

Air monitoring will be conducted in order to determine airborne contamination levels in personnel breathing zones and at site work areas and at work site perimeter. Air monitoring procedures will verify that respiratory protection is adequate to protect personnel against the chemical hazards encountered. The following air monitoring procedures will be implemented during planned project activities. Additional air monitoring protocols may be conducted at the discretion of the SSO.

8.1 Air Monitoring Strategies

The operation and maintenance of real-time, direct-reading air monitoring instruments and personal sampling equipment will adhere to the manufacturers' procedures at a minimum.

8.1.1 Initial Entry Monitoring

Initial entry monitoring must be conducted during the initial site visit. Air monitoring must identify any immediately dangerous to life or health (IDLH) conditions, exposure over the permissible exposure limit or published exposure levels, cumulative exposure to radiation, other dangerous conditions such as flammable or oxygen-deficient environments and impacts of the site activities on the work area perimeter.

8.1.2 Periodic Monitoring

Periodic monitoring will be performed to identify potential IDLH and personnel overexposure conditions that could arise during planned project activities. The OHM Team will conduct periodic air monitoring to characterize personnel exposures for each job category. The scope of this monitoring will be based on the results of initial entry monitoring and anticipated site contaminants. Periodic monitoring of suspected or identified hazards will be conducted according to the specific air monitoring procedures detailed in the SSHP.

Periodic monitoring must be conducted on those workers who represent the highest exposure potential for that job classification. The number of workers included in the air monitoring must be expanded from only high-risk workers to additional workers when exposures are suspected of exceeding action limits.

Periodic air monitoring procedures will be specified in the SSHP to address the following conditions:

- Additional contaminants are identified at the site;
- Work begins on a characteristically different portion of the project site;

- A different type of operation or task is initiated; and
- Workers are performing high hazard tasks (unknown drum operations) or tasks in areas of obvious liquid contamination.

8.1.3 Perimeter Monitoring

The perimeter of any active work area will be monitored periodically to assess and document the effects for work activities on perimeter ambient air contaminant concentration.

8.2 Air Monitoring Instrumentation

Lower Explosive Limit (LEL)/oxygen meters and direct reading volatile organic contamination (VOC) meters (i.e., Photoionization detector (PID) or organic vapor analyzers (OVA)) are routinely required for planned remedial actions at USACE project sites. VOC direct reading instruments may be used in conjunction with direct reading detector tubes (i.e., benzene, vinyl chloride) to characterize the VOCs present in personnel breathing zones when the PID/OVA action level is exceeded. Mini-Real Time Aerosol (Mini-Ram) monitors are required to be used during planned remedial actions when airborne particulate inhalation hazards (i.e., heavy metals) are potentially present in the breathing zone. Hydrogen cyanide, hydrogen sulfide monitors, and radiation survey meters are required for remedial actions involving "unknown" drum removal and handling operations.

The following chart lists the air monitoring devices along with monitoring frequency action levels and actions that may be required during planned remedial actions.

WORK AREA MONITORING

Monitoring Device	Monitoring Frequency	Action Level	Action
LEL/O_2 meters (work area)	At start-up, periodic daily.	>10% LEL	Stop operations; allow vapors to vent <10% before continuing Upgrade to Level B
	Prior to and during Confined Space Entry	<20.9% 0_2	Upgrade to Level B
OVA (FID) (Breathing Zone)	At start-up, periodic daily	>1 ppm for 5 min.	Increase monitoring frequency in affected area.
		>10 ppm for 5 min.	Upgrade to Level C
		>500 ppm for 5 min. (All readings less methane)	Upgrade to Level B
Mini-Ram (Breathing Zone)	At start-up and periodic daily	> 1 mg/m^3 Dust > 5 mg/m^3 Dust	Apply dust suppression agent Upgrade to Level C

PERIMETER MONITORING

Monitoring Device	Monitoring Frequency	Action Level	Action
OVA (FID)	At start-up and periodic daily	> 1 ppm for 5 minutes (All readings less methane)	Cease work Control Emission
Mini-Ram	At start-up and periodic daily	Visible Dust	Implement dust suppression
		> 0.5 mg/m^3	Cease work Implement controls

The above LEL action level only applies to LEL readings obtained in an area where flammable/explosive vapors may be present but personnel entry into the area will not occur. The confined space entry LEL and oxygen action levels for personnel entry into a confined space are zero percent LEL and 20.9 percent oxygen, with LEL/oxygen readings taken at representative locations inside the space. The hot work LEL and oxygen levels for cold-cutting operations and any related hot work are less than 10 percent LEL and less than 8 percent oxygen within tanks being cut.

8.3 Lower Explosive Limit/Oxygen Meter

Prior to entering a confined space area or hot work involving welding, cutting, or other high heat-producing operations where flammable or combustible vapors may be present, LEL/O_2 measurements must be obtained. LEL monitoring will be conducted at each borehole when drilling in suspected contaminated areas on site.

8.4 Organic Vapor Analyzer

An OVA will be used to monitor total organic volatile contaminants in ambient air. An OVA will prove useful as a direct reading instrument which will aid in determining if respiratory protection needs to be worn (Level C or Level B) and to indicate if the EZ encompasses the required areas. OVA monitoring will be performed in personnel breathing zones during site operations to document that the proper level of protection is worn by site personnel.

The SSO will take measurements before operations begin in an area to determine the amount of VOC naturally occurring in the air. This is referred to as a background level. The OVA breathing zone action level only applies to OVA readings above background (i.e., 1 ppm for 5 minutes above background) for unknown volatile organic contaminants.

For known contaminants only, to determine a protection level from OVA data, the SSO will multiply the threshold limit value (TLV) of the known compound by 25. This will be the limit for Level C protection for that compound. If OVA readings exceed 25 times the TLV, Level B protection will be required. Also, regardless of the TLV, a OVA reading of 1,000 ppm or more will indicate that the GMC-H cartridges may become overloaded and will necessitate Level B protection. (Note: OVA readings do not always indicate the actual air concentration of a compound. Consult the manual, OVA manufacturer, or the CIH for clarification.)

Levels of VOCs will be measured in the air at active work sites a minimum of four times daily and two times daily at the SZ when levels are detected above background in the EZ. If levels exceed background at any time in the SZ, work in the EZ will cease and correction actions will be taken, e.g., cover soil with polyethylene sheeting. Work will not resume until levels reach background in the SZ.

8.5 Real-Time Aerosol Monitor

A real-time aerosol monitor (Mini-Ram) may be used to measure airborne particulate in personnel breathing zones and site work area locations. A breathing zone action level has been specified that requires upgrading

to Level C protection based on sustained (five-minute average) Mini-Ram results. The Mini-Ram will be used to monitor personnel breathing zones when wearing Modified Level D protection and to determine when an upgrade to Level C is warranted.

8.6 Air Sampling and Analysis

Personal air samples will be collected in personnel breathing zones if the direct reading instruments indicate exposure in order to document that the appropriate level of protection was worn during remedial actions on site. Air samples will be collected on personnel with the greatest potential for exposure during each major project phase. Air samples will be analyzed by an American Industrial Hygiene Association-accredited laboratory.

Air samples will be collected and analyzed in accordance with the specified NIOSH method for the contaminant(s) of interest at the site.

8.7 Air Monitoring Log

The SSO will ensure that all air-monitoring data is logged into a monitoring notebook. Data will include instrument used, instrument reading, location, type of reading (breathing zone or work area), and site operations being performed. The Project Health and Safety Manager will periodically review this data.

8.8 Calibration Requirements

The OVA, LEL/O_2, Mini-Ram, and air sampling pumps will be calibrated daily prior to use in accordance with the manufacturer's procedures. A separate log will be kept detailing date, time span, gas, or other standard, and the name of the person performing the calibration.

8.9 Air Monitoring Results

Air monitoring results will be posted and discussed during morning safety meetings.

9.0 EMERGENCY RESPONSE

9.1 Pre-Emergency Planning

Prior to engaging in remediation activities at the site, the OHM Team will plan for possible emergency situations and have available adequate supplies and manpower to respond. In addition, site personnel will receive training during the site orientation concerning proper emergency response procedures. The proper Local Emergency Planning Committee (LEPC) and state/national response teams will be contacted in accordance with applicable OSHA/EPA requirements where the magnitude of the anticipated emergency conditions warrant. Local EMS and emergency providers will be contacted as appropriate to determine their capability to respond to site emergencies.

The following situations would warrant implementation of the Emergency Response and Contingency Plan (ERCP):

Fire/Explosion	• The potential for human injury exists • Toxic fumes or vapors are released • The fire could spread on site or off site and possibly ignite other flammable materials or cause heat-induced explosions • The use of water and/or chemical fire suppressants could result in contaminated run-off • An imminent danger of explosion exists
Spill or Release of Hazardous Materials	• The spill could result in the release of flammable liquids or vapors, thus causing a fire or gas explosion hazard • The spill could cause the release of toxic liquids or fumes in sufficient quantities or in a manner that is hazardous to or could endanger human health
Spill or Release of High Temperature Liquid or Vapor	• The spill can be contained on site, but the potential exists for groundwater contamination • The spill cannot be contained on site, resulting in off-site soil contamination and/or groundwater or surface water pollution • The spill quantity is greater than the reportable quantity limit for the material
Natural Disaster	• A rain storm exceeds the flash flood level • The facility is in a projected tornado path or a tornado has damaged facility property • Severe wind gusts are forecasted or have occurred and have caused damage to the facility
Medical Emergency	• Overexposure to hazardous materials • Trauma injuries (broken bones, severe lacerations/ bleeding, burns) • Eye/skin contact with hazardous materials • Loss of consciousness • Heat stress (Heat stroke) • Cold stress (Hypothermia) • Heart attack • Respiratory failure • Allergic reaction

The following measures will be taken to assure the availability of adequate equipment and manpower resources:

- Sufficient equipment and materials will be kept on site and dedicated for emergencies only. The inventory will be replenished after each use.
- On-site emergency responders will be current in regards to training and medical surveillance programs. Copies of all applicable certificates will be kept on file for on-site personnel required to respond.
- It will be the responsibility of the emergency coordinator to brief the on-site response team on anticipated hazards at the site. The emergency coordinator shall also be responsible for anticipating and requesting equipment that will be needed for response activities.
- Emergency response activities will be coordinated with the LEPC in compliance with SARA Title III requirements.

Communications will be established prior to commencement of any activities at the remediation site. Communication will be established so that all responders on site have availability to all pertinent information to allow them to conduct their activities in a safe and healthful manner. Air horns may be used to alert personnel of emergency conditions. A telephone will be located at the command post to summon assistance in an emergency.

Primary communication with local responders in the event of an emergency will be accomplished using commercial telephone lines.

9.2 Emergency Recognition and Prevention

Because unrecognized hazards may result in emergency incidents, it will be the responsibility of the PS and SSO, through daily site inspections and employee feedback (Safety Observation Program, daily safety meetings, and activity hazard analyses), to recognize and identify all hazards that are found at the site. These may include the following:

Chemical Hazards	• Materials at the site • Materials brought to the site • IDLH atmospheres
Physical Hazards	• Fire/explosion • Slip/trip/fall • Electrocution • Confined space • Excessive noise

Mechanical Hazards	• Heavy equipment • Stored energy system • Pinch points • Electrical equipment • Vehicle traffic
Environmental Hazards	• Electrical storms • High winds • Heavy rain/snow • Temperature extremes (Heat/Cold stress) • Poisonous plants/animals

Once a hazard has been recognized, the PS and/or SSO will take immediate action to prevent the hazard from becoming an emergency. This may be accomplished by the following:

- Daily safety meeting
- Task-specific training prior to commencement of activity
- Lockout/tag-out
- PPE selection/use
- Written and approved permits for hot work, confined space
- Trenching/shoring procedure
- Air monitoring
- Following all OHM standard operating procedures
- Practice drills for fire, medical emergency, and hazardous substances spills

The EC will determine the nature of the emergency and take appropriate action as defined by this ERCP. The EC will implement the ERCP immediately as required. The decision to implement the plan will depend upon whether the actual incident threatens human health or the environment. Immediately after being notified of an emergency incident, the EC or his designee will evaluate the situation to determine the appropriate action.

TABLE 9-1
EMERGENCY TELEPHONE NUMBERS

Local Agencies	Numbers
Marshall Fire Department	(903)935-7831
Ambulance Service	(903)938-6711 OR 911
Marshall Hospital	(903)938-6711 or 911
LHAAP Security	679-2327 (ON POST PHONE 2327)
Poison Control Center	(903)935-9311
National Response Center (environmental emergencies only)	(800)822-9761
Texas Natural Resources Conservation Commission (TNRCC)	(903)595-5466
THE FOLLOWING PERSONNEL WILL BE NOTIFIED THAT AN INCIDENT HAS OCCURRED:	
OHM District Health and Safety Manager: Mr. Jim Hollingsworth, CIH	work: (713) 775-7672 home: (713)852-6213
OHM Corporate Health and Safety Manager: Mr. Fred Halvorsen, Vice President, Health and Safety	work: (419)424-4910 home: (419)423-2234
OHM Senior Project Manager: Mr. Glen Turney	work: (713) 775-7658
OHM Corporate Medical Consultant: Mr. Mark Harber, R.N.	(800)537-9942
Federal OSHA Hot Line	(800)321-6742
USACE Tulsa District Safety and Occupational Health Office: Mr. Bob Vandegriff	(918)669-7360
USACE Tulsa district HTRW Resident Office: Mr. Cliff Warren	(918)669-7505
USACE HTRW Quality Assurance: Ms. Ramona Wagner	(918)669-7505
USACE Industrial Hygiene Section: Mr. Greg Snider	(918)669-7073
USACE Huntsville Division Safety and Occupational Health Office - Explosive MCX: Mr. David Douthat	(205)955-5785
USACE Eastern Area Office: Frank Meleton	(318)676-3365

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9.3 Personnel Roles, Lines of Authority, and Communications

This section of the ERCP describes the various roles, responsibilities, and communication procedures that will be followed by personnel involved in emergency responses.

The primary Emergency Coordinator (EC) for this site is the PS. In the event an emergency occurs and the EC is not on site, the SSO or the highest ranking employee on site will serve as the EC until he arrives.

9.3.1 Responsibilities and Duties

It is recognized that the structure of the "Incident Command System" will change as additional response organizations are added. OHM will follow procedures as directed by the fire department, LEPC, state, and federal agencies as required. OHM will defer to the local Fire Department chief to assume the role of Incident Commander upon arriving on site. Additional on-site personnel may be added to the Site Emergency Response Team as required to respond effectively.

This section describes the responsibilities and duties assigned to the EC.

9.3.2 On-Site Emergency Coordinator Duties

The on-site EC is responsible for implementing and directing the emergency procedures. All emergency personnel and their communications will be coordinated through the EC. Specific duties are as follows:

- Identify the source and character of the incident, type, and quantity of any release. Assess possible hazards to human health or the environment that may result directly from the problem or its control.

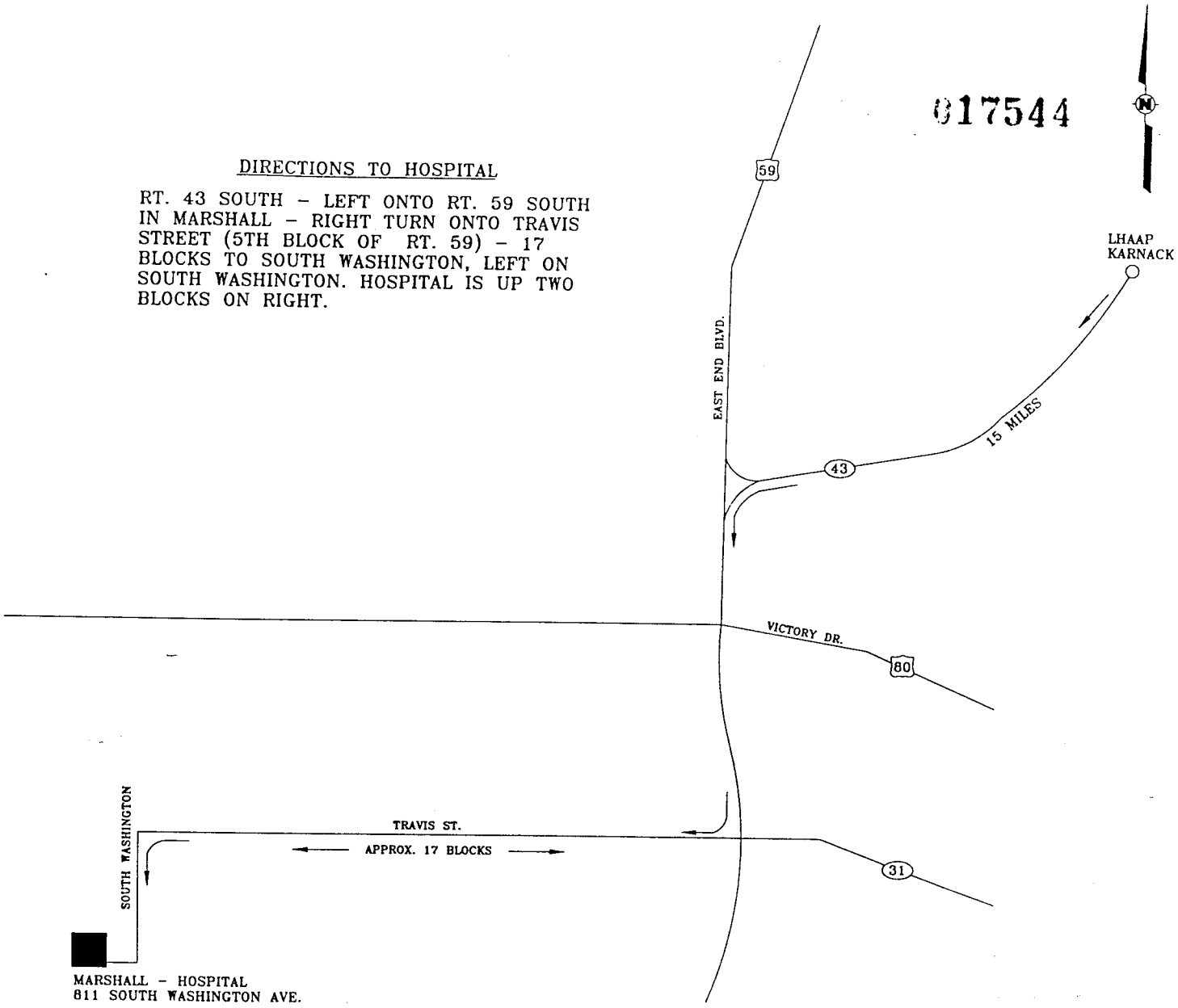
- Discontinue operations in the vicinity of the incident if necessary to ensure that fires, explosions, or spills do not recur or spread to other parts of the site. While operations are dormant, monitor for leaks, pressure build-up, gas generation, or ruptures in valves, pipes, or other equipment where appropriate.

- Notify local Emergency Response Teams if their help is necessary to control the incident. **Table 9-1** provides telephone numbers for emergency assistance.

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DIRECTIONS TO HOSPITAL

RT. 43 SOUTH – LEFT ONTO RT. 59 SOUTH IN MARSHALL – RIGHT TURN ONTO TRAVIS STREET (5TH BLOCK OF RT. 59) – 17 BLOCKS TO SOUTH WASHINGTON, LEFT ON SOUTH WASHINGTON. HOSPITAL IS UP TWO BLOCKS ON RIGHT.



OHM Remediation Services Corp. HOUSTON, TEXAS A SUBSIDIARY OF OHM CORPORATION	U.S. ARMY CORPS OF ENGINEERS	FIGURE 9–1 ROUTE TO HOSPITAL
DRAWN BY: O.C.GALINDO 05/01/96	TULSA DISTRICT	PREPARED FOR LONGHORN ARMY AMMUNITION PLANT
CHECKED BY: W. McCULLOUGH 05/01/96		
FILE: HOSPITAL.DWG –		
REV. 0 SHEET 1 PROJECT NO. 18675	TERC CONTRACT DACA 56-94-D-0020 SUMP SAMPLING PROJECT	DELIVERY ORDER 0012 LHAAP, KARNACK, TEXAS

Direct on-site personnel to control the incident until, if necessary, outside help arrives.

- Ensure that the building or area where the incident occurred and the surrounding area are evacuated, and shut off possible ignition sources, if appropriate. The Emergency Response Team is responsible for directing site personnel such that they avoid the area of the incident and leave emergency control procedures unobstructed.

- If fire or explosion is involved, notify Plant Fire Department.

- Notify designated USACE Emergency Response Coordinator.

- Notify OHM Senior Project Manager.

- Have protected personnel, in appropriate PPE, on standby for rescue.

If the incident may threaten human health or the environment outside of the site, the EC should immediately determine whether evacuation of the area outside of the site may be necessary and, if so, notify the Police Department and the Office of Emergency Management.

When required, notify the National Response Center. The emergency telephone number for the National Response Center is 800-424-8802. The following information should be provided to the National Response Center:

- Name and telephone number
- Name and address of facility
- Time and type of incident
- Name and quantity of materials involved, if known
- Extent of injuries
- Possible hazards to human health or the environment outside of the facility.

If hazardous waste has been released or produced through control of the incident, ensure the following:

- Waste is collected and contained.

- Containers of waste are removed or isolated from the immediate site of the emergency.

- Treatment or storage of the recovered waste, contaminated soil or surface water, or any other material that results from the incident or its control is provided.

- Ensure that no waste that is incompatible with released material is treated or stored in the facility until cleanup procedures are completed.

- Ensure that all emergency equipment used is decontaminated, recharged, and fit for its intended

use before operations are resumed.

- Notify the USEPA Regional Administrator that cleanup procedures have been completed and that all emergency equipment is fit for its intended use before resuming operations in the affected area of the facility. The USEPA Regional Administrator's telephone number is included in the Emergency Contacts.

- Record time, date, and details of the incident, and submit a written report to the USEPA Regional Administrator. Report is due to USEPA within 15 days of the incident.

9.4 Safe Distances and Places of Refuge

The EC for all activities will be the PS. No single recommendation can be made for evacuation or safe distances because of the wide variety of emergencies which could occur. Safe distances can only be determined at the time of an emergency based on a combination of site and incident-specific criteria. However, the following measures are established to serve as general guidelines.

In the event of minor hazardous material releases (small spills of low toxicity), workers in the affected area will report initially to the CRZ. Small spills or leaks (generally less than 55 gallons) will require initial evacuation of at least 50 feet in all directions to allow for cleanup and to prevent exposure. After initial assessment of the extent of the release and potential hazards, the EC or his designee will determine the specific boundaries for evacuation. Appropriate steps such as caution tape, rope, traffic cones, barricades, or personal monitors will be used to secure the boundaries.

In the event of a major hazardous material release (large spills of high toxicity/greater than 55 gallons), workers will be evacuated from the building/site. Workers will assemble at the entrance to the site for a head count by their foremen and await further instruction.

If an incident may threaten the health or safety of the surrounding community, the public will be informed and, if necessary, evacuated from the area. The EC or his designee will inform the proper agencies, if necessary. Telephone numbers are listed in Table 9-1.

Places of refuge will be established prior to the commencement of activities. These areas must be identified for the following incidents:

- Chemical release
- Fire/explosion
- Power loss
- Medical emergency
- Hazardous weather

In general, evacuation will be made to the crew trailers unless the EC determines otherwise. It is the responsibility of the EC to determine when it is necessary to evacuate personnel to off-site locations.

In the event of an emergency evacuation, all employees will gather at the entrance to the site until a head count establishes that all are present and accounted for. No one is to leave the site without notifying the EC.

9.5 Evacuation Routes and Procedures

All emergencies require prompt and deliberate action. In the event of an emergency, it will be necessary to follow an established set of procedures. Such established procedures will be followed as closely as possible. However, in specific emergency situations the EC may deviate from the procedures to provide a more effective plan for bringing the situation under control. The EC is responsible for determining which situations require site evacuation.

9.5.1 Evacuation Signals and Routes

An air horn will be used to notify employees of the necessity to evacuate an area or building involved in a release/spill of a hazardous material. Total site evacuation will be initiated only by the EC; however, in his absence, decision to preserve the health and safety of employees will take precedence. Evacuation routes will be posted in each outside work area. Signs inside buildings will be posted on walls or other structural elements of a building. Periodic drills will be conducted to familiarize each employee with the proper routes and procedures.

9.5.2 Evacuation Procedures

In the event evacuation is necessary, the following actions will be taken:

- The emergency signal will be activated.
- No further entry of visitors, contractors, or trucks will be permitted. Vehicle traffic within the site will cease in order to allow safe exit of personnel and movement of emergency equipment.
- Shut off all machinery if safe to do so.
- ALL on-site personnel, visitors, and contractors in the SZ will assemble at the entrance to the site for a head count and await further instruction from the EC.
- ALL persons in the EZ and CRZ will be accounted for by their immediate crew leaders (e.g., Project Superintendent). Leaders will determine the safest exits for employees and will also choose an alternate exit if the first choice is inaccessible.
- During exit, the crew leader should try to keep the group together. Immediately upon exit, the crew leader will account for all employees in his crew.

- Upon completion of the head count, the crew leader will provide the information to the EC.
- Contract personnel and visitors will also be accounted for.
- The names of emergency response team members involved will be reported to the emergency spill control coordinator.
- A final tally of persons will be made by the EC or designee. No attempt to find persons not accounted for will involve endangering lives of OHM or other employees by re-entry to emergency areas.
- In all questions of accountability, immediate crew leaders will be held responsible for those persons reporting to them. Visitors will be the responsibility of those employees they are visiting. Contractors and truck drivers are the responsibility of the PS. The security guard will aid in accounting for visitors, contractors, and truckers by reference to sign-in sheets available from the guard shack.
- Personnel will be assigned by the EC to be available at the main gate to direct and brief emergency responders.
- Re-entry into the site will be made only after clearance is given by the EC. At his direction, a signal or other notification will be given for re-entry into the facility.
- Drills will be held periodically to practice all of these procedures and will be treated with the same seriousness as an actual emergency.

9.6 Emergency Spill Response Procedures and Equipment

In the event of an emergency involving a hazardous material spill or release, the following general procedures will be used for rapid and safe response and control of the situation. Emergency contacts found in Table 9-1 provide a quick reference guide in the event of a major spill.

9.6.1 Notification Procedures

If an employee discovers a chemical spill or process upset resulting in a vapor or material release, he or she will immediately notify the on-site EC.

The on-site EC will obtain the following information:

- The material spilled or released;
- Location of the release or spillage of hazardous material;
- An estimate of quantity released and the rate at which it is being released;
- The direction in which the spill, vapor, or smoke release is heading;

- Injuries involved;
- Fire and/or explosion or possibility of these events; and
- The area and materials involved and the intensity of the fire or explosion.

This information will help the on-site EC to assess the magnitude and potential seriousness of the spill or release.

9.6.2 Procedure for Containing/Collecting Spills

The initial response to any spill or discharge will be to protect human health and safety, and then the environment. Identification, containment, treatment, and disposal assessment will be the secondary response.

If a chemical spill is not contained within a dike or sump area, an area of isolation will be established around the spill. The size of the area will generally depend on the size of the spill and the materials involved. If the spill is large (greater than 55 gallons) and involves a tank or pipeline rupture, an initial isolation of at least 100 feet in all directions will be used. Small spills (less than or equal to 55 gallons) or leaks from a tank or pipe will require evacuation of at least 50 feet in all directions to allow cleanup and repair and to prevent exposure. When any spill occurs, only those persons involved in overseeing or performing emergency operations will be allowed within the designated hazard area. If possible, the area will be roped or otherwise blocked off. If the spill results in the formation of a toxic vapor cloud (by reaction with surrounding materials or by outbreak of fire) and its release (due to high vapor pressures under ambient conditions), further evacuation will be enforced. In general, an area at least 500 feet wide and 1,000 feet long will be evacuated downwind if volatile materials are spilled. (Consult the DOT Emergency Response Guide for isolation distances for listed hazardous materials.)

If an incident may threaten the health or safety of the surrounding community, the public will be informed and possibly evacuated from the area. The on-site EC will inform the proper agencies in the event this is necessary (refer to **Table 9-1**).

As called for in regulations developed under the Comprehensive Environmental Response Compensation Liability Act of 1980 (Superfund), OHM's practice is to report a spill of a pound or more of any hazardous material for which a reportable quantity has not been established and which is listed under the Solid Waste Disposal Act, Clean Air Act, Clean Water Act, or TSCA. OHM also follows the same practice for any substances not listed in the Acts noted above but which can be classified as a hazardous waste under RCRA.

Clean up personnel will take the following measures:

- Ensure all unnecessary persons are removed from the hazard area.

- Put on protective clothing and equipment.

- If a flammable material is involved, remove all ignition sources and use spark- and explosion-proof equipment for recovery of material.

- Remove all surrounding materials that could be especially reactive with materials in the waste. Determine the major components in the waste at the time of the spill.

- If wastes reach a storm sewer, try to dam the outfall by using sand, earth, sandbags, etc. If this is done, pump this material out into a temporary holding tank or drums as soon as possible.

- Place all small quantities of recovered liquid wastes (55 gallons or less) and contaminated soil into drums for incineration or removal to an approved disposal site.

- Spray the spill area with foam, if available, if volatile emissions may occur.

- Apply appropriate spill control media (e.g. clay, sand, lime, etc.) to absorb discharged liquids.

- For large spills, establish diking around leading edge of spill using booms, sand, clay, or other appropriate material. If possible, use a diaphragm pump to transfer discharged liquid to drums or holding tank.

9.6.3 Emergency Response Equipment

The following equipment will be staged in the SZ and throughout the site, as needed, to provide for safety and first aid during emergency responses:

- ABC-type fire extinguisher
- First-aid kit, industrial size
- Eyewash/safety shower
- Emergency oxygen unit
- Emergency signal horn
- Self contained breathing apparatus (two)
- Stretcher/backboard

In addition to the equipment listed above, OHM maintains direct reading instrumentation that may be used in emergency situations to assess the degree of environmental hazard. This equipment will only be used by the SSO or other specially trained personnel. This equipment will be stored, charged, and ready for immediate use in evaluating hazardous chemical concentrations. The equipment will be located at the OHM office trailer.

EQUIPMENT NAME	APPLICATION
Portable Organic Vapor Analyzer	Measures selected inorganic and organic chemical concentrations
Oxygen and Combustible Gas Meter	Measures oxygen and combustible gas levels
Detector Tubes	Assorted detector tubes to measure specific chemical concentrations

9.6.4 Personal Protective Equipment

A supply of two (minimum) SCBAs will be located in the support zone for use in emergency response to hazardous material releases. The SCBAs will be inspected at least monthly according to OSHA requirements. In addition, all emergency response personnel will have respirators available for use with cartridge selection determined by the SSO, based on the results of direct reading instruments. Emergency response personnel will also be provided with protective clothing as warranted by the nature of the hazardous material and as directed by the SSO.

9.6.5 Emergency Spill Response Cleanup Materials and Equipment

A sufficient supply of appropriate emergency response cleanup and PPE will be inventoried and inspected visually on a weekly basis. The materials listed below will be kept on site for spill control depending on the types of hazardous materials present on site. The majority of this material will be located in the SZ, supply trailer, or storage area. Small amounts will be placed on pallets and located in the active work areas.

- Sand or clay to solidify/absorb liquid spills.
- Lime (calcium oxide), soda ash (sodium carbonate), or baking soda (sodium bicarbonate) for neutralizing acid (pH <7) spills.
- Activated charcoal (carbon) to adsorb organic solvents (hydrocarbons) and reduce flammable vapors.
- Citric acid for neutralizing caustic (pH >7) spills.
- Vapor-suppressing foam, if required by the Client, for controlling the release of volatile organic compounds.
- Appropriate solvents, e.g., CITRIKLEEN, for decontamination of structures or equipment.

The following equipment will be kept on site and dedicated for spill cleanup:

- Plastic shovels for recovering corrosive and flammable materials;
- Sausage-shaped absorbent booms for diking liquid spills, drains, or sewers;
- Sorbent sheets (diapers) for absorbing liquid spills;
- Overpack drums for containerizing leaking drums; and

- 55-gallon, open-top drums for containerization of waste materials.

NOTE: All contaminated soils, absorbent materials, solvents, and other materials resulting from the cleanup of spilled or discharged substances shall be properly stored, labeled, and disposed off site.

9.7 Emergency Contingency Plan

This section of the ERCP details the contingency measures OHM will take to prepare for and respond to fires, explosions, spills, and releases of hazardous materials, hazardous weather, and medical emergencies.

9.7.1 Medical Emergency Contingency Measures

The procedures listed below will be used to respond to medical emergencies. The SSO will contact the local hospital and inform them of the site hazards and potential emergency situations. A minimum of two First-Aid/CPR-trained personnel will be retained on site.

Response

The nearest workers will immediately assist a person who shows signs of medical distress or who is involved in an accident. The crew Project Superintendent will be summoned. The crew Project Superintendent will immediately make radio contact with the on-site EC to alert him of a medical emergency situation. The Project Superintendent will relay the following information:

- Location of the victim at the work site;
- Nature of the emergency;
- Whether the victim is conscious; and
- Specific conditions contributing to the emergency, if known .

The EC will notify the SSO. The following actions will then be taken depending on the severity of the incident:

- Life-Threatening Incident--If an apparent life-threatening condition exists, the crew Project Superintendent will inform the EC, and the local Emergency Response Services (EMS) will be immediately called. An on-site person will be appointed who will meet the EMS and have him/her quickly taken to the victim. The EC or SSO will evaluate the need and appropriateness of moving the victim from the EZ. If it can be accomplished without causing further injury to the victim, the injured person within the EZ will be evacuated by OHM personnel to a clean area for treatment by EMS personnel. If the victim cannot be safely moved, EMS personnel will be advised of the hazards and victim assistance will then be conducted following appropriate precautions as directed by the EC and EMS personnel. Personnel entering the EZ for emergency response are required to posses equivalent training as First Responder Operations Level. No

personnel should be allowed to enter the EZ without being advised of the hazards and requirements.

- Non Life-Threatening Incident--If it is determined that no threat to life is present, the SSO will direct the injured person through decontamination procedures (see below) appropriate to the nature of the illness or accident. Appropriate first aid or medical attention will then be administered.

NOTE: The area surrounding an accident site must not be disturbed until the scene has been cleared by the SSO.

Any personnel requiring emergency medical attention will be evacuated from the EZ and CRZ if doing so would not endanger the life of the injured person or otherwise aggravate the injury. Personnel will not enter the area to attempt a rescue if their own lives would be threatened.

The decision whether or not to decontaminate a victim prior to evacuation is based on the type and severity of the illness or injury and the nature of the contaminant. For some emergency victims, immediate decontamination may be an essential part of life-saving first aid.

For others, decontamination may aggravate the injury or delay life-saving first aid. Decontamination will be performed if it does not interfere with essential treatment.

If decontamination can be performed, observe the following procedures:

- Wash external clothing and cut it away.

If decontamination cannot be performed, observe the following procedures:

- Wrap the victim in blankets or plastic to reduce contamination of other personnel.
- Alert emergency and off-site medical personnel to potential contamination, and instruct them about specific decontamination procedures.
- Send site personnel familiar with the incident and chemical safety information, e.g., MSDSs, with the affected person.

All injuries, no matter how small, will be reported to the SSO or PS. An accident/injury/ illness report will be completely and properly filled out and submitted to the District Health and Safety Director/Project CIH, in accordance with OHM's reporting procedures.

A list of emergency telephone numbers is given in **Table 9-1**.

Notification

The following personnel/agencies will be notified in the event of a medical emergency:

- Local Fire Department or EMS
- On-Site Emergency Coordinator
- Workers in the affected areas
- Client Representative

Directions To Hospital

Written directions to the hospital and an area map (see **Figure 9-1**) will be posted in all trailers in the staging area.

9.8 Fire Contingency Measures

OHM personnel and subcontractors are not trained professional firefighters. Therefore, if there is any doubt that a fire can be quickly contained and extinguished, personnel will notify the EC and vacate the structure or area. The EC will immediately notify the local Fire Department.

The following procedures will be used to prevent the possibility of fires and resulting injuries:

- Sources of ignition will be distant from areas where flammable materials are handled or stored.
- The air will be monitored for explosivity before and during hot work and periodically where flammable materials are present. Hot work permits will be required for all such work.
- "No smoking" signs will be conspicuously posted in areas where flammable materials are present.
- Fire extinguishers will be placed in all areas where a fire hazard may exist.
- Before workers begin operations in an area, the Project Superintendent will give instructions on egress procedures and assembly points. Egress routes will be posted in work areas and exit points clearly marked.

The following procedures will be used in the event of a fire:

- Anyone who sees a fire will notify his supervisor who will then contact the EC by radio. The EC will activate the emergency air horns and contact the local Fire Department.
- When the emergency siren sounds, workers will disconnect electrical equipment in use (if possible) and proceed to the nearest fire exit.

- Work crews will be comprised of pairs of workers (buddy system) who join each other immediately after hearing the fire alarm and remain together throughout the emergency. Workers will assemble at a predetermined rally point for a head count.

- When a small fire has been extinguished by a worker, the EC will be notified.

9.9 Hazardous Weather Contingency Measures

Operations will not be started or continued when the following hazardous weather conditions are present:

- Lightning
- Heavy rains/snow
- High winds

9.9.1 Response

- Excavation/soil stock piles will be covered with a plastic liner.

- All equipment will be shut down and secured to prevent damage.

- Personnel will be moved to safe refuge; initially crew trailers. The EC will determine when it is necessary to evacuate personnel to off-site locations and will coordinate efforts with fire, police, and other agencies.

9.9.2 Notification

The EC will be responsible for assessing hazardous weather conditions and notifying personnel of specific contingency measures. Notifications will include the following:

- OHM employees and subcontractors
- Client representative
- Local Civil Defense Organization

9.10 Spill/Release Contingency Measures

In the event of release or spill of a hazardous material, the following measures will be taken.

- Any person observing a spill or release will act to remove and/or protect injured/ contaminated persons from any life-threatening situation. First aid and/or decontamination procedures will be implemented as appropriate.

- First aid will be administered to injured/contaminated personnel. Unsuspecting persons/vehicles will be warned of the hazard. All personnel will act to prevent any unsuspecting persons from coming in contact with spilled materials by alerting other nearby persons.

  Without taking unnecessary risks, personnel will attempt to stop the spill at the source. This may involve activities such as uprighting a drum, closing a valve, or temporarily sealing a hole with a plug.

- The EC will be notified of the spill/release, including information on material spilled, quantity, personnel injuries, and immediate life-threatening hazards. Air monitoring will be implemented by the EC and SSO to determine the potential impact on the surrounding community. Notification procedures will be followed to inform on-site personnel and off-site agencies. The EC will make a rapid assessment of the spill/release and direct confinement, containment, and control measures. Depending upon the nature of the spill, measures may include the following:

  - Construction of a temporary containment berm utilizing on-site clay absorbent earth.
  - Digging a sump, installing a polyethylene liner, and diverting the spill material into the sump placing drums under the leak to collect the spilling material before it flows over the ground.
  - Transferring the material from its original container to another container.

The EC will notify the USACE-designated Emergency Response Coordinator (if designated) of the spill and steps taken to institute cleanup. Emergency response personnel will clean up all spills in accordance with the spill cleanup plan developed by the EC. Supplies necessary to clean up a spill will be immediately available on site. Such items may include, but are not limited to, the following:

- Shovel, rake
- Clay absorbent
- Polyethylene liner
- Personal safety equipment
- Steel drums
- Pumps and miscellaneous hand tools

The major supply of material and equipment will be located in the SZ. Smaller supplies will be kept at active work locations. The ECM will inspect the spill site to determine that the spill has been cleaned up to the satisfaction of the USACE-designated Emergency Response Coordinator. If necessary, soil, water, or air samples may be taken and analyzed to demonstrate the effectiveness of the spill cleanup effort. The EC will determine the cause of the spill and determine remedial steps to ensure that recurrence is prevented. The EC will review the cause with the USACE-designated Emergency Response Coordinator and obtain his concurrence with the remedial action plan.

10.0 TRAINING REQUIREMENTS

All OHM Team field personnel involved with hazardous waste operations will be provided 40-hour, refresher, and supervisory (as required) training in accordance with the training requirements contained in 29 CFR 1910.120. Personnel who are performing tasks that are not intrusive in nature and do not have a potential for exposure to hazardous materials may be required to have only 24 hours of training per 29 CFR 1910.120.

10.1 40-Hour Hazardous Waste Operations Safety Training

All field employees with exposure to hazardous materials are required to take a 40-hour training class. This training is comprehensive and covers all forms of PPE. In addition, this course covers the toxicological effects of various chemicals, handling of unknown tanks and drums, confined space entering procedures, and electrical safety. This course is in full compliance with OSHA requirements in 29 CFR 1910.120. In addition, each employee is required to have three days of on-the-job, supervised training. Superintendents are required to have eight hours of additional training. All employees receive eight hours of annual refresher training as required by the above regulations.

10.2 Site Pre-Job Safety Orientation

All personnel entering the EZ will be trained in the provisions of this SSHP and be required to sign the SSHP acknowledgment which is included in the back of this SSHP. A site safety orientation meeting will be held (attendance will be documented) discussing the following topics:

- Names of personnel responsible for site safety;
- Names of CPR and First Aid trained personnel;
- Health and safety hazards on site;
- Personal Protective Equipment (use and care);
- Location of safety equipment such as fire extinguishers;
- Site Standard Operating Procedures and safe work practices;
- Work zones and site control measures;
- Hazard Communication Program, including discussion of MSDSs on site;
- Emergency and Spill Response and Contingency Plan; and
- Hot Work Procedures (when applicable).

All personnel will receive information on the health and safety hazards associated with lead per 29 CFR 1926.62.

10.3 Daily and Periodic Safety Training

Daily "Tailgate" safety meetings are held prior to each shift where health and safety problems, and issues are discussed. "Phase Safety" briefings will be held prior to the commencement of a new task where task-specific risks and precautions are discussed. Attendance is mandatory and will be documented.

11.0 MEDICAL SURVEILLANCE PROGRAM

All OHM Team personnel will participate in a medical and health monitoring program. This program is initiated when the employee starts work with a complete physical and medical history and is continued on a regular basis. A listing of a worker medical profile is shown below. This program was developed in conjunction with a consultant toxicologist. Other medical consultants are retained when additional expertise is required. Procedure 10 in OHM's Health and Safety Procedures Manual discusses the corporate medical surveillance program in further detail.

Biological monitoring for lead will be performed per 29 CFR 1926.62.

WORKER MEDICAL PROFILE

Item	Initial	Annual
Medical History	√	√
Work History	√	√
Visual Acuity and Tonometry	√	√
Pulmonary Function Tests	√	√
Physical Examination	√	√
Audiometry Tests	√	√
Chest X-Ray	√	Biennial age 35-45 yrs Every 5th yr 18-35 yrs Annual 45 yrs plus
Complete Blood Count	√	√
Blood Chem. (SMAC-23 or equivalent)	√	√
Urinalysis	√	√
Dermatology Examination	√	√
EKG	√	Annual 35 yrs plus

11.1 Examination Schedule

Active remediation employees are examined initially upon start of employment, annually thereafter, and may be examined upon termination of employment. Unscheduled medical examinations are conducted under the following conditions:

- At employee request after known or suspected exposure to toxic or hazardous materials.
- At the discretion of the client, Project Health and Safety Manager, SSO, or occupational physician after known or suspected exposure to toxic or hazardous materials.
- At the discretion of the occupational physician.

All non-scheduled medical examinations will include, as a minimum, all items specified above for period surveillance with the exception of the chest x-ray, which will be conducted at the discretion of the occupational physician performing the examination.

12.0 OHM HEALTH AND SAFETY PROCEDURES MANUAL

The following is the table of contents of OHM's Health and Safety Procedures Manual that serves as minimum health and safety procedures that must be implemented during the USACE LHAAP project activities. The OHM Health and Safety Procedures Manual will be on site during all remediation activities.

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3. Employee Safety Responsibilities
4. Visitor Safety Responsibilities
5. Proposals
6. Site Safety Plans
7. Projects Without Site Safety Plans
8. General Safety Rules
9. Accident/Injury/Illness Investigation and Reporting Procedures
10. Occupational Health and Examination Program
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12. Air Monitoring
13. Safety Training Requirements
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SAFETY PLAN ACKNOWLEDGMENT

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WORKER ACKNOWLEDGMENT TO HEALTH AND SAFETY PLAN 017563

I HAVE BEEN TRAINED ON THE SITE SAFETY PLAN FOR THIS SITE AND FULLY UNDERSTAND ITS CONTENTS.

NAME	DATE

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APPENDIX C

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APPENDIX C

CONTRACTOR QUALITY CONTROL PLAN (CQCP)

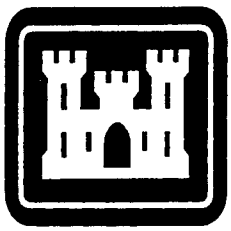
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CONTRACTOR QUALITY CONTROL PLAN

REMOVAL AND CLOSURE OF WASTEWATER SUMPS
LONGHORN ARMY AMMUNITION PLANT (LHAAP)
KARNACK, TEXAS

Prepared for



U. S. Army Corps of Engineers
Fort Worth District
280 Miller Road
Bossier City, LA 71112-2505

Prepared by



OHM Remediation Services Corp.
A Subsidiary of OHM Corporation

225 West Airtex Boulevard
Houston, TX 77090

May 21, 1996

TERC No. DACA56-94-D-0020, D. O. No. 0015
OHM Project No. 18675

FINAL

CONTRACTOR QUALITY CONTROL PLAN
REMOVAL AND CLOSURE OF WASTEWATER SUMPS
LONGHORN ARMY AMMUNITION PLANT (LHAAP)

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ATTACHMENT A

Referenced TERC SOPs: Nos. 0900, 0901, 1101

FINAL

CONTRACTOR QUALITY CONTROL PLAN
REMOVAL AND CLOSURE OF WASTEWATER SUMPS
LONGHORN ARMY AMMUNITION PLANT (LHAAP)

1.0 INTRODUCTION

1.1 Site Location

LHAAP is located in central east Texas in the northeast corner of Harrison County 40 miles west of Shreveport, Louisiana, and approximately 14 miles northeast of Marshall, Texas. The installation occupies 8,493 acres between State Highways 43 and 134 (western and northern boundaries, respectively) and the western shore of Caddo Lake.

The project site for this delivery order includes all sumps associated with past plant operations. The area in which the sumps are located covers a large portion of the northern half of the facility. Most of the sumps are concentrated in the area referred to as the Plant Production Area comprising 1,180 acres.

1.2 Project Purpose and Objectives

The United States Army Corps of Engineers (USACE) has contracted OHM Remediation Services Corporation (OHM) to remove and close 85 wastewater sumps along with associated structures and equipment described in LHAAP's "Closure Plan for Wastewater Sumps" (May 1995).

The project objective is to complete the closure of each sump in strict accordance with the **Closure Plan**, and **OHM's Work Plan** within the allotted schedule and budget.

1.3 Project Scope of Work

This CQCP will be implemented to cover all work required by the **Closure Plan** and the **Work Plan**. The project work plan addresses the operational, quality control, health and safety, and waste management requirements for the closure procedure. The approved closure procedure includes (1) sampling and analysis of sump contents; (2) removal and containerization of sump contents; (3) decontamination of sump surfaces; (4) decontamination of equipment; (5) internal visual inspection of sumps; (6) determination of sump disposition; and (7) certification of closure actions. The major definable features of work or major tasks required to accomplish the sump closure procedure are listed below.

- Task 1 - Mobilize
- Task 2 - Collect Water and Sludge Samples
- Task 3 - Analyze Water and Sludge Samples
- Task 4 - Remove Water and Sludge From Sumps
- Task 5 - Remove Sumps
- Task 6 - Transport and Dispose of Wastes
- Task 7 - Decontaminate and Demobilize
- Task 8 - Prepare Closure Report
- Task 9 - Remove and Dispose of Soils Adjacent to Sumps
- Task 10 - Additional Sampling

At the direction of the Government, OHM will conduct limited conformational sampling and analysis of the soil and/or water on specified sump removal excavation sites. The sampling will consist of the collection of soil samples from the excavation sidewalls or bottom and/or groundwater or rainwater that may collect in the excavation. The chemical analysis of the soil and /or water samples will consist of total volatile and semi-volatile organic compounds and total metals.

1.4 Responsibility

The overall responsibility for implementation and enforcement of the CQCP is assigned to the OHM Senior Project Manager. The responsibility for providing Quality Control direction and verification of the effectiveness of the Project CQCP is assigned to the Contractor Quality Control System Manager.

2.0 CQCP PURPOSE AND SCOPE

2.1 CQCP Purpose

The purpose of this CQCP is to document the quality control requirements applicable to services provided by OHM and its subcontractors to USACE for the closure of 85 sumps at LHAAP, Karnack, Texas. This plan describes the requirements of the CQCP for organizing, planning, performing, reviewing, documenting, and reporting the activities which affect the quality of work.

2.2 CQCP Scope

The scope of this plan applies to all sump closure activities set forth in the Closure Plan and covers the specific requirements for the implementation of the Contractor Quality Control System. This plan provides and/or references the procedures, policies, and practices required to execute and document compliance with the Closure Plan and quality control measures taken to assure conformance.

This CQCP establishes controls for:

- QC staff organization and authority
- Workmanship
- Construction activities for major definable features of work
- Records
- Inspections and tests
- Documentation
- Audits
- Subcontractor performance

2.3 Acceptance of CQCP

Work performed within the scope of this plan will not be started prior to the approval of this CQCP by USACE unless otherwise permitted by USACE. Any proposed changes to this CQCP will require notification of the changes to USACE in writing. All proposed changes are subject to the approval of USACE.

2.4 CQCP Distribution Control

This CQCP and all documents that affect project quality control requirements are control documents. The Project Manager is responsible for control of the distribution and accountability of all documents relating to the project. He issues all copies of documents relating to the site-specific CQCP, and revisions thereto, and maintains a record of distribution.

Acknowledgment of receipt of the documents and of receipt of revisions to the documents are recorded by the document holder by signing an appropriate document transmittal form and returning it to the Project Manager for inclusion in the project files. These forms must be signed by the person to whom the document or revision is assigned.

The holder of each controlled document is responsible:

1. To keep the latest revised copy
2. To destroy or appropriately mark as "SUPERSEDED" or "VOID" all old copies and/or revision replaced
3. To return the Receipt Acknowledgment form to the Project Manager
4. To return his copy when his need for the document no longer exists because of reassignment from the project, retirement, termination of employment, or cancellation by the Project Manager

Each individual or organization holding a CQCP will be responsible for updating and maintaining their copy of the plan. The CQCSM will maintain a record of changes to the CQCP and submit proposed changes to USACE for approval prior to issuing the changes for implementation. Revisions to the CQCP will be made by sections or by the addition of supplements or amendments. All approved changes and revisions will be transmitted to plan holders. Superseded sections will be removed and destroyed, or may be maintained for reference purposes provided the sections are clearly identified as superseded and noted for information only.

3.0 ORGANIZATION AND RESPONSIBILITIES

3.1 Personnel and Structure

The organization of key personnel assigned to the LHAAP wastewater sumps project is presented in chart form in **Figure 5-1** of the **Site Work Plan (SWP)**. Overall responsibilities to the Contracting Officer for all activities on this project are made through the Senior Project Manager. The Contractor Quality Control System Manager coordinates with the Senior Project Manager, Project Superintendent, and technical staff in the implementation of the CQCP.

3.2 Duties and Responsibilities

The duties and responsibilities of personnel associated with the CQC program are briefly outlined below. Duties and responsibilities of personnel associated with field sampling and health and safety activities are presented in respective plans.

Senior Project Manager: The Senior Project Manager has overall responsibility to the Contracting Officer for all activities on the project. He directs and monitors the Project Superintendent in planning, coordinating, and controlling all work performed on the project. In this capacity, he has overall responsibility for establishing the CQCP and for its implementation in all project activities, and he has the authority to access the required resources throughout OHM to ensure compliance with the contract requirements.

Contractor Quality Control System Manager (CQCSM): The CQCSM is responsible for the overall management of the project CQC program. He receives administrative and day-to-day direction from the Senior Project Manager and is responsible to the OHM QA/QC Manager for QC direction on any matters that may affect the QC requirements for the project. He is assigned the following duties:

- Monitor and verify that the work is performed in accordance with the contract requirements.
- Review and verify the disposition of discrepancy and corrective action reports.
- Perform QC inspections and surveillance, as necessary, and report daily on project QC.
- Transmit and track project submittals in accordance with submittal register requirements.

The CQCSM has the authority to reject materials and workmanship that do not comply with requirements and to stop nonconforming work activities. He will work closely with the Site Safety Officer and the Project Chemist to verify conformance with the Site Safety and Health Plan (SSHP) and Chemical Data Acquisition Plan (CDAP), respectively.

A copy of the Letter of Authority for the CQCSM is included in this plan in the form of a memorandum **(Figure 3-1)**.

Site Superintendent: The Site Superintendent is responsible to the Senior Project Manager for day-to-day supervision of the on-site remedial activities. His involvement in QA/QC includes communicating the necessity of quality in performance of all remedial activities to the on-site project staff.

QA/QC Manager: The QA/QC Manager is responsible to review, monitor, and report on the conformance to quality control requirements set forth in the CQCP. He may also advise the CQCSM on QC methods and practices. He will maintain a record of his quality monitoring activities and will inform the CQCSM of his monitoring activities. He shall also be responsible for performing periodic internal audits and reporting his findings to the CQCSM.

Subcontractors: OHM assumes overall responsibility for conformance to the quality requirements for the subcontracted items and services. However, it is the role of each subcontractor to plan, manage, and accomplish the construction/installation activities in accordance with the **Site Work Plan**, and subcontract agreement(s).

Each subcontractor is responsible to the Senior Project Manager for completion of the portion of project activities assigned to them and to the CQCSM for CQCP activities. They shall verify that their construction and materials comply with the requirements of the contract plans. Subcontractors include also those organizations supplying quality related items or services to the project.

3.3 Qualification of Personnel

OHM personnel assigned to the project will be qualified to perform the tasks to which they are assigned. The Senior Project Manager will appraise the qualification of professional and/or technical personnel assigned to the project. The appraisal will include the comparison of the requirements of the job assignment with the relevant experience and training of the prospective assignee.

FIGURE 3-1. LETTER OF AUTHORITY

MEMO

017574

OHM Remediation Services Corp.
225 West Airtex Boulevard
Houston, Texas 77090

To:	*To Be Determined*
From:	John W. Patin-TERC Program QA/QC Manager
Date:	April 9,1996
Subject:	Contractor Quality Control System Manager, Letter of Authority U.S. Army Corps of Engineers, Tulsa District TERC Contract No. DACA56-94-D-0020, DO No. 0015

This letter describes the responsibilities and authority delegated to you in your capacity as the Contractor Quality Control System Manager (CQCSM) for the subject TERC Delivery Order.

In this position, you are responsible for the implementation and enforcement of the CQCP. You will use the plan to verify that the quality of materials, workmanship, operations, and safety monitoring and compliance meets the specified requirements throughout the duration of the project.

Your responsibilities include identifying and reporting quality problems, rejecting nonconforming materials, initiating corrective actions, and recommending solutions for nonconforming activities. You have the authority to control or stop further processing, delivery, or installation activities until satisfactory disposition and implementation of corrective actions are achieved.

4.0 CONTRACTOR QUALITY CONTROL SYSTEMS

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4.1 Control Measures

The CQCP provides measures to verify and document that the work performed complies with the requirements specified in the contract documents. These measures include:

- CQC inspections
- Document control
- Submittals
- Completion inspection
- Records
- Audits and surveillance

Procedures for implementing the above measures are included throughout the CQCP. The CQCP may be supplemented by standard operating procedures, guidelines, or instructions for implementing measures to verify compliance with the contract requirements.

4.2 Quality Assurance Monitoring

The project CQC program will be monitored to verify that the program is in compliance with the CQCP. Monitoring activities will be performed by the OHM QA/QC Manager, or his representative, and will include the review of daily QC reporting and instructions or directions given to the CQCSM on QC matters. If required, an audit of the project's CQC system will be performed by the QA/QC Manager. If performed, the audit will include, but not be limited to, the following items.

- Work Performance
- Field Operation and Records
- CQC Inspections, Testing, and Records
- Document Control

4.3 Testing

The CQCSM will monitor the field sampling and laboratory activities to verify the following:

- Execution of all required tests
- Proper calibration of equipment
- Location of tests
- Timely and accurate reporting of test results
- Correct frequency of tests
- Completeness of documentation

Results of each QC test will be recorded on the Field QC Test Report (**Figure 4-1**). Quality control tests will also be recorded (listed) on the Daily Quality Control Report (**Figure 7-1**).

017576

4.4 Quality Control Testing Plan

Quality Control testing predominantly involves the environmental sampling and analysis associated with sump closure activities. In addition, QC testing will include material testing for placement and compaction of backfill in sump excavations (see **Section 6.9, Sub-task 9-3**). Environmental QC samples include field blanks (i.e., source, equipment rinses, and trip blanks) and sample duplicates as addressed in the **CDAP**. QA samples will be collected for USACE and sent to their **SWD** laboratory at the stated frequencies in the **CDAP**, or at USACE's specific direction.

4.5 Government Property Inventory and Control

As required by the TERC contract, OHM developed standard operating procedures for the inventory, tagging and control of all government-owned property installed and removed from the project site. **TERC SOPs Nos. 0900 and 0901** are contained in **Attachment A** to this plan. **SOP No. 0900** outlines the procedures used in implementing the government property accounting program and includes (1) definitions important to the operations and implementation of the program, (2) assignment of responsibilities, and (3) record keeping requirements. **SOP No. 0901** includes logs for the inventory and control of both installed and removed property with instructions on what is to be recorded on each log.

Proper implementation of this program is critical to the quality and success of the project and must be executed as property is installed or removed from the project site.

FIGURE 4-1. FIELD QC TEST REPORT

017577

OHM Remediation Services Corp.
225 W. Airtex Blvd.
Houston, Texas 77090

Project Name:_____
Project Location:_____
OHM Project No.: _____

FIELD QC TEST REPORT

U.S. Army Corps of Engineers
Contract No. DACA56-94-D-0020, DO No.___

Report No. _____
Date: _____

Exact Location of Test(s):

List Sampling Equipment Used:

Reference Paragraph/Section Numbers of Work Plan (and/or reason for making tests):

Description of Sampling/Testing Method(s):

Complete List of Personnel Present (those witnessing test and their title):

Comments:

CQCSM or Designee _____

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5.0 INSPECTION PLAN

5.1 Quality Control Inspections

The measures required to verify the quality of work performed in compliance with the specified requirements include inspection of materials/equipment and workmanship before, during, and after each definable feature of work. The CQC inspection plan consists of the following:

- Preparatory inspections
- Initial inspections
- Follow-up inspections

Major definable features of work (tasks) are reiterated below. **Table 5-1** summarizes general QC inspection requirements for each major work task. More specific or critical inspection requirements are included by task in Section 6.0 of this plan.

Definable Features of Work

Task 1 - Mobilize
Task 2 - Collect Water and Sludge Samples
Task 3 - Analyze Water and Sludge Samples
Task 4 - Remove Water and Sludge From Sumps
Task 5 - Remove Sumps
Task 6 - Transport and Dispose of Wastes
Task 7 - Decontaminate and Demobilize
Task 8 - Prepare Closure Report
Task 9 - Remove and Dispose of Soils Adjacent to Sumps
Task 10 - Additional Sampling

5.2 Preparatory Inspection

Preparatory inspections will be performed prior to starting any definable features of work which have control requirements. Where more than one definable feature of work is indicated in a work activity, a preparatory meeting may be appropriate to discuss the separate features of work. Preparatory inspection meetings will be initiated by the Site Superintendent and attended by the responsible construction staff personnel, any applicable subcontractor involved with the feature of work, and the CQCSM. USACE will be notified in advance of the inspection and may participate in the meetings whenever possible. The preparatory inspection meeting includes:

- Review of pertinent contract requirements, including performance specifications and related measurement and payment clauses.
- Review of material and equipment documentation for required tests, submittals, and approvals.
- Review of required control inspections and test requirements.
- Examination of the preliminary work necessary to begin the feature of work for completeness and conformance with approved plans and submittal data.
- Availability and examination of the required materials and equipment for commencement of the work and for use throughout the work feature.

- Review of safety procedures/controls for compliance to approved Safety and Health Plan.

Preparatory inspection meetings will be documented on the Preparatory Inspection Checklist **(Figure 5-1)**. In addition, separate minutes of the meeting may be prepared by the CQCSM and attached to the checklist, if appropriate. Preparatory inspections will be reported on the CQC Daily Report with the inspection checklist.

5.3 Initial Inspection

An initial inspection will be conducted soon after beginning each definable feature of work. The inspection will be performed when it is determined that a sufficient portion of the feature of work has been accomplished to evaluate the following criteria:

- Compliance with the specifications, drawings, submittals, and other contract requirements.
- Acceptable levels of workmanship.
- Safety measures - compliance with activity hazard analysis.
- Resolution of differences.

Initial inspections will include participation of the responsible personnel, including appropriate subcontractors and the CQC personnel, involved with the feature of work. USACE will be notified in advance of each initial inspection and may participate in the inspection whenever possible. Initial inspections will be performed for each major feature of work. In addition to the above initial inspections, whenever subsequent follow-up inspections indicate the workmanship has become unacceptable the deficiencies will be corrected and documented.

Initial inspections will be documented using the combined Initial/Follow-up Inspection Form **(Figure 5-2)**. When required to cover inspection items not on the checklist, separate notes will be prepared and attached to the checklist. The initial inspections will be reported on the Daily CQC Report and the checklist included as an attachment.

5.4 Follow-Up Inspections

The frequency of the follow-up inspections will depend on the extent of work being performed on each particular feature of work, but will normally be daily. Follow-up inspections will be performed on all ongoing work and on all completed work prior to starting subsequent phases. All deficiencies will be corrected prior to starting new work. Follow-up inspections will be documented using the combined Initial/Follow-up Inspection Form **(Figure 5-2)**. The follow-up inspections will be reported as part of the CQC Report with copies of the Follow-up Inspection Forms attached.

As part of the follow-up inspection phase, at the completion of each feature of work or increment, the work will be inspected for compliance with the contract plans and specifications. The CQCSM is responsible for initiating the completion inspection and verifying development of a punch list of items that do not conform to the specified requirements, including incomplete work items. The punch list will identify all nonconforming or incomplete work. Upon completion of the punch list items, a second inspection will be conducted by the CQCSM to verify that all of the items conform to the requirements. When the CQCSM is satisfied that all of the work inspected meets the specified requirements, the Site Superintendent, or his

designee, will notify USACE for a joint inspection by USACE and OHM. Results of the final inspection will be documented on the Final Inspection Form (see **Figure 5-3**).

5.5 Inspection Documentation

The CQCSM is responsible for the maintenance of inspection records. Inspection records will be legible and will clearly provide all information necessary to verify that items or activities inspected conform to the specified requirements, or in the case of non-conforming conditions, provide evidence that the conditions were brought into conformance or otherwise accepted by USACE. All inspection records will be available to USACE.

5.6 Deficiency Reports

The CQCSM will report each non-conforming item on a Deficiency Report **(Figure 5-4)** assisted as appropriate by the individual who discovered the problem. The CQCSM will describe the deficiency in the Daily CQC Report and maintain a list of deficient items on the Deficiency Tracking Log **(Figure 5-5)**. The Senior Project Manager, QA/QC Manager, CQCSM, and Site Superintendent will review this list and initiate a Corrective Action Report **(Figure 5-6)** if a deficiency is not satisfactorily corrected in a timely manner.

The Senior Project Manager will review unresolved Corrective Action Reports (CAR) and take appropriate measures to ensure that the corrective actions are completed on schedule. The CQCSM will conduct an inspection to verify that the CAR is resolved, update the Deficiency Tracking Log, and note this in the Daily CQC Report.

Table 5-1
THREE-PHASE INSPECTION PROGRAM

FEATURE OF WORK	INSPECTIONS		
	Preparatory Phase	Initial Phase	Follow-up Phase
Task 1 - Mobilize and Site Setup 1. Mobilize OHM site personnel. 2. Receive support equipment.	-Discuss Work Plan -Ensure materials and equipment are received in safe working order -Review SSHP and hazards specific to each hazard -Review traffic routes and discuss site security measures -Complete Preparatory Inspection Checklist -Ensue that all project plans are on site	-Meet with each crew -Review Work Plan requirements -Ensure worker OSHA training and medical certificates are in order -Inspect hookup of temp. facilities -Review traffic routing and site security measures -Support resolution of questions/concerns -Complete Initial Inspection Checklist Form	-Perform surveillance of mobilization activities. Ensure the following: -Temporary facilities are setup at locations defined in drawings -Observe quality of equipment and materials delivered to site, check storage areas for neatness and provide adequate protection of materials from weather -Survey safety of operations and conformance with SSHP -Complete Follow-Up Inspection Checklist -Daily QC reporting
Task 2 - Collect Water and Sludge Samples 1. LHAAP explosive scanning of each sump. 2. Collect samples and ship to lab. 3. Decontaminate sampling equipment	-Meet with sampling teams -Review and discuss CDAP -Affirm that all sampling equipment is on hand and previously decontaminated or cleaned -Discuss health and safety of testing & operations -Complete Preparatory Inspection Checklist -Ensure LHAAP has tested explosivity of sump contents	-Meet with sampling team -Review CDAP requirements -Observe sampling and affirm conformance with CDAP -Review documentation for accuracy and completeness -Support resolution of questions/concerns -Review adequacy of worker protection -Complete Initial Inspection Checklist Form	-Perform surveillance of sampling activities -Spot-check documentation -Survey safety of operations and conformance with SSHP -Complete Follow-Up Inspection Checklist -Daily QC reporting

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FEATURE OF WORK	INSPECTIONS		
	Preparatory Phase	Initial Phase	Follow-up Phase
Task 3 - Analyze Water and Sludge Samples 1. Package and ship samples to lab. 2. Analyze samples and report data.	-Meet with sampling team -Review and discuss CDAP analytical parameters/ -Ensure that only pre-cleaned sampling containers are used for sample collection -Discuss sampling packaging, shipping and chain of custody requirements -Complete Preparatory Inspection Checklist	-Observe quality of work; ensure compliance with CDAP -Inspect COC documents for accuracy and completeness -Resolve discrepancies and conflicts -Complete Initial Inspection Checklist	-Perform daily surveillance -Observe quality of work -Inspect safety of operations and conformance with SSHP -Complete Follow-up Inspection Forms -Daily QC Reporting
Task 4 - Remove Water and Sludge From Sumps 1. Remove sump water. 2. Remove sump sludge. 3. Remove sand from previously closed sumps.	-Meet with each crew -Review and discuss SWMP and work task requirements -Ensure that all materials and equipment are on hand -Discuss spill prevention/response procedures -Discuss waste handling/ containerization -Discuss task-specific safety requirements -Complete Preparatory Inspection Checklist	-Meet with each crew -Review and discuss work task requirements -Observe work and ensure work is performed correctly -Inspect waste containers for proper labeling -Support resolution of questions/concerns -Review adequacy of worker protection -Complete Initial Inspection Checklist Form	-Perform daily surveillance of operations -Observe waste handling and containerization for conformance with work plan and SWMP -Survey safety of operations and conformance with SSHP -Complete Follow-Up Inspection Checklist -Daily QC reporting

017582

FEATURE OF WORK	INSPECTIONS		
	Preparatory Phase	Initial Phase	Follow-up Phase
Task 5 - Remove Sumps 1. Decontaminate sumps. 2. Sample sump concrete. 3. Demolish and remove sump.	-Meet with each crew -Ensure that 14 days prior notification has been given to COR and Mr. David Tolbert of LHAAP -Review and discuss CDAP, SWMP and work task requirements -Ensure that all materials and equipment are on hand for decontamination, sampling and demolition -Discuss spill prevention/response procedures -Discuss waste handling/ containerization -Discuss task-specific safety requirements -Complete Preparatory Inspection Checklist -Ensure that confined space entry requirements are met -check showing of sides, when used.	-Meet with each crew -Review and discuss work task requirements -Observe work and ensure work is performed correctly -Inspect waste containers for proper labeling -Support resolution of questions/concerns -Review adequacy of worker protection -Complete Initial Inspection Checklist Form	-Perform daily surveillance of operations -Observe waste handling and containerization for conformance with work plan and SWMP -Survey safety of operations and conformance with SSHP -Complete Follow-Up Inspection Checklist -Daily QC reporting
Task 6 - Transport & Dispose of Wastes 1. Transport and dispose sump contents and demolition debris.	-Meet with each crew -Review and discuss SWMP requirements -Ensure coordination with transporters and TSDFs and approval of waste profile and analysis -Discuss waste container labeling, placarding, and marking requirements -Review hazardous waste manifesting system and establish waste tracking log -Discuss task-specific safety requirements -Complete Preparatory Inspection Checklist	-Meet with each crew -Review and discuss SWMP requirements -Observe work and ensure work is performed correctly per SWMP and DOT regs. -Inspect waste containers for proper labeling, placarding, and marking. -Inspect hazardous waste manifests for accuracy and completeness. -Support resolution of questions/concerns -Review adequacy of worker protection -Complete Initial Inspection Checklist Form	-Perform daily surveillance of operations -Observe waste manifesting and transportation for conformance with work plan and SWMP -Follow-up on waste disposal and ensure certificates of disposal/destruction are accurate and complete. -Survey safety of operations and conformance with SSHP -Complete Follow-Up Inspection Checklist -Daily QC reporting

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FEATURE OF WORK	INSPECTIONS		
	Preparatory Phase	Initial Phase	Follow-up Phase
Tasks 7 - Decontaminate & Demobilize 1. Perform final project cleaning. 2. Demobilize all remaining equipment and materials. 3. Dispatch personnel from site.	-Meet with appropriate OHM personnel -Review and discuss equipment decon requirements and demobilization sequence -Review SSHP task requirement -Discuss the organization and closeout of site files -Complete Preparatory Inspection Checklist	-Meet with appropriate OHM personnel -Review and discuss Work Plan requirements and demobilization sequence -Ensure temporary facilities, equipment and materials are safely removed from site (as applicable) -Ensure project housekeeping and cleaning -Review SSHP task requirement -Complete Initial Inspection Checklist	-Perform surveillance of daily operations -Complete Follow-up Inspection Checklist -Perform completion inspection when work is substantially complete -Generate punch lists of outstanding items -Assure project housekeeping and final project cleaning is accomplished -Daily QC Reporting -Coordinate preparation of final report
Task 8 - Prepare Closure Report 1. Closeout project files and send to office central file. 2. Assemble final closeout documents and submit to USACE.			
Task 9 - Remove and Dispose of Soils Adjacent to Sumps 1. Excavate contaminated soils adjacent to sumps. 2. Transport and dispose contaminated soils. 3. Backfill excavations at removed sumps	-Meet with crew -Review and discuss work plan, CDAP, SWMP, and SSHP -Discuss soil excavation and T&D requirements -Identify all sump excavations requiring backfill -Discuss backfill placement and compaction requirements -Review soil testing results and affirm correct soil classifications -Complete Preparatory Inspection Checklist	-Meet with each crew -Review task requirements -Observe operations affirm conformance with work plan, CDAP, and SWMP. -Review documentation -Support resolution of questions/concerns -Review adequacy of worker protection -Complete Initial Inspection Checklist Form	-Perform daily surveillance of operations -Spot-check documentation -Survey safety of operations and conformance with SSHP -Complete Follow-Up Inspection Checklist -Daily QC reporting

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Task 10 - Additional Sampling 1. Conduct limited confirmational sampling and analysis of the soil and/or water on specified sump remvoval excavation sites.	-Meet w/sampling team -Review work plan, SWMP, SSHP and CDAP requirements -Ensure all material and equipment is on hand and has been decontaminated prior to beginning task -Review task hazards and discuss PPE requirements -Complete Preparatory Inspection Checklist	`-Meet w/sampling team -Review level of quality and workmanship -Ensure all material and equipment is decontaminated between samples -Review task hazards and discuss PPE requirements -Review documentation for accuracy and completeness -Complete Preparatory Inspection Checklist	-Perform daily surveillance of operations -Spot-check documentation -Survey safety of operations and conformance with SSHP -Complete Follow-Up Inspection Checklist -Daily QC reporting

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FIGURE 5-1. PREPARATORY INSPECTION CHECKLIST

017586

OHM Remediation Services Corp.
225 W. Airtex Blvd.
Houston, Texas 77090

Project Name: _____
Project Location: _____
Project No.: _____

PREPARATORY PHASE CHECK LIST

U.S. Army Corps of Engineers
Contract No. DACA56-94-D-0020
Delivery Order No. _____

Report No. _____
Date: _____

Plan Title/Section: _____ Drawing Nos.: _____

A. Personnel Present: (*use back of form to list additional personnel*)

Name	Position	Company

B. Submittals Involved: (*use back of form to list additional submittals*)

Number and Type	Description	Indicate Contractor of Govt. . Approval

C. Are all materials on hand and in accordance with approvals: ___Y ___N
List all deficiencies:

_____

D. Tests Required: (list/reference all quality control tests with their required frequencies):

_____

_____

E. Accident Prevention Preplanning:(list all H&S items discussed):

_____

CQCSM: _____

FIGURE 5-2. INITIAL/FOLLOW-UP INSPECTION FORM

017587

OHM Remediation Services Corp.
225 W. Airtex Blvd.
Houston, Texas 77090

Project Name: _____
Project Location: _____
Project No.: _____

(check one)

INITIAL PHASE CHECKLIST ☐ or
FOLLOW UP PHASE CHECKLIST ☐

U.S. Army Corps of Engineers
Contract No. DACA56-94-D-0020
Delivery Order No. _____

Report No._____
Date: _____

Plan Title/ Section:_____ Drawing Nos.:_____

A. Personnel Present:

Name	Position	Company

B. Materials are in strict conformance with contract specifications: ____Yes ____No
If no, explain:

C. Work being performed is in strict conformance with contract specifications: _____Yes ___No
If no, explain:

D. Workmanship is acceptable: ____Yes ___No
If improvement is needed, explain:

CQCSM_____

FIGURE 5-3. FINAL INSPECTION FORM

017588

OHM Remediation Services Corp.
225 W. Airtex Blvd.
Houston, Texas 77090

Project Name: _____
Project Location: _____
Project No.: _____

FINAL INSPECTION FORM

U.S. Army Corps of Engineers
Contract No. DACA56-94-D-0020
Delivery Order No. _____

Report No. _____
Date: _____

Plan Title/ Section: _____ Drawing Nos.: _____

Inspected Work (list feature(s) of work inspected):

1. 6.
2. 7.
3. 8.
4. 9.
5. 10.

Performance Specification By Contract Delivery Order Reference	Status of Inspection

On behalf on OHM Remediation Corp., I certify that the work inspected is complete and meets the performance specifications cited above and that all material and equipment used and work performed was completed in accordance with approved plans and work instructions and meets contract delivery order requirements.

CQCSM_____ Date____/____/____

FIGURE 5-4. DEFICIENCY REPORT

017589

OHM Remediation Services Corp.
225 W. Airtex Blvd.
Houston, Texas 77090

Project Location: _____
Project No.:_____

DEFICIENCY REPORT FORM

U.S. Army Corps of Engineers
Contract No. DACA56-94-D-0020
Delivery Order No. _____

Report No._____
Date: _____

Plan Title/Section:_____ Drawing Nos.:_____

DESCRIPTION OF DEFICIENCY:

IDENTIFIED BY:_____ DATE:

DISPOSITION/CORRECTIVE ACTION REQUIRED:

REWORK _____ REJECT _____ REPAIR _____ USE AS IS _____

TO BE PERFORMED BY:_____DATE:_____

MUST CORRECTION BE VERIFIED? YES___ NO___

TO BE VERIFIED BY:_____ PREPARED BY:_____DATE:_____

CORRECTIVE ACTION TAKEN:

IMPLEMENTED BY:_____DATE:_____

VERIFIED BY: _____DATE:_____

Approved By:_____Date:___/___/___

FIGURE 5-5. DEFICIENCY TRACKING LOG

017590

OHM Remediation Services Corp.
225 W. Airtex Blvd.
Houston, Texas 77090

Project Name: _____
Project Location: _____
Project No.: _____

DEFICIENCY TRACKING LOG

U.S. Army Corps of Engineers
Contract No. DACA56-94-D-0020
Delivery Order No. _____

Report No. _____
Date: _____

Deficiency / Nonconform. Report No.	Date Identified	Item Description	Contract Requirement (Plan Section & Page No.; Dwg. No. & Detail No., etc.)	Corrective Action Taken (CAR#/Date)	Resolution	Date Resolved

FIGURE 5-6. CORRECTIVE ACTION REPORT 017591

)HM Remediation Services Corp.
225 W. Airtex Blvd.
Houston, Texas 77090

Project Name: _____
Project Location: _____
OHM Project No.: _____

CORRECTIVE ACTION REPORT

U.S. Army Corps of Engineers
Contract No. DACA56-92-D-0020
Delivery Order No. _____

Report No. _____
Date: _____
Originator: _____

DESCRIPTION OF PROBLEM: _____

PERSONNEL RESPONSIBLE FOR INVESTIGATIVE PROCESS:

RECOMMENDED CORRECTIVE ACTIONS:

PERSONNEL RESPONSIBLE FOR IMPLEMENTATION OF CORRECTIVE ACTIONS:

RESULTING ACTIONS AND EFFECTIVENESS OF THOSE ACTIONS:

PERSONNEL RESPONSIBLE FOR MONITORING EFFECTIVENESS OF CORRECTIVE ACTIONS:

FINAL DISPOSITION APPROVED BY:
Name: _____ Title: _____
Date: _____
Name: _____ Title: _____
Date: _____

COPIES TO:

017592

6.0 CONSTRUCTION QC PROGRAM

This section addresses the QC measures to be taken, as a supplement to requirements in **Table 5-1**, to ensure the quality of the constructed product. QC measures are addressed below for each major definable feature of work (work tasks).

6.1 Task 1 - Mobilize

Following approval of the Project Work Plan, OHM will mobilize key personnel, and OHM-owned equipment from the Houston District office. OHM will use personnel and equipment present at LHAAP for Delivery Order 0012 (Landfills 12 and 16 Caps) to the maximum extent practical. The temporary office facility established for D.O. 0012 will also be used for this project.

The temporary facilities layout is shown on **Figure 7-1 of the SWP**. A typical decontamination facility is shown on **Figure 7-2 of the SWP**.

QC inspections will be conducted by the CQCSM in accordance with the three-phase QC system to ensure the following:

- All construction equipment undergoes safety and preventative maintenance checks and is suitable for the task(s) for which it will be used
- All site personnel have the necessary OSHA training and medical surveillance statements/certifications
- Government property accounting plan is reviewed and implemented for all permanent equipment to be installed/removed from the site
- Work zones are clearly demarcated using temporary barricading or fencing as required

6.2 Task 2 - Collect Water and Sludge Samples

OHM will verify that the sump contents and the air above the liquids and sludges in the sumps contain no explosive materials prior to beginning OHM sampling activities. These preliminary samples will be analyzed for ignition sensitivity through electrostatic discharge (ESD), impact and friction.

Two 2-man sampling teams will be employed to collect one composite liquid sample and one composite sample of sludge from each sump. One composite sample of sand backfill will be collected from each of the previously closed sumps. All samples will be collected, handled and analyzed in accordance with the **Chemical Data Aquisition Plan (CDAP) and EPA SW-846 Test Methods for Evaluating Solid Waste, Physical /Chemical Methods** (which satifies the requirements of 40 CFR Part 261).

OHM assumes from the Closure Plan and USACE statement of work that a total of 85 sumps and associated equipment/structures will be closed. Out of this total, 58 sumps are assumed to contain approximately one foot of sludge and 2 feet of water, and the remaining 27 sumps were previously closed and filled with sand.

The CDAP sets forth the methods, procedures, and requirements for the following:

- Sampling Equipment Types and Uses
- Sampling Equipment Decontamination
- Sample Collection
- Sample Screening and Laboratory Analysis
- Sample Preservation, Volume, and Holding Times
- Sample Packaging and Shipping
- Sample Chain of Custody
- Sampling Documentation
- Analytical Data Reporting

Sump sampling will be performed in accordance with **CDAP Subsection 4.4.**

The CQCSM will closely monitor and inspect sample collection activities to ensure conformance with the CDAP and Closure Plan and affirm the following:

- Sampling teams have reviewed the CDAP and understand the scope of work.
- Field team leader (chemist) has instructed sampling technicians on the sampling/screening procedures and methods.
- Field team leader assigns specific duties and responsibities to each team member.
- Sampling equipment decontamination procedures are reviewed and discussed with each sampling team.
- Sampling equipment is decontaminated prior to delivery to site and arrives packaged in clean packaging materials. New equipment will require certification of cleaning and/or analysis of a rinsate sample as described in CDAP.
- Checklist of sampling equipment necessary for each event is completed prior to beginning sampling activities.
- Sampling documentation is performed in accordance with the CDAP and is properly filed in accordance with **TERC SOP No. 1101.**
- Required QA/QC samples are collected at required locations and frequencies. Document QC sampling information on **CDAP Figure 7-1** and on **Figure 4-1** of this plan.
- Sample labels, custody seals, and COCs contain all required sampling and analytical information prior to packaging and shipping samples to the offsite laboratory.
- Sampling team is briefed by the SSO on the site specific hazards and PPE requirements.
- Laboratory is notified at least 24 hours in advance of sample shipment.
- All required QC samples (and associated QA samples) are collected at specified frequencies.

6.3 Task 3 - Analyze Water and Sludge Samples

Water, sludge and sand samples will be analyzed at an off-site analytical laboratory for:

- Volatile Organic Compounds (VOC)
- Semi-volatile Organic Compounds (SVOC)
- Total Metals (concrete, sludge and sand samples having more than for any metal will be analyzed for TCLP for that metal)

Contents of 12 sumps specifically identified in Appendix IX of the Closure Plan will be sampled and analyzed for additional analytical parameters:

- Total Recoverable Petroleum Hydrocarbons (TRPH)
- Cyanide

Sump contents requiring incineration will also be analyzed for Thermal Content (BTU) per disposal facility's waste profiling requirements.

Analytical methods and related parameters for sump matrices (sump contents) are summarized in the following **CDAP Tables:**

Table 4-1: Group 3 DERA Sumps and Associated Additional Analyses
Table 4-2: Sampling and Analysis Requirements for Liquid Samples Collected From 58 Sumps
Table 4-4: Sampling and Analysis Requirements for Sludge Samples Collected From 58 Sumps
Table 4-6: Sampling and Analysis Requirements for Sand Samples Collected From 27 Sumps

CDAP Tables 4-3, 4-5, and 4-7 summarize respective requirements for sample volume, preservation, and holding tmes.

The Project Chemist will review the analytical data reports, discuss results with the Project Manager and the Transportation & Disposal (T&D) Coordinator, and prepare a report summarizing his findings.

The CQCSM will monitor sample preparation for shipment to affirm the following:

- Personnel tasked with sample coordination have been instructed by the field team leader on applicable CDAP procedures and laboratory requirements.
- Laboratory(ies) is informed in advance (at least 24 hours) of sample shipment.
- Sample labels, custody seals, and COCs contain all required sampling and analytical information prior to packaging and shipping samples to the offsite laboratory
- Custody seals are secured on each cooler prior to shipment
- Sample Shipment Checklist (**CDAP Figure 4-5**) is completed for each cooler prior to shipping samples.
- Laboratory Cooler Receipt Form (**CDAP Figure 4-6**) is completed by the off-site laboratory sample recipient and any deficiency is reported to Project Chemist immediately.
- Information on sample labels such as sample number, date/time, and requested analysis match information on COCs.

6.4 Task 4 - Remove Liquid and Sludge From Sumps

The CQCSM will monitor sump content removal activities and perform inspections to affirm the following:

- Crew understands the scope of work and has received specific instructions from the Site Superintendent and/or Project Manager on removal and transfer methods.
- All construction equipment undergoes safety and preventative maintenance checks and is suitable for the task(s) for which it will be used.

- All site personnel have the necessary OSHA training and medical surveillance statements/certifications.
- Work zones are clearly demarcated using temporary barricading or fencing as required.
- Task hazards have been analyzed by the SSO and communicated to the crew.
- Crew is suited in appropriate PPE.
- Sump content removal and transfer operations are environmentally sound and any spills are immediately contained and reported to the SSO.
- Sump contents are containerized per the SWMP and containers are properly labeled and staged in specified storage locations.

6.4.1 Sub-task 4-1 - Remove Liquid From Sumps

A trash pump will be used to transfer liquid from the sumps to trailer-mounted holding tanks. Based on sample analysis, liquid will be segregated and containerized separately in accordance with **SWMP** by EPA waste code, and compatibility . Decontamination liquids will also be contained and analyzed separately.

6.4.2 Sub-task 4-2 - Remove Sludge From Sumps

A sludge pump will be used to transfer pumpable sludges from the sumps to drums. Sludges that cannot be pumped will be removed by a combination of backhoe and manual methods. Confined space entry procedures will be used when personnel enter a sump. Drums will be marked/labeled and palletized then moved by forklift and truck to a temporary storage area for later disposal.

6.4.3 Sub-task 4-3 - Remove Sand From Sumps

A backhoe will be used to transfer sand from the previously closed sumps to roll-off boxes. A hoe-ram or small concrete breaker will be used to break up the concrete caps to access the sand. The roll-offs will be moved to a temporary staging area pending results of analysis.

6.5 Task 5 - Remove Sumps

6.5.1 Sub-task 5-1 - Decontaminate Sumps

Sump structures will be decontaminated after removal of water and sludge, by high pressure water or air blasting with dry ice. The dry ice method will be sued on sumps that potent contain explosive residues. This task will be performed by personnel working within the sumps using confined space entry procedures. Decon waste will be collected with a HEPA vacuum if solid, or pump if liquid, and drummed for sampling and disposal in accordance with the CDAP and SWMP, respectively.

The CQCSM will monitor sump decontamination activities and perform inspections to affirm the following:

- Crew understands the scope of work and has received specific instructions from the Site Superintendent and/or Project Manager on sump decontamination methods.
- All construction equipment undergoes safety and preventative maintenance checks and is suitable for the task(s) for which it will be used.

- All site personnel have the necessary OSHA training and medical surveillance statements/certifications.
- Work zones are clearly demarcated using temporary barricading or fencing as required.
- Task hazards have been analyzed by the SSO and communicated to the crew.
- Crew is suited in appropriate PPE.
- Sump decon waste removal and transfer operations are environmentally sound and any spills are immediately contained and reported to the SSO.
- Sump decon wastes are containerized per the **SWMP** and containers are properly labeled and staged in specified storage locations.

6.5.2 Sub-task 5-2 - Spall Concrete Samples

Samples of the decontaminated concrete sump surface will be spalled from the walls and bottoms of all sumps and analyzed in accordance with **CDAP Subsection 4.4.4. CDAP Tables 4-8 and 4-9** summarize the sampling and analysis requirements, and sample volume, preservation and holding times, respectively.

The CQCSM will monitor this sampling activity and perform the inspection items listed above under **Tasks 6.2 and 6.3** of this plan.

6.5.3 Sub-task 5-3 - Demolish Sumps

Concrete tops, walls and bottoms of sumps determined by concrete sample analysis to be hazardous will be broken-up with a hoe-ram or air hammer. Hazardous concrete debris will be loaded into roll-off boxes for disposal in accordance with applicable SWMP addendum. Non-hazardous concrete sumps will be left in place and backfilled with clean sand or soil. The concrete drainage chutes leading to the sumps will also be demolished and disposed of in accordance with each sump's final disposition. Additionally, the chute will be grouted at the building to prevent future use.

The CQCSM will monitor sump demolition activities and perform inspections to affirm the following:

- Crew understands the scope of work and has received specific instructions from the Site Superintendent and/or Project Manager on sump demolition methods.
- All construction equipment undergoes safety and preventative maintenance checks and is suitable for the task(s) for which it will be used.
- All site personnel have the necessary OSHA training and medical surveillance statements/certifications.
- Work zones are clearly demarcated using temporary barricading or fencing as required.
- Task hazards have been analyzed by the SSO and communicated to the crew.
- Crew is suited in appropriate PPE.
- Demolished sump debris/waste removal and transfer operations are environmentally sound and any spills are immediately contained and reported to the SSO.
- Demolished sump debris/waste are containerized per the **SWMP** and containers are properly labeled and staged at specified storage locations.

6.6 Task 6 - Transport and Dispose of Wastes

The task addresses the requirements for transportation and disposal (T&D) of all wastes generated during sump closure activities, excluding the adjacent soils excavated following sump removal (**see Task 6.9**).

The CQCSM will closely monitor the transporation and disposal of site wastes and coordinate such activities with the T&D Coordinator in the Houston Office to affirm the following:

- OHM personnel involved in T&D have undergone appropriate DOT training required under HM-126f.
- Waste profiling has been executed and accurately represents each EPA waste code.
- Transport vehicles are accurately marked and placarded in accordance with DOT requirements and applicable SWMP addendum.
- Bulk containers of waste have been inventoried prior to transportation and have appropriate labels/markings.
- Transporters and TSDFs are qualified by OHM and approved by USACE.
- A properly completed and signed (by generator's representative) hazardous waste manifest accompanies each shipment of waste.
- TSDFs used for disposal are permitted by EPA and are in compliance with their permit(s).
- Wastes are disposed within time limits, if any, of the subcontract agreement with TSDF.
- Certificates of Disposal/Destruction are promptly provided to OHM and are checked for accuracy and completeness.
- A waste tracking log is maintained for all wastes disposed off-site. The tracking log is periodically checked for accuracy and completeness and contains the following information (as a minimum): hazardous waste manifest number, truck number, disposal facility, site departure and TSDF delivery dates, associated EPA waste codes, and quantities of waste with each shipment.

6.6.1 Sub-task 6-1 - Transport and Dispose of Water

Water removed from sumps and stored in temporary holding tanks will be sampled, analyzed and disposed. The **Closure Plan** anticipates deep well injection of all contaminated water. Sampling and analysis requirements are addressed in the **CDAP** as previously discussed. Transportation and disposal requirements are addressed in the **SWMP**.

6.6.2 Sub-task 6-2 - Transport and Dispose of Sludge

Sludge removed from sumps and stored in drums will be disposed of by off-site incineration in accordance with the **Closure Plan**. The drums will be loaded onto the transporter's trucks with a forklift. Sludges will not be resampled except for disposal profiling. Transportation and disposal of sludges are addressed in the **SWMP**.

6.6.3 Sub-task 6-3 - Transport and Dispose of Concrete and Sand

Concrete debris and sand from sumps will be stored in roll-off boxes and disposed of as described in the **SWMP**. The **Closure Plan** anticipates that some of this concrete debris and sand may be hazardous and the remainder will be non-hazardous. Concrete and sand will be placed in the same roll-off box if both are either hazardous or non-hazardous. Roll-off boxes will be picked up by the transportation subcontractor. Sampling and analysis of the concrete debris and sand are addressed in the **CDAP** as previously discussed.

6.7 Task 7 - Decontaminate and Demobilize

Equipment used in sump removal will be decontaminated prior to demobilization from LHAAP. Liquids generated during decontamination will be stored in temporary holding tanks for analysis and disposal as described in the **SWMP**.

The CQCSM or authorized designee will (1) observe equipment decontamination activites to ensure decontamination adequacy, (2) remain on site throughout demobilization of the equipment to ensure that it is completed, and (3) assist in any administrative closeout requirements such as preparing project files for transport to the Houston office and dispatching remaining office equipment. Equipment will be demobilized when it is no longer required. The OHM office trailer and tool/supply trailer will remain on site for use during D.O. 0012 (Landfills 12 and 16 Caps).

6.8 Task 8 - Prepare Closure Report

Upon conclusion of the demobilization, the OHM team will prepare the Closure Report. The Senior Project Engineer will lead the closure report activities. During the field work, the Project Superintendent will be responsible for maintaining a daily log of all on-site activities. The log will be submitted to the Senior Project Engineer to provide a detailed history of each field activity for inclusion in the Closure Report. The Closure Report will also include sampling and analysis results, waste profiles and waste manifests for materials hauled off-site.

Other project management team members from QA/QC, Project Management, Health and Safety, and Contract Administration will provide input to the Senior Project Engineer. The Closure Report will be signed by a Professional Engineer licensed in the State of Texas.

6.9 Task 9 - Remove and Dispose of Soils Adjacent to Sumps

The CQCSM will monitor this task (and associated subtasks) and perform the inspection items previously adressed for sampling and analysis, sump waste removal, and T&D.

6.9.1 Sub-task 9-1 - Excavate Contaminated Soils Adjacent to Sumps

Where sumps are removed, OHM will also excavate and remove approximately one foot of soil surrounding those sumps. A backhoe will be used to excavate the soil and place it into roll-off boxes. Excavations will be shored as necessary for personnel safety and integrity of adjacent buildings. Sampling of these soils will be in accordance with the **CDAP Subsection 4.4.5.** Sampling and analysis requirements, and sample volume, preservation, and holding times are summarized in **CDAP Tables 4-10 and 4-11**, respectively. Disposal requirements are addressed in the **SWMP** addendum.

6.9.2 Sub-task 9-2 - Transport and Dispose of Contaminated Soils Adjacent to Sumps

Contaminated soil will be stored in roll-off boxes and disposed of as described in **SWMP**. Based on sample analysis, some of this contaminated soil may require incineration and the remainder will be disposed of at an off-site landfill. Roll-off boxes will be picked up by the transportation subcontractor.

6.9.3 Sub-task 9-3 - Backfill Excavations at Removed Sumps

Excavations will be backfilled using small compactors. Backfill soils will be imported from off-site or on-site, if available. The disturbed surface will not be revegetated or otherwise covered.

QC inspections will be conducted by the CQCSM in accordance with the three-phase QC system to ensure the following:

- All construction equipment has undergone safety and preventive maintenance checks and is suitable for the task(s) for which it will be used.
- Backfilling crew understands the scope of work.
- Backfill material meet the requirements and conditions of the particular fill for which it is to be used (where applicable).
- Backfill laboratory compaction characteristics (Proctor tests) have been determined and tolerances for optimum moisture and percentage of maximum dry density have been established (where applicable).
- Backfill is placed and compacted to lift thicknesses specified in contract specification and drawings (where applicable).
- Field density-moisture testing is performed in accordance with specified methods and frequencies (where applicable).
- Backfilled excavations are rough graded to match the surrounding ground surface elevation.

6.10 Task 10 - Additional Sampling

At the direction of the Government, OHM will " conduct limited confirmational sampling and analysis of the soil and/or water on specified sump removal excavations. The sampling will consist of the collection of soil samples from the excavation sidewalls or bottom and/or groundwater or rainwater that may collect in the excavation. The chemical analysis of the soil and/or water samples will consist of total volatile and semi-volatile organic compounds and total metals."

7.0 DOCUMENT CONTROL

7.1 Documentation

The CQCSM will maintain current records of QC activities and tests performed including those of suppliers and subcontractors. The records will include evidence that required control measures and tests have been performed and will indicate the results of the activities. Photographic documentation will also be maintained for this project in accordance with subsection 7.3 of this plan.

7.2 Daily CQC Report

A Daily CQC Report **(Figure 7-1)** will be completed and maintained by the CQCSM. The report will cover both conforming and non-conforming work. The original Daily CQC Report and one copy will be submitted to USACE no later than one business day following the date of the report.

The Daily CQC Report will include a statement of certification that all materials, supplies, and work performed comply with the contract requirements. The CQCSM, or his authorized designee, will sign the daily report to indicate the above certification.

The Daily CQC Report will include:

- Type and number of control activities
- Results of test and inspections
- Types of defects/causes for rejection of work or materials
- Corrective actions and results
- Trades working, description, and number
- Weather conditions
- Verbal instructions from the USACE

The results of daily safety inspections performed, including any non-conforming conditions and corrective actions, will be attached or documented on the Daily CQC Report. The Daily CQC Report will be supplemented as necessary and approved by the CQCSM with other project reports such as daily site notes and records of Health & Safety activities and inspections.

7.2.1 Daily Weather Conditions/Lost Time Report

A Daily Weather Conditions/Lost Time Report **(Figure 7-2)** will be prepared on a daily basis by the CQCSM.

7.3 Photographic Documentation

The CQCSM will take photographs or videos (or a combination of both) of the project activities as pictorial documentation. The subject and quantity of this documentation will depend on the judgement of the CQCSM and the nature of the work being performed. Generally, it is desirable to show the sites before any work is performed, with additional photographs showing major steps in the work, and ending with photographs of the finished product. Photographs from different angles may be required for some work features. Overall views and close-in shots may both be required to adequately document the work.

Photographs will be taken on 35mm film using a camera capable of date-stamping each negative with the date the photograph was taken. One 3-inch x 5-inch glossy print will be made from each selected negative.

Each print will be marked with the job number, date, negative roll number and frame number, and a description of the subject of the photograph. Prints will be placed in clear plastic print holders. Negatives will be placed in negative protectors, annotated with the job number, date processed, and roll number. Photographs will be logged using the Photograph Log form **(Figure 7-3)**. The Photograph Log, print holders and negatives will be kept in a 3-ring binder.

The 3-ring binder of Photograph Log, prints and negatives will be submitted to the CO at project close-out.

7.4 Submittals

7.4.1 Responsibilities

The Senior Project Manager, or his designee, will be responsible for the preparation of submittals. The CQCSM will monitor submittal activities to verify:

- Completeness and accuracy of submittals;
- Inclusion of all required submittals;
- Submittal schedule status;
- Current submittal status; and
- Resubmittals.

7.4.2 Submittal Control

OHM will control and schedule all submittals to USACE. These submittals include all items listed in the contract document and listed or specified in the project specifications. Units of weights and measures used on all submittals will be consistent with those used in the contract documents. **Figure 7-4** is a Submittal Register form.

Each submittal will be reviewed for completeness, accuracy, and compliance with contract requirements by individuals qualified to perform the review of that specific item. Prior to each submittal, the CQCSM, or his designee, will affirm that the submittal is in compliance with the contract requirements. Submittals that do not comply with the requirements will be returned to the originator for correction and resubmittal. Substitutions or variations of specified requirements will be clearly noted and will require approval or acceptance by USACE. Unless otherwise specified, five copies of submittals for USACE approval and three copies of information submittals will be transmitted to USACE using the Document Transmittal Form **(Figure 7-5)**. Additional submittals will be added as required by changes or variations in the plans or specifications. Submittals will include, but not be limited to, the following:

- Work Authorization Documents
- Work Plans and Drawings
- Material Certifications
- Transportation and Disposal Submittals (as required)
- Daily QC reports
- QC Inspection Reports
- Construction Photographs
- Project Final Report

Submittals will be transmitted to USACE on the Document Transmittal Form **(Figure 7-5)**, which identifies the project, responsible organization, specifications, drawing numbers, and other pertinent information to indicate quantities and types of items submitted. Resubmittals will be identified using the original submittal number and consecutive alphabetic suffix for each time the resubmittal was made.

7.4.3 Submittal Scheduling

Submittals on component items forming a system, or that are interrelated, will be combined and, whenever possible, submitted concurrently. Certifications pertaining to specific items will be submitted with these documents.

7.4.4 Review of Vendor Submittal

Vendors and subcontractors are required to expeditiously submit items such as drawings, test data, and specifications to OHM for review to enable timely submittals to USACE. OHM technical and CQC personnel will review each submittal for compliance with contract documents. If acceptable, the item will be stamped or indicated as such and forwarded to USACE for review and approval.

If unacceptable, errors or deficiencies will be identified and returned to the vendor or subcontractor for correction. The corrected document will be resubmitted to OHM for review until it meets contract requirements.

FIGURE 7-1. DAILY CQC REPORT

017603

OHM Remediation Services Corp.
225 W. Airtex Blvd.
Houston, Texas 77090

Project Name:_____
Project Location:_____
OHM Project No.: _____

DAILY CONSTRUCTION QUALITY CONTROL REPORT

U.S. Army Corps of Engineers
Contract No. DACA56-94-D-0020, DO No.___

Report No. _____
Date: _____

WEATHER: ( ) Clear ( ) P. Cloudy ( ) Cloudy Wind _____
Temperature High_____Low _____
Precipitation: Today _____ Previous Period (i.e., weekend) _____
Site Conditions:_____
Lost Time Due to Inclement Weather: _____%

PRIME CONTRACTOR/SUBCONTRACTORS AND AREAS OF RESPONSIBILITY/LABOR COUNT:
(Include number, trade, hours, employer, location, and description of work.)

a.

b.

c.

d.

e.

f.

WORK PERFORMED: (Include location and description of work performed including equipment used. Refer to work performed by prime and/or subcontractors as previously designated by letter above. Attached subcontractor daily activity reports when applicable):

Report No._____

MATERIALS AND/OR EQUIPMENT DELIVERED: (Include a description of materials and/or equipment, quantity, late/hours used, date of safety check, and supplier.)

RESULTS OF SURVEILLANCE: (Include satisfactory work completed or deficiencies with action to be taken.)

a. Preparatory Inspection: (Attach minutes)

b. Initial Inspection: (Attach minutes)

c Follow-Up Inspection: (List results of inspection compared to specification requirements.)

d. Safety Inspection: (Include safety violations and corrective actions taken.)

OFF-SITE SURVEILLANCE ACTIVITIES: (Include action taken.)

QC TESTS PERFORMED AND RESULTS: (As required by plans and/or specifications.)

VERBAL INSTRUCTIONS RECEIVED OR GIVEN: (List any instructions received from government personnel or given by OHM on construction deficiencies identified, required retesting, etc., and the corresponding action to be taken.)

017605

CHANGED CONDITIONS/DELAYS/CONFLICTS ENCOUNTERED: (List any conflicts with the delivery order [i.e., scope of work and/or drawings], delays to the project attributable to site, and weather conditions, etc.)

SUBMITTALS REVIEWED: (Include submittal number, specification reference, and name of submitter.)

MEETINGS: (List the meetings, i.e., Health and Safety, Site Operations, Cost/Schedule, etc.)

VISITORS

REMARKS: (Any additional information pertinent to the project not defined by the previous entries.)

CONTRACTOR'S VERIFICATION: The above report is complete and correct. All material and equipment used and work performed during this reporting period are in compliance with the contract plans and specifications except as noted above.

OHM Quality Control Inspector

___/___/___
Date

017606

FIGURE 7-2. DAILY WEATHER CONDITIONS/LOST TIME REPORT

DAILY WEATHER CONDITIONS/LOST TIME REPORT FOR WEEK/MONTH OF _____

Contract No.: _____ Project: _____ Delivery Order No.: _____ Location: _____

Contractor: _____

DAY	DATE	W/C - L/T	% LOST	ACTIVITY DELAYED	REMARKS	CONCUR	
						CQCR	QAR
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
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24							
25							
26							
27							
28							
29							
30							
31							

Weather Conditions (W/C): R - Precipitation, C - Extreme Temperature, M - Muddy Site Conditions, W - Extreme Winds

Other Lost Time Conditions (L/T): D - Demobilized, S - Standby

_____ _____

Representative of the Contractor Representative of the Government

017607

FIGURE 7-3. PHOTO LOG FORM

PROJECT PHOTO LOG				
Project Name:_____ Project Location:_____ Project No.:_____				
Photo No.	Date	Time	Task and Description	View Direction

FIGURE 7-4. SUBMITTAL REGISTER

SUBMITTAL ID NUMBER	DESCRIPTION OF SUBMITTAL	TYPE OF SUBMITTAL							CONTRACTOR SCHEDULED DATES				DATE APPROVED	ACTION CODE/REMARKS
		1	2	3	4	5	6	7	SUBMIT	APP NEEDED BY	MAT'L NEEDED BY	SUBMITTED TO CLIENT REP		
001	Project Work Plan				X				GA					
002	Listof Approved TSDFs							x	FIO					
003	List of Approved Transporters							X	FIO					
004	Equipment Decon Certificates			X					FIO					
005	Analytical Data Reports						x		GA					
005	Waste Profile & Analysis						x	x	FIO					
006	Hazardous Waste Manifests				x				FIO					
007	Certificates of Disposal/Desctruction			x		x			FIO					
008	Daily Sample QC Reporrts				x				FIO					
009	Daily CQC Reports				x				FIO					
010	Project Closeout Documentation			x	x				GA					
011	Photo Log				x				FIO					

NOTES: 1 SHOP DRAWING 2 SAMPLE 3 GUARANTEE/CERTIFICATION 4 PLANS/LOGS
5 CERTIFICATE 6 TEST REPORT 7 OTHER

NLT = NO LATER THAN FIO = For Information Only
CA = CONTRACT AWARD GA = Government Approval
ASAP = AS SOON AS POSSIBLE

017608

FIGURE 7-5. DOCUMENT TRANSMITTAL FORM

OHM Remediation Services Corp.
225 W. Airtex Blvd.
Houston, Texas 77090

Project Name: _____
Project Location: _____
Project No.: _____

DOCUMENT TRANSMITTAL FORM

U.S. Army Corps of Engineers
TERC No. DACA56-94-D-0020
Delivery Order No. _____

Date: _____
Transmittal Document No. _____

The following documents are transmitted herewith for the purposes noted. Please sign and return one copy of this transmittal form to acknowledge receipt of the document.

Submittal/ Document Number	Title	Quantity		For Information	For Approval	Date Approval Needed
		Original	Copy			

CQCSM: _____ Date: ___/___/___

Acknowledged by:

Submitted by:
Signature: _____
Title: _____
OHMRSC SW District

Signature: _____
Title: _____
USACE TERC Tulsa District

8.0 SUBCONTRACTOR QUALITY CONTROL

All subcontractors for this project are responsible for compliance with the QC requirements of their respective subcontract. Subcontractors include organizations supplying quality related items or services to the project. OHM assumes overall responsibility for conformance to the quality requirements for the subcontracted items and services.

The requirements for personnel qualifications, technical performance levels, QC procedures, acceptability criteria, and documentation will be included as a part of the subcontract documents. The CQCSM, or his designee, will review the subcontract procurement documents to verify all of the QC requirements are communicated to the subcontractor.

Each subcontractor will be required to identify an adequately qualified individual within the organization to perform QC duties. The qualifications of this individual will be submitted to the CQCSM for review and approval. The CQCSM will coordinate all QC functions with the designated subcontractor QC representative. The Senior Project Manager, or his authorized designee, will assist the CQCSM in managing subcontractor QC.

The CQCSM is responsible for the performance of inspections, surveillance, document reviews, audits, and other QC functions to verify compliance with the subcontract requirements. These activities will be documented on inspection reports, checklists, audit reports, field logs, or other forms appropriate to the function performed.

For field operations, the CQCSM will provide QC inspections before and during the subcontractor activities, to the extent required, to verify that the subcontractor is in compliance with the QC requirements of the contract and the applicable subcontract documents.

Audits of subcontractor activities will be conducted by the CQCSM as necessary to verify compliance with the CQCP. Objective evidence of conformance to the subcontract documents will be reviewed during the audits.

017611

ATTACHMENT A

TERC SOPS: NOs. 0900, 0901, & 1101

SOP # 0900
Revision # 00
Revision Date November 10, 1995

Approved: _____ 11.27.95
Program Manager — Date

Approved: _____ 11-10-95
QA/QC Manager — Date

STANDARD OPERATING PROCEDURE
GOVERNMENT PROPERTY CONTROL

017612

PURPOSE: To establish standard operating procedures for the administration of government property.

REFERENCE: TERC Program Contract Management Procedure #5

SCOPE: Program-Wide

DEFINITION: Government Property refers to all property and equipment owned by or acquired for the government by OHM.

PROCEDURE:

1. OHM's contract with the Tulsa District Corps of Engineers requires OHM to have a property management program to track and dispose of government furnished property. A property management program was developed, documented and incorporated into the TERC contract. This procedure outlines the program with a series of charts for review and use in implementing the government property accounting program.

   a. **Exhibit 900-01** contains definitions important to the operations and implementation of OHM's property management program, assignment of responsibilities for the program, and the record keeping requirements.

   b. **Exhibit 900-02** are the forms to be used to implement the program.

   c. **Exhibit 900-03** are charts outlining actions to be taken from receipt of property to contract closeout.

STANDARD OPERATING PROCEDURE
GOVERNMENT PROPERTY CONTROL

017613

2. All government furnished property must be marked and identified with the decals **(Exhibit 900-04)**. Attach one to each piece of indoor government furnished equipment preferably on the back side where the decal can be readily found. Outdoor equipment will be marked with white paint. In both instances the following information must be included:

Contract No.	DACA 56-94-D-0020
Item Desc.	(Fill in with short description)
Serial No.	(Use Delivery Order # plus sequential number beginning with 001 to identify each piece of equipment)

3. The Project Manager for each delivery order will appoint a government property administrator to perform material receipt and inspection, document distribution and material/equipment issue. The remaining actions and responsibilities are to be handled by others in the Houston office.

4. The records are subject to audit and inspection by the government Contracting Officer or his designated representative throughout the contract performance period.

PROPERTY MANAGEMENT
Tulsa TERC Delivery Orders

KEY DEFINITIONS	
• Government-furnished Property	All property and equipment owned by or acquired for the government by OHM.
• Expendable Property	Property consumed or expended in the performance of the contract, e.g., raw processing materials, supplies, parts, small tools, components.
• Non-expendable Property	Property with unit costs of $1,000 or more, excluding furniture, including accessories and which does not lose its identity or become a component part of another item when placed in use, e.g., equipment used to perform the work but not remaining with the completed project.

017614

PROPERTY MANAGEMENT
Tulsa TERC Delivery Orders

RESPONSIBILITIES		
• Program Manager	Overall responsibility for the implementation and adherence to Contract Management Procedure No. 5.	John Ollsen
• Government Contracts Administrator	Monitor program for compliance, disseminate new policies and procedures to individuals responsible for performing the program, and audit program and project levels.	Gerald Schulke
• Project Manager	Responsible for and assures individual assigned property administration performs the work in the field.	TBD
• _____	Site individual responsible for performing propoerty receipt and inspection, document distribution, and material issues.	TBD

017615

DOD PROPERTY RECORD

Form Approved
OMB No. 0704-0246
Expires Mar 31, 1993

Public reporting burden for this collection of information is estimated to average 2.5 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0246), Washington, DC 20503.

PLEASE DO NOT RETURN YOUR COMPLETED FORM TO EITHER OF THESE ADDRESSES. RETURN COMPLETED FORM TO THE CONTRACT ADMINISTRATION OFFICE

1.	a. ACTIVE	b. INITIAL	c. IDLE	d. CHANGE	2. JULIAN DATE	3. I.D./GOVERNMENT TAG NO.

SECTION I - INVENTORY RECORD

4. COMMODITY CODE	5. STOCK NUMBER	6. ACQUISITION COST	7. TYPE CODE	8. YR OF MFG.	9. POWER CODE	10. STATUS CODE	11. SVC CODE	12. COMMAND CODE	13. ADM OFFICE CODE

14. NAME OF MANUFACTURER	15. MFR'S CODE	16. MANUFACTURER'S MODEL NO.	17. MANUFACTURER'S SERIAL NO.

18. LENGTH	19. WIDTH	20. HEIGHT	21. WEIGHT	22. CERTIFICATE OF NON-AVAILABILITY NUMBER	23. PEP NO.	24. ARD	25. CONTRACT NUMBER

26. DESCRIPTION AND CAPACITY

CONTINUED ON BACK OF FORM ☐ YES ☐ NO

27. ELECTRICAL CHARACTERISTICS

a. QTY	b. HORSEPOWER	c. VOLTS	d. PHASE	e. CYCLE	f. AC	g. DC	h. SPEED	i. TYPE AND FRAME NUMBER

28a. PRESENT LOCATION

28b. DIPEC CONTROL NO.

29. POSSESSOR CODE

SECTION II - INSPECTION RECORD (If explanation is required, respond in Remarks)

	YES	NO
30. Can items be stored and maintained on site for at least 12 months?		
31. Has item been rebuilt/overhauled? If so, when? Date		
32. Has item been modified from original configuration? If so, explain.		
33. Was item inspected under power? If no, explain.		
34. Are maintenance costs normal? If no, explain.		
35. Are safety devices adequate and satisfactory? If no, explain.		
36. Are installation instructions available for transfer?		
37. Are operating instructions available for transfer?		
38. Was item last used on a finishing operation?		
39. Will adjustments or calibration correct deficiencies?		
40. Is item severable without damage to components If not, give their replacement cost. $		
41. Is item in operable condition?		

		YES	NO
42. Must item be repaired/rebuilt/overhauled to perform all functions?	$		
43. Do QC records indicate satisfactory performance? If no, explain.			
44. Are manually operated mechanisms in working order? If no, describe.			
45. Are scales, dials, and gauges working and readable? If no, describe.			
46. Are hydraulic pumps, valves/fittings operating properly? If no, describe.			
47. Are electronic systems and controls operating properly? If no, explain.			
48. How many hours was item used by current possessor?			
49. Explain last use of equipment described in item 26 above.			
50. Estimated cost for packing, crating, handling.	$		
51. Indicate date item will be available for redistribution.			
52. Condition code.			
53. Operating test code.			

SECTION III - REMARKS

54. REMARKS

CONTINUED ON BACK OF FORM ☐ YES ☐ NO

SECTION IV - VALIDATION RECORD

55. VALIDATION (Typed name(s) and signature(s))

DD Form 1342, JAN 93 PREVIOUS EDITION IS OBSOLETE

017617

PROPERTY RECEIPT AND TRANSFER DOCUMENT

(See instructions on reverse)

1. VOUCHER NO.

2. NATURE OF, AND AUTHORITY FOR, ACTION

3. NAME AND ADDRESS OF ISSUING STATION

4. DISPOSING

A. ACCOUNTABLE AREA NO.	B. DATE INVOICED AND DROPPED	C. PROP. DOC. NO.

D. CUSTODIAL AREA TO BE CREDITED

E. SIGNATURE OF CUSTODIAL OFFICER

F. SIGNATURE OF PROPERTY MANAGEMENT OFFICER

5. RECEIVING

A. ACCOUNTABLE AREA NO.	B. DATE RECEIVED	C. PROP. DOC. NO.

D. CUSTODIAL AREA TO BE CHARGED

E. SIGNATURE OF CUSTODIAL OFFICER

F. SIGNATURE OF PROPERTY MANAGEMENT OFFICER

6. SHIPPING DATA

A. BILL OF LADING NO.	B. DATE

C. CARRIER OR METHOD OF SHIPMENT

D. NO. OF PKGS	E. POSTAGE	F. TOTAL WEIGHT

7. RECEIVING DATA

A. CHECK ONE AND EXPLAIN ON REVERSE

☐ REJECTED ☐ SHORT ☐ OTHER

B.

☐ ACCEPTED ☐ PARTIAL DELIVERY

C. RECEIVED BY

D. DATE

8. PROPERTY OR SERVICE

LINE OR STOCK NO. A.	DESCRIPTION OF PROPERTY OR SERVICE (Show property numbers where appropriate) B.	QUANTITY C.	UNIT D.	UNIT COST E.	TOTAL AMOUNT F.

9. A. SIGNATURE OF PROPERTY MANAGEMENT OFFICER

B. DATE

10. ACKNOWLEDGMENT OF RECEIPT OUTSIDE EPA

A. NAME AND ADDRESS OF TRANSFEREE AGENCY, PURCHASER, DONEE, ETC.

B. SIGNATURE OF CONSIGNEE OR AGENCY

C. TITLE

D. DATE

POSTING DATA *(Use if applicable)*

STOCK CONTROL	MEMO ASSET ACCOUNT	COST ACCOUNTING

EPA Form 1700-7 (10-74) REPLACES EPA FORM 1770-17 (1-72) WHICH MAY BE USED UNTIL SUPPLY IS EXHAUSTED

REPORT OF EXPENDABLE PROPERTY ACQUIRED BY OHM

Contract No.	Delivery Order & Project No.	Region & Project Site			Report No. & Effective Date

Description	Quantity Received	Date Received	Quantity Issued	Date Issued	Balance on Hand	Unit/Lot Value

Type Full Name & Title	Signature	Date

017618

REPORT OF NONEXPENDABLE GOVERNMENT PROPERTY ACQUIRED BY CONTRACTOR

CONTRACT NO. | NO.

CONTRACTOR'S VOUCHER NO. | DATE

INSTRUCTIONS TO CONTRACTOR:

(a) Submit original to Property Administrator

(b) A copy of this report **MUST** be attached to voucher submitted to Financial Management Division to support claim for reimbursement.

CONTRACTOR AND ADDRESS

LIST BELOW EACH ARTICLE OF NONEXPENDABLE PROPERTY							
QTY	NOMENCLATURE/DESCRIPTION *(Including manufacturer's name)*	DATE ACQ'D	MODEL NUMBER	MFG SERIAL NUMBER	DECAL OR ID NUMBER	UNIT COST	TOTAL COST

017619

NAME AND ADDRESS OF EPA PROPERTY ADMINISTRATOR

PURCHASE AUTHORIZATION

☐ ARTICLE _____ OF CONTRACT

☐ CONTRACTING OFFICER'S LETTER OF APPROVAL DATED:

☐ OTHER *(Explain)*

SIGNATURE OF CONTRACTOR'S REPRESENTATIVE

TITLE

EPA VOUCHER NO. | DATE

INVENTORY SCHEDULE B (See FAR Section 45.606 for instructions) ☐ PARTIAL ☐ FINAL	TYPE ☐ TERMINATION ☐ NONTERMINATION	TYPE OF CONTRACT	DATE	FORM APPROVED OMB NO. 9000-0015

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the FAR Secretariat (VRS), Office of Federal Acquisition and Regulatory Policy, GSA, Washington, D.C. 20405; and to the Office of Management and Budget, Paperwork Reduction Project (9000-0015), Washington, D.C. 20503.

TYPE OF INVENTORY

☐ RAW MATERIALS (Other than metals) ☐ PURCHASED PARTS ☐ FINISHED COMPONENTS
☐ FINISHED PRODUCT ☐ PLANT EQUIPMENT ☐ MISCELLANEOUS

THIS SCHEDULE APPLIES TO (Check one)

☐ A PRIME CONTRACT WITH THE GOVERNMENT ☐ SUBCONTRACT OR PURCHASE ORDER

GOVERNMENT PRIME CONTRACT NO.	SUBCONTRACT OR P.O. NO.	REFERENCE NO.

CONTRACTOR WHO SENT NOTICE OF TERMINATION

NAME

ADDRESS (Include ZIP Code)

PRODUCT COVERED BY CONTRACT OR ORDER

PROPERTY CLASSIFICATION	PAGE NO.	NO. OF PAGES

COMPANY PREPARING AND SUBMITTING SCHEDULE

STREET ADDRESS

CITY AND STATE (Include ZIP Code)

LOCATION OF MATERIAL

FOR USE OF CONTRACTING AGENCY ONLY	ITEM NO. (a)	DESCRIPTION: ITEM DESCRIPTION (b)	GOVERNMENT PART OR DRAWING NUMBER AND REVISION NUMBER (b1)	TYPE OF PACKING (Bulk, bbls., crates, etc.) (b2)	CONDITION (Use code) (c)	QUANTITY (d)	UNIT OF MEASURE (d1)	COST (For finished product, show contract price instead of cost): UNIT (e)	COST: TOTAL (f)	CONTRACTOR'S OFFER (g)	FOR USE OF CONTRACTING AGENCY ONLY

INVENTORY SCHEDULE CERTIFICATE

The undersigned, personally and as representative of the Contractor, certifies that this inventory Schedule consisting of page numbers _____ to _____ inclusive, dated _____ has been examined, and that in the exercise of the signer's best judgment and to the best of the signer's knowledge, based upon information believed by the signer to be reliable, said Schedule has been prepared in accordance with applicable instructions; that the inventory described is allocable to the designated contract and is located at the places specified; if the property reported is termination inventory, that the quantities are not in excess of the reasonable quantitative requirements of the terminated portion of the contract; that this Schedule does not include any items reasonably usable, without loss to the Contractor, on its other work; and that the costs shown on this Schedule are in accordance with the Contractor's records and books of account.

The Contractor agrees to inform the Contracting Officer of any substantial change in the status of the inventory shown in this Schedule between the date hereof and the final disposition of such inventory.

Subject to any authorized prior disposition, title to the inventory listed in this Schedule is hereby tendered to the Government and is warranted to be free and clear of all liens and encumbrances.

NAME OF CONTRACTOR	BY (Signature of Authorized Official)	TITLE	DATE

NAME OF SUPERVISORY ACCOUNTING OFFICIAL	TITLE

NSN 7540-01-142-0135
Previous edition is usable

EXPIRATION DATE: 4-30-82

1428-102

STANDARD FORM 1428 (REV. 7-82)
Prescribed by GSA - FAR (48 CFR) 53.245(

017620

INVENTORY SCHEDULE B - CONTINUATION SHEET

TYPE ☐ TERMINATION ☐ NONTERMINATION

FORM APPROVED OMB NO. 9000-0015

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the FAR Secretariat (VRS), Office of Federal Acquisition and Regulatory Policy, GSA, Washington, D.C. 20405; and to the Office of Management and Budget, Paperwork Reduction Project (9000-0015), Washington, D.C. 20503.

TYPE OF INVENTORY

☐ RAW MATERIALS (Other than metals) ☐ PURCHASED PARTS ☐ FINISHED COMPONENTS ☐ FINISHED PRODUCTS ☐ PLANT EQUIPMENT ☐ MISCELLANEOUS

GOVERNMENT PRIME CONTRACT NO.	SUBCONTRACT OR P.O. NO.	REFERENCE NO.	PROPERTY CLASSIFICATION	DATE	PAGE NO.	NO. OF PAGES

FOR USE OF CONTRACTING AGENCY ONLY	ITEM NO. (a)	DESCRIPTION: ITEM DESCRIPTION (b)	GOVERNMENT PART OR DRAWING NUMBER AND REV. NUMBER (b1)	TYPE OF PACKING (Bulk, bbls., crates, etc.) (b2)	CONDITION (Use code) (c)	QUANTITY (d)	UNIT OF MEASURE (d1)	COST (For finished product, show contract price instead of cost): UNIT (e)	COST: TOTAL (f)	CONTRACTOR'S OFFER (g)	FOR USE OF CONTRACTING AGENCY ONLY

017621

DOD PROPERTY IN THE CUSTODY OF CONTRACTORS (DFARS 245.505-14) *(See Instructions on back before completing this form.)*	REPORT AS OF 30 SEP 19____ OR _____	*Form Approved* *OMB No. 0704-0246* *Expires Dec 13, 1996* REPORT CONTROL SYMBOL

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0246), Washington, DC 20503.

PLEASE DO NOT RETURN YOUR COMPLETED FORM TO EITHER OF THESE ADDRESSES.
RETURN COMPLETED FORM TO THE ADDRESS IN ITEM 1

1. TO *(Enter name and address of property administrator)*	2. FROM *(Enter full name, address and CAGE code of contractor)*

3. IF GOVERNMENT-OWNED, CONTRACTOR-OPERATED PLANT, ENTER GOVERNMENT NAME OF PLANT

4. CONTRACT NO. *(PIIN)*	5. CONTRACT PURPOSE	6. BUSINESS TYPE *(L, S, or N)*	7. OFFICIAL NAME OF PARENT COMPANY

8. PROPERTY LOCATION(S)	9. PLANT EQUIPMENT PACKAGE *(PEP No. and use)*

a. PROPERTY *(Type or Account)*	b. BALANCE START OF PERIOD		c. ADDITIONS *(in dollars)*	d. DELETIONS *(in dollars)*	e. BALANCE END OF PERIOD	
	(1) ACQUISITION COST *(in dollars)*	(2) QUANTITY *(in units or acres)*			(1) ACQUISITION COST *(in dollars)*	(2) QUANTITY *(in units or acres)*
10. LAND						
11. OTHER REAL PROPERTY						
12. OTHER PLANT EQUIPMENT						
13. INDUSTRIAL PLANT EQUIPMENT						
14. SPECIAL TEST EQUIPMENT						
15. SPECIAL TOOLING *(Government Title Only)*						
16. MILITARY PROPERTY *(Agency-Peculiar)*						
17. GOVERNMENT MATERIAL *(Government-Furnished)*						
18. GOVERNMENT MATERIAL *(Contractor-Acquired)*						

19. CONTRACTOR REPRESENTATIVE		
a. TYPED NAME *(Last, First, Middle Initial)*	b. SIGNATURE	c. DATE SIGNED *(YYMMDD)*

20. DOD PROPERTY REPRESENTATIVE		
a. TYPED NAME (Last, First, Middle Initial)	c. SIGNATURE	d. DATE SIGNED *(YYMMDD)*
b. TELEPHONE NUMBERS *(Commercial and DSN)*		

DD Form 1662, DEC 93 PREVIOUS EDITION IS OBSOLETE

017623

REPORTING INSTRUCTIONS

GENERAL. The prime contractor shall report all DoD property *(as indicated)* in its custody or in that of its subcontractors as of September 30 to the Government Property Representative by October 31 of each year. Also report zero end of period balances when no DoD property remains accountable to the contract. Report data from records maintained in accordance with FAR Subpart 45.5 and DFARS Subpart 245.5.

REPORT AS OF 30 SEP 19___. Fill in the appropriate year *(or other date)*.

ITEM 1 - TO. Enter the name of the Government Property Representative, the Contract Administration Office or other office the Government Property Representative works for, and the full mailing address *(including City, State, and ZIP + 4)*.

ITEM 2 - FROM. Enter the full name and address of the reporting contractor with the Division name stated after the Corporate name. Use the name as it appears on the contract but omit articles and insert spaces between company names that are made up of letters like XYZ Inc., for example. Also enter the Commercial and Government Entity (CAGE) Code.

ITEM 3 - IF GOVERNMENT-OWNED CONTRACTOR-OPERATED PLANT, ENTER GOVERNMENT NAME OF PLANT. Enter the Government name of the plant if the plant is Government - owned and Contractor - operated. Leave blank if it is a contractor - owned plant.

ITEM 4 - CONTRACT NO. *(PIIN).* Enter the 13-digit contract number or Procurement Instrument Identification Number *(PIIN)* under which the Government property is accountable. Use format XXXXXX - XX - X - XXXX.

ITEM 5 - CONTRACT PURPOSE. Enter one of the following 1-character alphabetic codes to identify the general purposes of the contract:

- A. RDT&E
- B. Supplies and Equipment *(deliverable end items)*
- C. Facilities Contract
- D. Lease of facilities by the contractor
- E. Maintenance, Repair, Modification, or Rebuilding of Equipment
- F. Operation of a Government - Owned Plant or Facilities including test sites, ranges, installations
- G. Service contract performed primarily on Military Installations, test facilities, ranges or sites
- H. Contract for storage of Government Property
- I. Others

ITEM 6 - BUSINESS TYPE. Enter a 1-character alphabetic code indicating the type of business concern:

L = Large S = Small N = Non-profit

(See FAR Part 19 for definition of Small Business and FAR 31.701 for definition of Non-profit Organizations.)

ITEM 7 - OFFICIAL NAME OF PARENT COMPANY. Enter the name of the Parent Corporation of the Reporting Contractor. The Parent Corporation is one in which common stock has been issued whether or not the stock is publicly traded and which is not a subsidiary of another corporation.

ITEM 8 - PROPERTY LOCATION(S). Enter the primary location(s) of the property if it is located at site(s) other than that of the Reporting Contractor, e.g., location of subcontract property or property at alternate sites of the prime contractor. Location is the City, State and Zip or the Military Installation or the Foreign site. Limit input to 69 characters. NOTE: Can be used as a "REMARKS" field.

ITEM 9 - PLANT EQUIPMENT PACKAGE. Enter the Number and Use of a Plant Equipment Package *(PEP)* if one exists on this contract. Leave blank otherwise. Example: ARMY PEP #570 - 81 mm Shells.

ITEMS 10 - 18.b.(1) - ACQUISITION COST (BALANCE AT THE BEGINNING OF THE FISCAL YEAR). Enter the acquisition cost for each type of property as defined in FAR 45.5 or DFARS 245.5. The amounts reported must agree with the amounts reported in the previous year for BALANCE AT END OF PERIOD.

ITEMS 10, 12 - 16.b.(2) - QUANTITY (BALANCE AT BEGINNING OF THE FISCAL YEAR). Enter the quantity for all categories of Government property except for Other Real Property and Material on hand at the beginning of the fiscal year. The amounts reported must agree with the amounts reported in the previous year for BALANCE AT END OF PERIOD.

ITEMS 10 - 15.c. - ADDITIONS *(in dollars).* For the property categories indicated, enter the acquisition cost for the total additions to the contract from any source during the fiscal year. Do not enter for Government Material or Military Property.

ITEMS 10 - 15.d. - DELETIONS *(in dollars).* For the property categories indicated, enter the acquisition cost for the total deletions from the contract during the fiscal year. Do not enter for Government Material or Military Property.

ITEMS 10 - 18.e.(1) - ACQUISITION COST (BALANCE AT THE END OF THE FISCAL YEAR). Enter the acquisition cost for each type of property as defined in FAR 45.5 or DFARS 245.5.

ITEMS 10, 12 - 16.e.(2) - QUANTITY (BALANCE AT END OF FISCAL YEAR). Enter the quantity for all categories of Government Property except for Other Real Property and Material on hand at the end of the fiscal year. These will be carried forward to reflect the balance at the beginning of the following year.

ITEMS 17 and 18 - GOVERNMENT MATERIAL. Report material as reflected on inventory records in accordance with FAR 45.505-3.

ITEM 19 - CONTRACTOR REPRESENTATIVE. Type the name of the contractor representative authorized by the property control system to sign this report.

ITEM 20 - DOD PROPERTY REPRESENTATIVE. Type the name of the DoD Property Administrator or other Authorized Property Representative, plus that individual's commercial area code and telephone number and DSN number *(if one exists)*. Signature and date.

NOTE TO CONTRACTOR: When reporting more than one contract from the same location and the same contractor, you may elect to fill out Data Elements 1, 3, 6, 7, and 19 only once as long as each form can be readily identified if any form becomes separated from the others.

DD Form 1662, DEC 93 (BACK)

TRANSPORTATION CONTROL AND MOVEMENT DOCUMENT

PAGE NO.

1. Doc Id	2. Trlr Cont	3. Consignor	4. Comm-Spec Hdlg	5. Air DIM	6. POE	7. POD	
8. Mode	9. Pack	10. Trans Control No	11. Consignee	12. Pri	13. RDD	14. Proj	15. Date Shpd	16. ETA	17. Tr Acct
18. Carrier		19. Flight-Truck-Voy Doc No.	20. Ref	21. Remarks			22. Pieces	23. Weight	24. Cube

25 a. Transhp Point (1)	b. Date Rec	c. Bay Whse	d. Date Shpd	e. Mode Carrier	f. Flight-Truck-Voy Doc No.	g. Ref	h. Stow Loc	i. Split	j. Cond	k. Signature-Remarks
26 a. Transhp Point (2)	b. Date Rec	c. Bay Whse	d. Date Shpd	e. Mode Carrier	f. Flight-Truck-Voy Doc No.	g. Ref	h. Stow Loc	i. Split	j. Cond	k. Signature-Remarks
27 a. Transhp Point (3)	b. Date Rec	c. Bay Whse	d. Date Shpd	e. Mode Carrier	f. Flight-Truck-Voy Doc No.	g. Ref	h. Stow Loc	i. Split	j. Cond	k. Signature-Remarks
28. Consignee	29. Date Received-Offered (Sign)			30. Condition	31. Remarks					

32. Doc Id	33. Trailer-Container	34. Consignor Comm Abbr Other	35. Commodity Spec Hdlg	36. VOY NO Air Dim a	36. VOY NO POE b	37. POD	38. Mode	39. Type Pack	40. Transportation Control Number	41. Consignee	42. PR	43. REMARKS AND/OR RDD a	Proj b	Stow Loc Shpd c	Stow Loc ETA d	Stow Loc The e	44. ADDITIONAL REMARKS OR Pieces a	Weight b	Cube c

DD Form 1384, APR 66

REPLACES EDITION OF 1 APR 63, WHICH MAY BE USED.

PROPERTY MANAGEMENT
TULSA TERC CONTRACT
DACA56-94-D-0020
Required Actions

Expendable

Government Furnished Property — Government issues property to OHM.

Non-Expendable

Receive and Inspect	Distribution of Documents	Property Issue	Annual Inventory	Annual Acquisition Cost Report	Close Out
1. Note description on Waybill. 2. Complete "Property Receipt and Transfer Document" accompanying shipment. 3. If document does not accompany shipment - generate the document. 4. If property is expendable, log receipt of materials to "Report of Non-Expendable Property Acquired By Contractor" created to list list only Government furnished expendable property. 5. Store equipment/ materials separate from OHM or other organizations' property.	1. Copies of Waybill and receipt and transfer document to: a. 2 to OHM Government Contracts Administrator. b) Retain copy with project files. c) Government Contracts Administrator sends copy to OHM Program Management office maintains other copy in official property records file.	If property is expendable, log on previously created record and create a new Property receipt and Transfer Docu. Obtain signatures and retain a copy in central file and send original Property Receipt and Transfer Document to Government Contracts Administrator.	1. Performed by Project Accountant as of Sept 30 2. Project Manager issues memo of results to Government Contracts Administrator by Oct 10. 3. Government Contracts Administrator to report/ (Attachment D, Approval A). SF 1429, Inventory Schedule B and Continuation Sheet Attachment E, to Govt. Property Administrator as of September 30 due Oct 31.	Generated from Financial Records: - Total cost of items less than $5,000. - Total costs of items equals to or greater than $5,000. -Total for all Government Report provided to Govt. Property Administrator. Use DD1662 due Oct 31, data as of Sept 30.	Return property to Government on DD1384. Document various records with the transfers, i.e. log as an "issue" to the Government on the Report of Expendable or Non-Expendable property.

Discrepancy Reports:

Memo of findings and causes to Contracts Administrator; copy to Contracting Officer; copy to project office and Project Manager.

017625

PROPERTY MANAGEMENT
TULSA TERC CONTRACT
DACA56-94-D-0020
Required Actions

	Receive and Inspect	Distribution of Documents	Issue	Annual Inventory	Annual Acquisition Cost Report	Close Out
Property which Contractor buys and Government reimburses. Expendable property is property that is consumed in performing the contract, i.e. losses its identity by incorporation or destruction. Expendable Contractor Acquired Government Funded	Same as Government furnished property. Complete Property Equipment Receipt and Transfer document. Use DD1342 Attachment B or a "Report of Expendable Property Acquired by OHM."	Same as Government furnished property.	Log on "Report of Expendable Property Acquired by OHM".	Same as Government furnished property.	Same as Government furnished property.	Same as Government furnished property.
Non-Expendable Non-expendable property is that property which maintains identity even though incorporated into the construction, e.g. major equipment items, large fixtures.	Same as above. Maintain a record: -Contract number. -Description -Quantity received. -Date received. -Quantity issued. -Date issued. - Balance on hand. -Posting reference. See Attachment ___ "Report of Non-Expendable Gov't. Property Acquired by Contractor".	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.
Discrepancy Reports: Notify OHM Purchasing.						

01 7629

REPORTING LOST, DAMAGED AND/OR REPAIR OF GOVERNMENT PROPERTY

A record, acknowledged by the Project Manager, will be made to document the loss, damage, and/or repair to each piece of government property. The record shall consist of a short factual explanation of the loss or damage which shall be attached to the property record. If repairs are needed the documentation shall consist of the Purchase Requisition, Statement of Work or other identification of the repairs needed and a copy of the purchase order or other contractual document acquiring the repair services. Repair services are to be acquired in accordance with OHM's Purchasing Policies and Procedures.

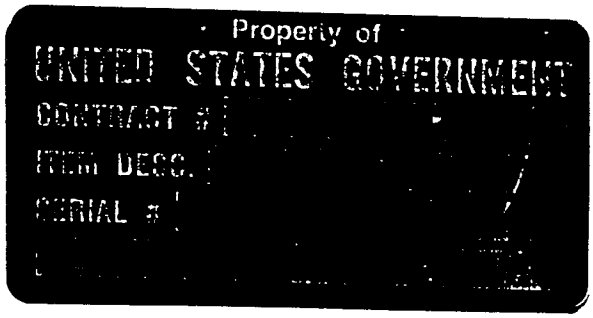
A copy of any record created shall be forwarded to the Contract Manager in the Houston, Texas office.

017628

Government Property Control Plan

"SAMPLE"

GOVERNMENT PROPERTY IDENTIFICATION TAG



Approved: _____ 11-27-95
Program Manager — Date

Approved: _____ 11-10-95
QA/QC Manager — Date

STANDARD OPERATING PROCEDURE
INSTALLED PROPERTY INVENTORY

PURPOSE: To provide a consistent method of tracking and recording property installed on or removed from government facilities.

REFERENCE: None

SCOPE: This procedure applies to all TERC projects where property furnished by the Government or purchased with government funds is installed at government facilities or when property is removed from government facilities under the TERC Program. It is applicable to OHM and any of its subcontractors involved with the installation and/or removal of property.

PROCEDURE:

Each Project Manager is responsible for ensuring that an "Installed Property Inventory Log" is kept for each TERC project. This log **(Exhibit 0901-1)** records all property physically installed or removed from Government facilities. This log is a submittal on the Project Submittal Log.

Property Installed – All property installed will be recorded in the log by the following categories:

1. Engineering -- All engineering associated with the property installed.

2. Material/Equipment -- Includes piping, vessels, electrical, mechanical, concrete, paving and others, as required.

The categories are included under the description portion of the inventory log. A separate log will be maintained for each facility on the project site. All costs associated with engineering will be recorded. The cost of only the material/equipment will be recorded on an item-by-item basis.

STANDARD OPERATING PROCEDURE
INSTALLED PROPERTY INVENTORY

017630

Property Removed - All property removed from a Government facility will be recorded in the same manner as the installed property, with the following exceptions:

1. Costs, if unknown, do not have to be logged in. Record "unknown" in the cost section.

2. Engineering is not recorded for removal of property.

3. Identification of property removed should have the concurrence of the onsite Quality Assurance Representative (QAR).

CONTRACT N DACA-56-94-D-0020 DELIVERY ORDER NO. _____

INSTALLED PROPERTY INVENTORY

Item No	Description	Qty	Manufacturer	Model/Type	Size	Serial No	Unit Cost	Location	Remarks
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									

0163

CONTRACT NO. DACA-56-94-D-0020 DELIVERY ORDER NO. _____

INSTALLED PROPERTY INVENTORY — (Continuation Sheet) _____

Item No	Description	Qty	Manufacturer	Model/Type	Size	Serial No	Unit Cost	Location	Remarks

23962

Approved: _____ 11.27.95
Program Manager — Date

Approved: _____ 11-10-95
QA/QC Manager — Date

STANDARD OPERATING PROCEDURE
CENTRAL FILE SYSTEM PROCEDURES

PURPOSE: To establish a uniform filing system within the TERC program. Each TERC project will utilize this system to ensure uniform file setup and maintenance.

REFERENCE: None.

RESPONSIBILITY: Under the direction of the TERC Program Manager, it is the responsibility of each TERC Project Manager to ensure implementation and compliance with this procedure.

SCOPE: Each TERC project will maintain Project files and Program files utilizing the TERC File Index **(Exhibit 1101-1)**.

PROCEDURE:

1. **General Documents** - All project-specific generated and related documents will be maintained in a Central Filing System, located in the Administrative Office at each respective project. The Administrative Office location will be identified by the Program Manager. The Central Filing System will consist of standard 8 ½ X 11 metal locking file cabinets stored in the same area. A project Specific File Index, utilizing the TERC File Index, will be maintained by the Project Manager or his assigned delegate, the Project Document Control Clerk.

2. **Document Input** - All project related documents and correspondence are to be included in both the Project files and Program files and will be indexed with appropriate File I.D. Number, filed in the Central Files, and recorded in the Central File Log by the Project Document Control Clerk (PDCC). All correspondence and documents are to identify the file number as described in the File Index **(Exhibit 1101-1)**. All documents related to a specific project are to be copied to the PDCC for inclusion in the Project Central File and Central Program File. In cases of extremely sensitive documents, which may be kept under tighter control, a letter is to be placed in the Central File to acknowledge the location of those documents of sensitive nature. Separate Project files will be maintained at the project site.

STANDARD OPERATING PROCEDURE

017634

CENTRAL FILE SYSTEM PROCEDURES

a. Project Files — Cases where field activities are ongoing and a project office has been established, otherwise, the project will utilize the Program files maintained in the Houston office.

b. Program Files — (Houston Office) **All** Program and Project documents and correspondence will be copied to the Program Files. Separate Project Files will be maintained at the project site.

3. **Document Retrieval** - Documents which are to be retrieved from the Project Central Files should be requested from the PDCC, the PDCC will then pull the required document, fill out a File Out Card **(Exhibit 1101-2)**, which will be put into the Central File in place of the documents. When the document is returned to the Central File, the PDCC will pull the File Out Card, return the document to the Central File and mark the File Out Card as document returned.

4. **Central File Review** - Quarterly, the Central File Index is published and distributed to the appropriate project employees for both information and review. The appropriate project employees will review the Index and make recommendations to the Project Manager to include or delete topics in the Index. The Index also serves as a directory, so that files requested can be identified and located easily.

5. **Central File Maintenance** - The Central Files will be reviewed at least once a year to identify files which may not be active, but still need to be retained. Files which contain this type of information may be boxed in file boxes and stored in a convenient location to the project. Each file box will have an Index of the files it contains and the time period these files pertain to. One copy of this index will be placed in the file box itself and one copy will be kept in the Central Files. Each box stored will have a description of the material inside it written on the outside of the box. Each box will be consecutively numbered and logged in a File Box Storage Log **(Exhibit 1101-3)**, which designates the location of that file box. The logs will be maintained by the project PDCC.

6. **Long Term Storage -- Project Completion** - Once a TERC project is complete, the Central Files will be shipped to a storage location designated in the Project Demobilization Plan. This location is to be determined by the TERC Program Manager. All Central Files are to be kept a minimum of 4 years following program close out and final payment or 4 years after the settlement of any claim(s) or litigation pertaining to the TERC Program.

STANDARD OPERATING PROCEDURE

017635

CENTRAL FILE SYSTEM PROCEDURES

7. The TERC Program Manager or his delegate will maintain a TERC Program Master File utilizing the TERC File Index.

TULSA TERC PROGRAM

OHM Remediation Services Corp.
Project Central Filing System

017636

Project Number XXXXX	Major Category XX	Sub Category XX	Indiv. Category XX	Description of File Contents
XXXXX	**01**			**PRE-AWARD**
	01	01		RFP (SOW, Addenda, Mods, Notes, Clarifications, etc.)
	01	02		Wage Determinations
	01	03		Pre-Bid Site Visit
	01	04		Proposal (Technical Approach, Cost Estimate, Clarifications, S.B./S.D.B Plan, etc.)
	01	05		Negotiations, Notes & Memorandums
XXXXX	**02**			**CONTRACTUAL**
	02	01		Contract / Purchase Order
	02	02		Modifications
	02	03		Wage Determinations
	02	04		Original Budget / Schedule
	02	05		Subcontracts
	02	05	01	(Individual Subcontractors)
	02	06		Insurance Certificates, Bonds, Waivers
	02	07		Award Fee Evaluations
	02	08		Technical Direction Letters
XXXXX	**03**			**CORRESPONDENCE**
	03	01		Client - Outgoing (Correspondence Log)
	03	01	01	(Group by month, phase, etc.)
	03	01	02	i.e. Pre-Award
	03	01	03	i.e. Contract
	03	02		Client - Incoming (Correspondence Log)
	03	02	01	(Group by month, phase, etc.)
	03	02	02	i.e. Pre-Award
	03	02	03	i.e. Contract/Delivery Order Negotiations
	03	03		OHM - Internal (Memos & Correspondence)
	03	03	01	General
	03	03	02	Project / Program Specific
	03	04		Subcontractor
				(Individual files for each subcontractor)

TULSA TERC PROGRAM

017637

OHM Remediation Services Corp.
Project Central Filing System

Project Number XXXXX	Major Category XX	Sub Category XX	Indiv. Category XX	Description of File Contents
XXXXX	03			**CORRESPONDENCE** (Cont.....)
	03	05		Vendor
				(Individual files for each vendor)
	03	06	01	Other - Incoming
	03	07	01	Other - Outgoing
	03	08		Telephone Logs - (Record of Conversations)
	03	09		Letters of Transmittal
	03	10		Meeting Minutes
	03	11		Other - (Notes)
XXXX	04			**SUBMITTALS/DOCUMENT CONTROL**
	04	01		Distribution Matrix
	04	02		Submittal Status Log
	04	03		Submittals
	04	03	01	(Individual, As Appropriate)
	04	04		Subcontractor Submittals
	04	04	01	(Individual, As Appropriate)
	04	05		Construction Drawing Control Log
	04	06		Construction Drawings
XXXXX	05			**PLANNING DOCUMENTS**
	05	01		Work Plan
	05	02		Quality Assurance Project Plan
	05	03		Site Safety & Health Plan
	05	04		CDAP
	05	05		Waste Management Plan
	05	06		Sampling and Analysis Plan

TULSA TERC PROGRAM

OHM Remediation Services Corp.
Project Central Filing System

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Project Number XXXXX	Major Category XX	Sub Category XX	Indiv. Category XX	Description of File Contents
XXXXX	06			PROJECT STATUS REPORTS
	06	01		Project Status Peports
	06	01	01	Internal Reports (PSR)
	06	01	02	External Reports (Bi-Weekly)
	06	02		Progress / Production
	06	02	01	Daily (As Applicable)
	06	02	02	Weekly (As Applicable)
	06	02	03	Monthly (As Applicable)
	06	03		Subcontractor Reports
	06	03	01	By Individual Subcontractor
	06	04		Schedule Updates
	06	05		Production Reports
XXXXX	07			PROJECT DOCUMENTATION (EXCL. QA/QC AND H & S)
	07	01		As-Built Drawings
	07	02		Organization Chart
	07	03		WAD Requests
	07	04		Travel Authorizations
	07	05		Overtime Approvals
	07	06		Mobilization Approvals
	07	07		Field Notes
	07	08		Supervisor Logbook
	07	09		Project Photographs / Video(s)
	07	10		Drawings / Maps
	07	11		Survey Data
	07	12		Visitor Waivers
	07	13		Sign In / Sign Out Sheets
	07	14		Other (Newspaper, Magazine Articles, etc.)
	07	15		Personnel Daily Reports
	07	16		Equipment Daily Reports
	07	17		Inventory Daily Reports
	07	18		Field Purchases Daily Reports

TULSA TERC PROGRAM

OHM Remediation Services Corp.
Project Central Filing System

017639

Project Number XXXXX	Major Category XX	Sub Category XX	Indiv. Category XX	Description of File Contents
XXXXX	08			PROJECT CONTROLS
	08	01		Work Breakdown Structure
	08	02		Project Estimate
	08	03		Budget
	08	04		Forecasts
	08	05		Schedules
	08	06		Trend Reports
	08	07		Change Control
	08	08		Cost Reports
	08	09		Critical Items Action Report
XXXX	09			QUALITY CONTROL
	09	01		Daily Quality Control Reports
	09	02		Inspection Plans
	09	03		Material Test Reports
	09	04		Analytical Reports
	09	05		Non-Conformance Reports
	09	06		Audit Reports
XXXXX	10			HEALTH & SAFETY
	10	01		Site Specific Safety Plan / Amendments
	10	02		Training Records (Should Include) OSHA Medical/Training Certificates Worker Emergency Information
	10	03		Safety Reports
	10	04		Monitoring Records / Logs
	10	05		Incident / Accident Logs
	10	06		Daily Safety Meeting Logs
	10	07		Material Safety Data Sheets (MSDS)
	10	08		Equipment Calibration Records
	10	09		Site Permits
	10	10		Personnel Safety Logs
	10	11		Audit Reports
	10	12		Exposure Reports

TULSA TERC PROGRAM

OHM Remediation Services Corp.
Project Central Filing System

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Project Number XXXXX	Major Category XX	Sub Category XX	Indiv. Category XX	Description of File Contents
XXXXX	11			**TRANSPORTATION & DISPOSAL**
	11	01		Pre-Disposal Analysis (by location)
	11	02		Waste Profile Applications/Approvals (by location)
	11	03		Manifests / Weight Tickets (by waste stream)
	11	04		Certificates of Disposal (by waste stream)
	11	05		Off-Specification Reports (by waste stream)
	11	06		Discrepancy Reports (by waste stream)
	11	07		Daily T&D Reports (by waste stream)
XXXX	12			**ANALYTICAL**
	12	01		Sample Collection Logs
	12	02		Sample Map / Grid (Pre- & Post)
	12	03		Chain of Custody
	12	04		Analytical Results
	12	05		IRMA Data
	12	06		Subsurface Logs
	12	07		Geotechnical Test Data
XXXXX	13			**RESOURCE MANAGEMENT**
	13	01		Dispatches
	13	02		Resource Allocations
	13	03		Utilization Reports
	13	04		Work Orders
	13	05		Equipment Maintenance Logs
	13	06		Rental Equipment Log
	13	07		Equipment Load Sheets
	13	08		Government Property
	13	09	01	O & M Manuals
	13	09	02	Warranties
	13	09	03	Government Property Forms
	13	10		Inventory / Material Control

TULSA TERC PROGRAM

OHM Remediation Services Corp.
Project Central Filing System

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Project Number XXXXX	Major Category XX	Sub Category XX	Indiv. Category XX	Description of File Contents
XXXXX	14			SMALL BUSINESS & SMALL DISADVANTAGE BUSINESS
	14	01		Form 294 Report
	14	02		Form 295 Report
	14	03		Project Status Report
	14	04		Audits
XXXXX	15			ENGINEERING / REFERENCE
	15	01		Reference Data
	15	02		Calculations
	15	03		Regulatory Information
	15	04		Geotechnical Information
XXXXX	16			GOVERNMENT PROPERTY ACCOUNTING
XXXXX	17			ACCOUNTING
	17	01		Cost Tracking Reports
	17	01	01	Employee Hours Report
	17	01	02	Detail Cost Report, Etc.
	17	02		Daily Cost Reports
	17	03		Master Time Sheets
	17	04		Time Sheets
	17	05		Purchasing
	17	05	01	Master Purchase Order Log
	17	05	02	Vendor Files - Include for each vendor Purchase Order Log Purchase Order Requisition Executed Purchase Order Purchase Order Amendment Vendor Invoices Vendor Ship / Pack Tickets

TULSA TERC PROGRAM

OHM Remediation Services Corp.
Project Central Filing System

017642

Project Number XXXXX	Major Category XX	Sub Category XX	Indiv. Category XX	Description of File Contents
XXXXX	17			ACCOUNTING (Contin.....)
	17	05	03	Field Purchases Log - Cash
	17	05	04	Field Purchases Log - Draft
	17	05	05	Misc. Vendor Quotes
	17	06		Expense Reports
	17	07		Work Orders
	17	08		Waivers of Lien
	17	09		Invoices to Client

OUT

IBIT 1101-2

OUT TO	FILE NUMBER OR NAME OUT	DATE	OUT TO	FILE NUMBER OR NAME OUT	DATE	OUT TO	FILE NUMBER OR NAME OUT	DAT

117643

EXHIBIT 1101-3

FILE BOX NO.	FILE NAME	FILE NO.	JOB CITY	STATE	FILE		LOCATION OF FILE
					START DATE	END DATE	

APPENDIX D

0117645

APPENDIX D

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CHEMICAL DATA ACQUISITION PLAN
(CDAP)

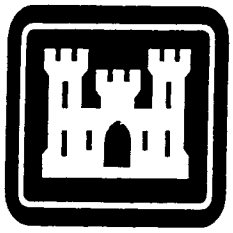
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CHEMICAL DATA ACQUISITION PLAN

REMOVAL OF AND CLOSURE OF WASTEWATER SUMPS
LONGHORN ARMY AMMUNITION PLANT (LHAAP)
KARNACK, TEXAS

Prepared For



U. S. Army Corps of Engineers
Fort Worth District
280 Miller Road
Bossier City, LA 71112-2505

Prepared By



OHM Remediation Services Corp.
A Subsidiary of OHM Corporation

OHM Remediation Services Corp.
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Houston, Texas

May 21, 1996

TERC No. DACA56-94-D-0020, D.O. No. 0015
OHM Project No. 18675

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CHEMICAL DATA ACQUISITION PLAN
LONGHORN ARMY AMMUNITION PLANT

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ACRONYMS AND ABBREVIATIONS

AA	Atomic Absorption
AJ	Amber Jar
ALARA	As Low As Reasonably Achievable
ARARs	Applicable or Relevant and Appropriate Requirements
bgs	Below Ground Surface
BMPs	Best Management Practices (BMPs)
BTU	British Thermal Units
C	Centigrade
CAR	Corrective Action Report
CDAP	Chemical Data Acquisition Plan
CDRL	Contract Data Requirements Lists
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulation
CIH	Certified Industrial Hygienist
COC	Chain-of-Custody
CQCP	Contractor Quality Control Plan
CQCSM	Contractor Quality Control System Manager
CQMP	Contractor Quality Management Plan
CRZ	Contamination Reduction Zone
CWM	Clear Wide Mouth
DERA	Defense Environment Restoration Act
DO	Delivery Order
DOT	Department of Transportation (US)
DQCR	Daily Quality Control Reports
EC	Emergency Coordinator
EPA	Environmental Protection Agency (US)
ERCP	Emergency Response and Contingency Plan
ESD	Electrostatic Discharge
EZ	Exclusion Zone
FID	Flame Ionization Detector
FS	Field Sample
GC	Gas Chromatography
HAZMAT	Hazardous Material
HAZWOPER	Hazardous Waste Operations and Emergency Response
HDPE	High Density Polyethylene
HE	High Explosive
HEPA	High Efficiency Particulate Air (Filter)
HSA	Hollow Stem Auger
HSO	Health and Safety Officer
ICP	Inductively Coupled Plasma - Atomic Emission Spectroscopy
IATA	International Air Transportation Association
ICP	Inductively Coupled Plasma
IDLH	Immediately Dangerous to Life or Health
LCS	Laboratory Control Sample
LEL	Lower Explosive Limit

ACRONYMS AND ABBREVIATIONS

LEPC	Local Emergency Planning Committee
LHAAP	Longhorn Army Ammunition Plant
LLDPE	Linear Low-Density Polyethylene
LQMP	Laboratory Quality Management Plan
MRD	Missouri River Division - USACE
MS	Matrix Spike
MSD	Matrix Spike Duplicate
MSDS	Material Safety Data Sheets
NCTCOG	North Central Texas Council of Governments
OHM	OHM Remediation Services Corporation
OSHA	Occupational Safety and Health Administration
OVA	Organic Vapor Analyzers
OZ	Ounce
PARCC	Precision, Accuracy, Representativeness, Comparability, Completeness
PEP	Propellant, Explosives and Pyrotechnics
PM	Senior Project Manager
POC	Point-of-Contact
PPB	Parts per Billion
PPE	Personal Protective Equipment
PPM	Parts per Million
PS	Project Superintendent
PSSO	Project Site Safety Officer
PTFE	Polytetrafluoroethylene
QA	Quality Assurance
QAR	Quality Assurance Representative
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
RPD	Relative Percent Difference
RQ	Reportable Quantity
SSHP	Site Safety and Health Plan
SOP	Standard Operating Procedure
SQCR	Sample Quality Control Report
SRM	Standard Reference Material
SVOCs	Semi-Volatile Organic Compounds
SWDL	Southwest Division Laboratory
SWMP	Site Waste Management Plan
SWP	Site Work Plan
SZ	Support Zone
TAT	Turn-Around-Time
TBD	To Be Determined
T&D	Transportation and Disposal
TERC	Total Environmental Restoration Contract
TLV	Threshold Limit Value
TNRCC	Texas Natural Resource Conservation Commission
TRPH	Total Recoverable Petroleum Hydrocarbons

ACRONYMS AND ABBREVIATIONS

TSCA	Toxic Substances Control Act
TSDF	Treatment, Storage or Disposal Facility
UNS	United Nations Standards
USACE	United States Army Corps of Engineers
USDOT	United States Department of Transportation
VOA	40 mL Vial for Volatile Compounds
VOCs	Volatile Organic Compounds
YSI	Yellow Springs Instrument

FINAL

CHEMICAL DATA ACQUISITION PLAN
LONGHORN ARMY AMMUNITION PLANT

1.0 INTRODUCTION

The United States Army Corps of Engineers (USACE) has requested OHM Remediation Services Corp (OHM), a wholly-owned subsidiary of OHM Corp, under the Total Environmental Restoration Contract (TERC), Contract Number DACA56-94-D-0020, to perform remedial work at the Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas. This Chemical Data Acquisition Plan (CDAP) describes the analytical and field activities, as well as the QA/QC protocols associated with the sampling.

The ultimate accuracy of any data generation begins with a sampling and measurement procedure which is fully conceived and implemented. This CDAP is designed to delineate the methods that will be used to accomplish the chemical data quality control objectives to ensure accurate, precise, representative, and comparable data (see Section 7.1). These plans are in place to ensure that all aspects of sampling and analysis are in compliance with all USACE, Federal, Texas, and local laws and regulations and meet project goals.

2.0 PROJECT DESCRIPTION

2.1 Purpose and Scope

The USACE, Tulsa District, has directed OHM to perform remedial work at LHAAP, Karnack, Texas. This work includes the removal and closure of 85 Defense Environmental Resotration Act (DERA) (Group 3) wastewater sumps along with associated structures and utilities, and removal of contaminated soil encountered during removal of these structures.

2.2 Installation Background

2.2.1 Site Description

The Longhorn Army Ammunition Plant (LHAAP) is located east of the community of Karnack, Harrison County, Texas, on the western shore of Caddo Lake. The LHAAP is in the northeast corner of Texas, 14 miles north of Marshall, Texas and 40 miles west of Shreveport, Louisiana. The installation occupies land between State Highway 43 and the western shore of Caddo Lake. State Highways 43 and 134 access the LHAAP.

2.2.1.1 Wastewater Sumps

The "Site" includes 85 sumps associated with past and present plant operations. This area covers a large portion of the northern half of the facility. Most of the sumps are concentrated in the area referred to as the Plant Production Area which consists of 1,180 acres. These sumps have been used in the past for collection of organic solvents, solvent laden water, and solvent contaminated sludge associated with past manufacturing processes at LHAAP.

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2.2.2 Contaminants of Concern

2.2.2.1 Wastewater Sump Area

The following contaminants of concern are located in the area (see **Attachment C** and **Attachment D**):

Metals
Volatile Organic Compounds (VOC)
Semivolatile Organic Compounds (SVOC)
Cyanides
TRPH (Total Recoverable Petroleum Hydrocarbons)
Explosives

3.0 PROJECT ORGANIZATION AND RESPONSIBILITY

The project management organization is based on specific project requirements. The organizational structure of key personnel and their authorities are presented in the **Site Work Plan**. Two 2-man sampling crews will be used to sample all of the sumps. The key project team members and their responsibilities are listed in Subsection 3.1 below.

The Senior Project Manager is the primary focal point for control of project activities. The Senior Project Manager will be assisted by the program management support team which will provide reviews, guidance, and technical advice on project execution issues. The Senior Project Manager will be supported by a field superintendent, health and safety, and quality assurance\quality control (QA\QC) staff to ensure that the project is executed in compliance with all applicable laws, regulations, statutes, and industry codes.

3.1 Responsibilities of Key Personnel

3.1.1 Senior Project Manager

The Senior Project Manager is responsible for overall direction of the project which is executed under his supervision. The Senior Project Manager provides the managerial and administrative skills to ensure that resource allocations, planning, execution, and reporting meet contract requirements. The Senior Project Manager is ultimately accountable for all work activities undertaken on the project. The individual responsibilities of the Senior Project Manager can include, but are not limited to, the following:

- Participation in project QA reviews
- General supervision of the project
- Approval, as required, of project specific QA documents
- Approval of procurement documents
- Stopping work on a project, if necessary, because the project cannot be completed to the required quality levels, the schedule, or budget to permit successful completion
- Communication to the project staff of project-specific client and regulatory requirements

- Identification, documentation, and notification of the Contracting Officer and project staff of changes in scope of work, regulatory requirements, or QA practices.

3.1.2 Project Superintendent

The Project Superintendent will be the on-site operational manager of the project and is responsible for its day-to-day operation. This person is in charge of the on-site operational and technical staff and is responsible for maintaining clear, effective, up-to-date communications with the contracting officer concerning project scoping and planning. Responsibilities include coordination of subcontractors, including their compliance with OHM policies and procedures and contractual requirements, implementing and maintaining all site-specific plans, and controlling cost and schedule aspects of all site activities. Some of the quality-related responsibilities for the Project Superintendent include:

- Notifying the Senior Project Manager if the project cannot be completed or completed with regard to quality, schedule, or cost
- Determining that changes, revisions, and reworks are required of the work plan or CDAP
- Serving as the final reviewer prior to release of project information to the client

3.1.3 Project CQCSM

The Contractor Quality Control System Manager (CQCSM) will be chemist charged with the supervision is in charge of the on-site technical staff. Some of the quality-related responsibilities include:

- Determining that changes, revisions, and reworks are required of the Work Plan and CDAP.
- Supervise the on-site technical staff.
- Review and verify the disposition of non-conformance and corrective action reports.

3.1.4 Project Site Safety Officer (PSSO)

The Project Site Safety Officer will be primarily responsible for:

- Assessing the potential health and safety hazards at the site
- Developing/implementing Site Safety and Health Plans
- Performing periodic safety audits.

3.1.5 Off-Site Project Chemist - Laboratory Coordinator

An off-site Project Chemist will be assigned to perform analytical data review and lab coordination. When the off-site Project Chemist is assigned, USACE Chemistry and Industrial Hygiene Section, Tulsa District, will be notified. However, the off-site Project Chemist will not be stationed on-site, but will be stationed in the Houston, Texas Office. The Project Chemist will be involved in the initial phases of the program. The duties of the Project Chemist will also encompass some field oversight of sampling activities in conjunction with the CQCSM (on-site Chemist). He will be responsible for the following:

- Manage production and quality of all data generated from sampling and analytical activities
- Verify that the CDAP quality objectives are met
- Review all data prior to release to Project Superintendent
- Provide for contact between site and the sub-contract analytical lab.

3.1.6 Senior Technologist

The Senior Technologist will be responsible for the following:

- Perform project sampling tasks
- Ensure compliance with the CDAP and Work Plan
- Generate daily and weekly reports to project staff
- Obtain samples and document sampling tasks
- Pack and ship samples to the off-site laboratory.

3.2 Qualifications of Personnel

Appraisal of the qualifications of personnel assigned to projects will be made by the Senior Project Manager.

3.3 Analytical Laboratory

3.3.1 Off-Site Analytical Laboratory

OHM will select, through a bidding process, an analytical laboratory to provide subcontract analytical services. The laboratory will be USACE MRD validated to perform all project analyses. The off-site laboratory will be selected after site sampling is scheduled.

USACE Chemistry and Industrial Hygiene Section, Tulsa District, will be notified immediately upon the procurement of the analytical services. A copy of the Laboratory's Quality Management Plan (LQMP) will be supplied to USACE as a submittal prior to execution of the sampling if requested by the USACE.

3.3.2 QA Laboratory

QA Samples will be shipped to the USACE SWD Laboratory at the following address:

USACE-Southwest Division Laboratory
Attn: Randy Smith
4815 Cass Street
Dallas, TX 75235
Telephone: 214/905-9130, Fax: 214/905-9135

The chain-of-custody will indicate USACE Point of Contact (POC) and POC telephone number as follows:

Randy Bratcher - (918) 669-7505

4.0 TASK SPECIFIC SAMPLING AND ANALYTICAL PROCEDURES

4.1 Types of Samples

In general, two basic types of sampling techniques are recognized: composite samples and grab samples. Sampling procedures are addressed in OHM's Corporate Chemical Quality Management Plan.

Composite Samples

Composite sampling technique can be applied to the solid matrix only (sludge, sand, soil). Composite samples are a combination of more than one sub-sample collected at various sampling locations or matrix layers and/or different points in time. Area composite samples are composed from individual grab samples that are collected on an areal or cross-sectional basis. Areal composites will be made up of equal volumes of grab samples; each grab sample will be collected in an identical manner.

Analysis of composites yield an average value and can, in certain instances, be used as an alternative to analyzing a number of individual grab samples and calculating an average value. It should be noted, however, that compositioning of samples can mask problems by diluting isolated concentrations of some hazardous compounds to below detection limits. It should also be noted that a small sample size may be removed for analysis and if the composite is not homogeneous, an error in reporting results may also occur. When compositing for trace organics and/or metals, only stainless steel, glass, or PTFE bowls and spatulas will be used for sampling. Samples for volatile analysis will not be composited in the field, due to potential for analyte loss during the compositing process.

Grab Samples

A grab sample is defined as a single sample which is collected all at once and is representative of the specific location in the sample medium at a given point in time. The representativeness of such samples is defined by the nature of the materials being sampled. In general, as sources vary over time and distance, the representativeness of grab samples decreases. Examples of grab samples collected are the samples collected at each groundwater well.

4.2 Assumptions Made for Sampling and Analytical Quantities:

The following assumptions provided by USACE based on the "worst case scenario" were used to estimate the level of effort for sampling and analysis:

Assume 85 sumps (identified as Group 3 DERA sumps) and associated equipment/structures will be closed. Assume 58 of the sumps contain 1 foot of sludge and 2 feet of water, and 27 are filled with sand. Assume that contaminated soil removal consisting of a 1 foot over excavation of the sump volume will be required from sites requiring sump removal.

Assume that all liquid, sludge, sand, concrete and soil samples analyzed for metals will fail the X20 the EPA Toxicity Characteristic Leaching Procedure (TCLP) regulatory limit for metals and will need further TCLP analysis for that metal utilizing the TCLP. Assume also that all liquids contain >0.5% filterable solids.

Estimated sample quantity are derived from the numerous assumptions taken from OHM's proposed technical approach, and may be modified as field work progresses and more information is available.

Table 4-1 presents a list of Group 3 DERA sumps and associated analyses. **Attachment A** provides a full list of sumps, **Attachment C** provides sumps location, and **Attachment D** summarizes the total of anticipated analyses based on the "worst case scenario."

4.3 Sump Sampling and Confirmation Sampling

Two 2-man sample crews will be used to sample all of the sumps. The Project Superintendent and SSO will oversee sample collection and sampling equipment decontamination. A sampling sample packaging station will be set up at the office support area to provide a central quality control point.

General sampling location points for wastewater sumps are outlined in **Attachment B**.

OHM personnel will analyze the sludge and sand for ignition sensitivity through electrostatic discharge (ESD), impact, and friction testing prior to sampling. The following sumps were listed as ignition sensitive: #21, 23, 25, 30, 31, 49, 50 and 110. Sump #43 was identified as extremely sensitive (see **Table 4-1**).

As specified in the Removal and Closure of Wastewater Sumps scope of work "at the direction of the Government, the contractor [i.e. OHM] will conduct limited confirmation sampling and analysis of the soil and/or water on specified sump excavation sites. The sampling will consist of the collection of soil samples from the excavation sidewalls or bottom and/or rainwater that may collect in the excavation. The chemical analysis of the soil and/or water will consist of total volatile and semivolatile organic compound and total metals."

4.4 Sump Closure: Associated Sampling and Analysis Procedures

Sampling and analysis procedures for sump closure will be as follows:

- Collect liquid samples for total and TCLP analyses from 58 sumps
- Collect sludge samples for regular and TCLP analyses from 58 sumps
- Collect sand samples for regular and TCLP analyses from 27 sumps
- Collect concrete samples for regular and TCLP analyses from 85 sumps
- Collect soil samples adhered to the excavated sump (a total of 43 samples from 43 sumps)

All samples (i.e. liquid, sludge, sand, concrete and soil) will be analyzed for total volatile organic compounds (SW-846 8260A), semivolatile (SW-846 8270A) organic compounds, and total metals (SW-846 6010A, 7470A/7471A, 7060A, 7421, 7740). Some sumps will be analyzed for Total Cyanide SW-846 9010A and TRPH EPA 418. Based on the information provided by USACE, only one sump (#94 filled with sand) was scheduled for SW-846 8330 analysis for explosives. Sludge and liquid samples will be not tested for explosives (see Attachment C, last page). **Table 4-1** presents a list of Group 3 DERA sumps and associated additional analyses.

Table 4-1
Group 3 DERA Sumps and Associated Additional Analyses

No	SUMP ID	Sump Contents	Additional Analyses	Ignition Sensitivity	Testing Prior to Sampling (Explosivity / sensitivity)
1	4	Sludge/Liquid	--	--	--
2	5	Sand	--	--	--
3	6	Sludge/Liquid	--	--	--
4	8	Sludge/Liquid	--	--	--
5	9	Sludge/Liquid	--	--	--
6	13	Sludge/Liquid	--	--	--
7	14	Sand	--	--	--
8	15	Sludge/Liquid	--	--	--
9	16	Sludge/Liquid	--	--	--
10	17	Sludge/Liquid	--	--	--
11	18	Sand	--	--	--
12	19	Sludge/Liquid	--	--	--
13	21	Sludge/Liquid	--	Potentially Sensitive	To be determined per Thiokol
14	23	Sludge/Liquid	--	Potentially Sensitive	To be determined per Thiokol
15	25	Sludge/Liquid	--	Potentially Sensitive	To be determined per Thiokol
16	26	Sludge/Liquid	--	--	--
17	28	Sludge/Liquid	--	--	--
18	29	Sludge/Liquid	--	--	--
19	30	Sludge/Liquid	--	Potentially Sensitive	To be determined per Thiokol
20	31	Sludge/Liquid	--	Potentially Sensitive	To be determined per Thiokol
21	33	Sand	--	Potentially Sensitive	To be determined per Thiokol
22	36	Sludge/Liquid	--	--	--
23	37	Sand	--	--	--
24	39 [1]	Concrete	--	--	--
25	43	Sludge/Liquid	--	Extremely Sensitive	To be determined by Thiokol
26	46	Sludge/Liquid	--	--	--
27	49	Sludge/Liquid	--	Potentially Sensitive	To be determined by Thiokol

No	SUMP ID	Sump Contents	Additional Analyses	Ignition Sensitivity	Testing Prior to Sampling (Explosivity / sensitivity)
28	**50**	Sludge/Liquid	--	Potentially Sensitive	To be determined by Thiokol
29	**52**	Sand	--	--	--
30	**54**	Sludge/Liquid	--	--	--
31	**56**	Sludge/Liquid	--	--	--
32	**57**	Sand	--	--	--
33	**58** [2]	None	--	--	--
34	**59**	Sand	--	--	--
35	**60**	Sludge/Liquid	--	--	--
36	**62**	Sand	--	--	--
37	**63**	Sand	--	--	--
38	**64**	Sand	--	--	--
39	**67**	Sand	--	--	--
40	**68**	Sludge/Liquid	--	--	--
41	**69**	Sludge/Liquid	--	--	--
42	**71**	Sludge/Liquid	--	--	--
43	**74**	Sludge/Liquid	--	--	--
44	**78**	Sludge/Liquid	--	--	--
45	**79**	Sludge/Liquid	--	--	--
46	**80**	Sludge/Liquid	--	--	--
47	**81**	Sludge/Liquid	--	--	--
48	**82**	Sludge/Liquid	--	--	--
49	**83**	Sludge/Liquid	Total Cyanide SW-846 9010A	--	--
50	**84**	Sludge/Liquid	Total Cyanide SW-846 9010A	--	--
51	**85**	Sand	--	--	--
52	**86**	Sludge/Liquid	--	--	--
53	**87**	Sludge/Liquid	--	--	--
54	**88**	Sludge/Liquid	--	--	--
55	**89**	Sand	--	--	--
56	**90**	Sludge/Liquid	Total Cyanide SW-846 9010A	--	--

No	SUMP ID	Sump Contents	Additional Analyses	Ignition Sensitivity	Testing Prior to Sampling (Explosivity / sensitivity)
57	91	Sludge/Liquid	Total Cyanide SW-846 9010A	--	--
58	92	Sludge/Liquid	Total Cyanide SW-846 9010A	--	--
59	93	Sludge/Liquid	Total Cyanide SW-846 9010A	--	--
60	94	Sand	Total Cyanide SW-846 9010A Explosives SW-846 8330	--	--
61	95	Sludge/Liquid	Total Cyanide SW-846 9010A	--	--
62	96	Sand	Total Cyanide SW-846 9010A	--	--
63	97	Sludge/Liquid	--	--	--
64	98	Sand	--	--	--
65	99	Sludge/Liquid	Total Cyanide SW-846 9010A TRPH EPA 418.1	--	--
66	100	Sand	--	--	--
67	101	Sludge/Liquid	--	--	--
68	102	Sand	--	--	--
69	103	Sand	--	--	--
70	104	Sand	--	--	--
71	105	Sand	--	--	--
72	106	Sludge/Liquid	--	--	--
73	107	Sand	--	--	--
74	108	Sand	--	--	--
75	109	Sand	--	--	--
76	110	Sludge/Liquid	--	Potentially Sensitive	To be determined by Thiokol
77	113	Sludge/Liquid	--	--	--
78	115	Sludge/Liquid	--	--	--
79	116	Sludge/Liquid	--	--	--
80	117	Sludge/Liquid	--	--	--
81	118	Sludge/Liquid	--	--	--
82	119 [3]	Sand	--	--	--
83	120 [3]	Sand	--	--	--
84	121	Sludge/Liquid	--	--	--

No	SUMP ID	Sump Contents	Additional Analyses	Ignition Sensitivity	Testing Prior to Sampling (Explosivity / sensitivity)
85	123 [4]	Sludge/Liquid	--	--	--
	Total: 85 Sumps	Sludge/Liquid, Sand	Total: 10 sumps	Total: 10 sumps	Total: 10 sumps

[1] - Filled with concrete

[2] - Drain present but sump gone

[3] - Capped with concrete

[4] - Above ground tank

The samples will be analyzed for the parameters listed in **Attachment D** and **Tables 4-2, 4-4, 4-6, 4-8, 4-10**.

4.4.1 Liquid Samples Collection for Total and TCLP Analyses from 58 Sumps

A vertical composite sample of the liquid in the sump will be obtained to ensure collection of any discrete strata. The composite sample will be analyzed for 8 RCRA metals, and SVOC. Several specified sumps (see **Table 4-1**), will be also tested for cyanide and TRPH (SW 846 8330-Explosives was not scheduled for the liquid). One grab sample from the center portion (depth wise) of the liquid in the sump will be collected for volatile analysis. If the media is stratified, a representative sample of each distinctive layer will be obtained as a separate sample and submitted to the laboratory for volatile analysis. Samples for volatiles must be obtained before the media becomes agitated. The sample for volatiles will be collected from the center (depth) of each sump using a PTFE COLIWASA or open-end tube (such as disposable clear thief sampling device). Disposable equipment will be certified clean by the manufacturer under the acceptable cleaning methodology; documentation will be retained in the project file. One reagent-quality water rinse blank will be collected per 20 or fewer field samples collected per day of sampling. The following procedure describes the sampling and analysis activities:

A. Sampling

Compatibility verification:
Check the pH of the liquid to choose proper sampling equipment: collect an aliquot of the liquid (approximately 15-20 mL), perform pH test utilizing litmus indicator. If the pH of the liquid falls within the range of 2-12.5 pH units, use disposable thief sampling device or disposable clear PVC QC Rod sampling device. If liquid exhibits the characteristic of corrosivity (ph <2 or >12.5), use glass sampling device to collect sample for organics.

Discrete strata identification:
Collect first sample for visual identification of liquid stratification. If any discrete strata is present, document all field observations. Do not collect a composite sample for volatiles. Collect representative sample of each distinctive layer as a separate sample and submit it to the laboratory for volatile analysis. Discrete strata identification must be fully documented (number of layers, sequence of layers, thickness of layers, color, etc.).

Composite sample collection:

Collect representative composite sample which includes all discrete strata. The composite sample will be analyzed for metals, SVOC, cyanide, and TRPHs.

Open-ended tube sampling technique

Sampling will be performed according to the USACE Document EM-200-1-3, Requirements for the Preparation of Sampling and Analysis Plans, Appendix D Hazardous Waste Sampling Instructions, Washington DC, Change 1, 31 March 1995 (see **Attachment F**):

- Insert tubing slowly almost to the bottom of the sump.
- Be sure that the liquid in the sump maintains a constant level in the tube during the tube's descent.
- Cap the top of the sampling tube with a tapered stopper or gloved thumb, ensuring that the liquid does not come in contact with the stopper or thumb
- Carefully remove the capped tube from the sump and insert the uncapped end into the sample container. Removal of the tube from the sump may require a step or platform aid
- Release the stopper or thumb and allow the liquid to drain into the sample container until the appropriate sample containers are filled. Repeat as necessary. Note: Fill the 40 ml vials first when the sample container is near full, add the prescribed preservative, if required, as shown in Table 4-2 (Note: for VOC, the HCL should be added prior to filling the 40 ml vial) and mix
- Remove the tube from the sample container and dispose properly
- Secure the cap tightly, make sure that 40 mL vials do not contain bubbles
- To insure proper preservation, collect an aliquot of the liquids (5-10 mL) in a second small container and check the pH for all samples except VOC
- Label the sample bottle with the appropriate sample label. Be sure to complete the label carefully and clearly, addressing all categories or parameters.
- Complete all chain-of-custody documents and record in field logbooks

Composite Liquid Waste Sampler (COLIWASA) sampling technique

For liquids that exhibit the characteristic of corrosivity, use glass sampling device (COLIWASA) to collect sample for organics. Sampling will be performed according to the USACE Document EM-200-1-3, Appendix D (see **Attachment F**):

- Choose the glass ball type stopper COLIWASA for the liquid waste to be sampled and assemble sampler.
- Ensure the sampler is functioning properly. Adjust the locking mechanism if necessary to make sure the stopper provides a tight closure.
- Put the sampler in the open position. The open position for the glass ball type is achieved by pulling up on the inner rod, thereby pulling the glass ball away from the tapered end of the outer tube.
- Slowly lower the sampler into the liquid waste. (Lower the sampler at a rate that permits the levels of the liquid inside and outside the sampler tube to be about the same. If the level of the liquid in the sampler tube is lower than the level outside of the sampler, the sampling rate is too fast and will result in a sample biased to bottom contents).
- When the sampler stopper reaches the bottom of the sampling interval, push the sampler tube downward against the stopper to close the sampler. Lock the glass ball type sampler in the closed position by pushing the glass ball end of the inner rod against the tapered end of the outer tube.
- Slowly withdraw the sampler from the waste container with one hand while wiping the sampler tube with a disposable cloth or rag with the other hand.
- Carefully discharge the sample into a suitable sample container by slowly opening the sampler. This is done by slowly pulling up the inner rod to release the contents while the lower end of the sampler is positioned in a sample container. Repeat if necessary. Note: fill the 40 mL vials first when the sample container is near full, add the prescribed preservative, if required as shown in Table 4-2 (note: for VOC, the HCL should be added prior to filling the 40 mL vial).
- Secure the cap tightly, make sure that the 40 mL vials do not contain bubbles.
- Label the sample bottle with the appropriate sample label. Be sure to complete the label carefully and clearly, addressing all categories or parameters.
- To insure proper preservation, collect an aliquot of the liquid (5-10mL) in a second small container and check the pH for all samples except VOC.
- Complete all chain-of-custody documents and record in field logbooks.
- If reusable sampling equipment was used, perform decontamination after use and between sampling locations. Collect equipment rinsate blanks as directed in Section 7.

B. Analysis

The liquid will be analyzed for eight Toxicity Characteristic (TC) RCRA metals, VOCs, SVOCs, cyanide, and TRPH. Note: based on the information provided by USACE, test for explosives was not scheduled for the liquid samples (see **Table 4-1**). Liquid samples containing over 0.5% of filterable solids and containing any metal at levels 20 times or greater than the EPA Toxicity Characteristic Leaching Procedure (TCLP) regulatory limit will be analyzed for that metal utilizing the TCLP procedure.

Table 4-2 summarizes the sampling and analysis requirements for liquid samples from 58 sumps. **Table 4-3** present the preservation methods, holding times, and sample size/containers for the required analysis. A complete list of each analyte and each method is provided in **Attachment D.** Ten percent of the field samples collected at the LHAAP site will be field splits (QC samples) and USACE splits (QA samples). The number of QA/QC samples to be collected are also shown in **Table 4-2.** The anticipated number of trip blanks and equipment rinsates are discussed in Section 7 and presented in **Table 7-2.**

Table 4-2
SAMPLING AND ANALYSIS REQUIREMENTS FOR LIQUID SAMPLE COLLECTED FROM 58 SUMPS

Note that quantities are approximate, based on the assumptions described in paragraph 4.2

Field Samples	QC Samples	QA Samples	Parameter	Method	Turn Around Time
58	6	6	8 RCRA Metals	SW-846 6010A & 7000A series *	14 Days
58	6	6	VOC	SW-846 8260A	14 Days
58	6	6	SVOC	SW-846 8270B	14 days
8	1	1	Total Cyanide	SW-846 9010A	14 Days
1	1	1	TRPH	EPA 418.1	14 Days
58**	6	6	TCLP Metals	TCLP Extraction SW-846, Method 1311; Analyses: SW-846 6010A& 7470A series	14 Days

* 7000A series methods for wastewater will include Cold Vapor Method 7470A for mercury, and additional methods like 7060A, 7421, 7740.
** Number is dependent on number of metals whose total value is 20 times the TCLP value.

QA/QC samples will be collected on a 10% basis, equipment rinsate samples will be collected on a 5% basis, and trip blanks will be included in (of total samples) cooler containing water samples for volatiles.

TABLE 4-3
SAMPLE VOLUME, PRESERVATION, HOLDING TIMES REQUIREMENTS FOR LIQUID SAMPLE COLLECTED FROM 58 SUMPS

Parameter	Sample Volume	Holding Time	Preservation
WATER			
Metals	1 L HDPE	6 Months	HNO_3 to pH <2 4 °C
Volatiles	3 X 40 mL VOA, PTFE septa cap	7 Days	HCL to pH < 2 4 °C NO HEADSPACE
Semivolatile	2 ½ L AJ or 3xIL BR	7 Days to Extraction 40 Days to Analysis	4 °C
Cyanide	1 L HDPE	14 Days	NaOH to pH>12, (0.6 g Asbc Acid if residual Cl is present) 4 °C
TRPH	3X1 L Glass Jar	28 Days	H_2SO_4 to pH<2 4 °C
TCLP Metals	1 L HDPE	28 Days	4 °C

Abbreviations

HDPE - High Density Polyethylene Bottles
VOA - 40 mL Vial
PTFE - Polytetrafluoroethylene
AJ - Amber Jar, Glass
BR - Boston Round

4.4.2 Sludge Samples Collection for Regular and TCLP Analyses from 58 Sumps

One grab sample will be collected from sludge in the center portion (depth of sludge) of the bottom of the sump and analyzed for volatiles; then one composite sample of sludge per sump will be obtained from a minimum of three random areas near the bottom of the sump (see **Attachment B**). Composite sampling technique is discussed in Section 4.1. The composite sludge sample will be analyzed for 8 TC RCRA metals, SVOC, cyanide, and TRPH Note: based on the information provided by USACE, test for explosives was not scheduled (see **Table 4-1**). Samples containing any metal at levels 20 times or greater than the EPA TCLP regulatory limit will be analyzed for that metal utilizing the TCLP protocol.

A. Sampling

The sludge samples will be collected in the same manner as the liquid samples with respect to the pH of the sludge. For the multilayered matrix, the discrete strata strategy discussed in Section 4.4.1 will be applied. Sample for volatiles must be collected first. The sludge sampling device will be selected based on matrix density. An open-ended tube sampling device and a COLIWASA will be used for non-viscous sludge.

The sampling trier is the most common tool for the dense sludge sample collection. The sampling trier is used to obtain a core sample and is preferred when the sampling media is moist or sticky. Powdered or granular materials may provide low yield. If the sump is dry, the thief sampling device may be the best alternative.

Trier sampling technique
Sampling will be performed according to the USACE Document EM-200-1-3, Requirements for the Preparation of Sampling and Analysis Plans, Appendix D Hazardous Waste Sampling Instructions, Washington DC, Change 1, 31 march 1995 (see **Attachment F**):

- Insert the trier into the waste material at 0 to 45 degrees angle from horizontal. The orientation minimizes the spillage of sample from the sampler. Extraction of sample may require tilting of the containers.
- Rotate the trier once or twice to cut a core of material.
- Slowly withdraw the trier, making sure that the slot is facing upward.
- Begin sampling with the acquisition of any grab VOC samples, conducting the sampling with as little disturbance as possible to the media.
- If homogenation of the sample location is appropriate for the remaining analytical parameters, or if compositing of different locations is desired, the sample is transferred to the stainless steel, glass or PTFE bowl for mixing.
- Repeat the sampling at two other points and combine the samples in the same sample container.
- Transfer sample into an appropriate sample container with a stainless steel spoon or equivalent.

- Check that a PTFE liner is present in the sample container cap. Secure the cap tightly.
- Label the sample bottle with the appropriate sample label. Be sure to complete the label carefully and clearly, addressing all categories or parameters.
- Complete all chain-of-custody documents and records in field logbooks.
- Decontaminate sampling equipment after use and between sampling locations. Collect equipment rinsate blanks as directed in Section 7.

Thief sampling technique

For dry sludge samples use Thief sampling device. Sampling will be performed according to the USACE Document EM-200-1-3, Requirements for the Preparation of Sampling and Analysis Plans, Appendix D Hazardous Waste Sampling Instructions, Washington DC, Change 1, 31 march 1995 (see **Attachment F**):

- While the sampler is in the closed position, insert it into the granular or powered material or waste being sampled from a point near a top edge or corner, through the center, and to a point diagonally opposite the point of entry.
- Rotate the inner tube of the sampler into the open position.
- Move the sampler from side to side a few times to allow materials to enter the open slots.
- Return the sampler to the closed position and withdraw the sampler
- Begin sampling with the acquisition of any grab VOC samples, conducting the sampling with as little disturbance as possible to the media.
- If homogenation of the sample location is appropriate for the remaining analytical parameters, or if compositing of different locations is desired, the sample is transferred to the stainless steel, glass or PTFE bowl for mixing.
- Collect two or more core samples at different points and combine the samples in the same sample container.
- Transfer sample into an appropriate sample container with a stainless steel spoon or equivalent.
- Check that a PTFE liner is present in the sample container cap. Secure the cap tightly.
- Label the sample bottle with the appropriate sample label. Be sure to complete the label carefully and clearly, addressing all categories or parameters.
- Complete all chain-of-custody documents and records in field logbooks.

- Decontaminate sampling equipment after use and between sampling locations. Collect equipment rinsate blanks as directed in section 7.

B. Analysis

Table 4-4 summarizes the sampling and analysis requirements for sludge samples from 58 sumps. **Table 4-5** present the preservation methods, holding times, and sample size/containers for the required analysis. A complete list of each analyte and each method is provided in **Attachment D**. Ten percent of the field samples collected at the LHAAP site will be field replicates (QC split samples) and USACE replicates (QA split samples). The number of QA/QC samples to be collected are also shown in **Table 4-4**. The anticipated number of trip blanks and equipment rinsates are discussed in Section 7, and presented in **Table 7-2**.

Table 4-4
SAMPLING AND ANALYSIS REQUIREMENTS FOR SLUDGE SAMPLE COLLECTED FROM 58 SUMPS

Note that quantities are approximate, based on the assumptions described in paragraph 4.2

Regular Samples	QC Samples	QA Samples	Parameter	Method	Turn Around Time
58	6	6	8 RCRA Metals	SW-846 6010A & 7000A*	14 Days
58	6	6	VOCs	SW-846 8260A	14 Days
58	6	6	SVOCs	SW-846 8270B	14 days
8	1	1	Total Cyanide	SW-846 9010A	14 Days
1	1	1	TRPH	EPA 418.1	14 Days
58**	6	6	TCLP Metals	TCLP Extraction SW-846 Method 1311; Analyses: SW-846 6010A & 7471A series	14 Days

* 7000A series methods for sludge will include Cold Vapor Method 7471A for mercury, and additional methods like 7060A, 7421, 7740.
** Number is dependent on number of metals whose total value is 20 times the TCLP value.

QA/QC samples will be collected on a 10% basis, equipment rinsate samples will be collected on a 5% basis, and trip blanks will be included in each cooler containing field water samples for volatiles

TABLE 4-5
SAMPLE VOLUME, PRESERVATION, HOLDING TIMES REQUIREMENTS FOR SLUDGE SAMPLES COLLECTED FROM 58 SUMPS

Parameter	Sample Volume	Holding Time	Preservation
SLUDGE			
Metals	8 oz CWM	6 Months	4 °C
Volatiles	2X4 oz glass, PTFE septa cap	14 Days	4 °C Minimum Void Spacing
Semivolatile	8 oz CWM	14 Days to Extraction 40 Days to Analysis	4 °C
Cyanide	8 oz CWM	14 Days	4 °C
TRPH	8 oz CWM	6 mos. (Hg-28 Days)	4 °C
TCLP Metals	16 oz CWM	28 Days	4 °C

Abbreviations

CWM - Clear Wide Mouth Glass Jar
PTFE - Polytetrafluoroethylene

4.4.3 Sand Samples Collection for Total and TCLP Analyses from 27 Sumps

A sample area will be collected from sumps filled with sand. The sample will be obtained from the center bottom of the sump. A sample for VOC should be collected first. The sand will be analyzed for 8 TC RCRA metals, VOC, SVOC, total cyanide, and explosives (see Table 4-1). Samples containing any metal at levels 20 times or greater than the EPA TCLP regulatory limit will be analyzed for that metal utilizing the TCLP protocol.

A. Sampling

Sand samples will be obtained using a thief (see Section 4.4.3), scoop/trowel on an extended handle or hand auger/thin wall tube sampler.

Sampling will be performed to the USACE Document EM-200-1-3, Requirements for the Preparation of Sampling and Analysis Plans, Appendix D Hazardous Waste Sampling Instructions, Washington DC, Change 1, 31 March 1995. (See **Attachment F**).

- Insert scoop or trowel into material and remove sample.
- Transfer sample into an appropriate sample container with a stainless steel spoon or equivalent.
- Begin sampling with the acquisition of VOC samples, conducting the sampling with as little disturbance as possible to the media.
- If homogenization of the sample location is appropriate for the remaining analytical parameter, of if compositing of differenct location is desired the sample is transferred to the stainless steel, glass or PTFE mixing bowl and mix.
- Check that a PTFE liner is present in the cap. Secure the sample container cap tightly.
- Transfer the sample into an appropriate sample container with a stainless steel spoon or equivalent.
- Label the sample bottle with the appropriate sample label. Be sure to complete the label carefully and clearly, addressing all categories or parameters.
- Complete all chain-of-custody documents and record in field logbooks.
- Decontaminate sampling equipment after use and between sampling locations. Collect equipment rinsate blanks as directed in Section 7.

Hand augering using thin wall tube sampler technique.
This system consists of an auger bit, a series of drill rods, a "T" handle, and a thin-wall tube corer. The auger bit is used to bore a hole to the desired sampling depth and then withdrawn. The auger tip is then replaced with

the tube corer, and forced into the soil at the completion depth. The corer is then withdrawn and the sample collected.

Alternately the sample can be recovered directly from the auger. This technique, however, does not provide an "undisturbed" sample as would be collected with a thin tube sampler.

The following steps should be followed:

- Attach the auger bit to a drill rod extension and further attach the "T" handle to a drill rod.
- Drill to the desired depth.
- Slowly remove auger from hole. (Note: when sampling directly from auger, collect sample after auger is removed from boring).
- Remove auger tip from drill rods and replace with a precleaned thin-wall tube sampler. Install proper cutting tip.
- Gradually force corer into soil.
- Remove corer tip and remove core from device. The core is ready for containerization.
- Begin sampling with the acquisition of any grab VOC samples, conducting the sampling with as little disturbance as possible to the media.
- Transfer sample into an appropriate sample container with a stainless steel spoon or equivalent.
- Check that a PTFE liner is present in the cap. Secure the cap tightly.
- Label the sample bottle with the appropriate sample label. Be sure to complete the label carefully and clearly, addressing all categories or parameters.
- Complete all chain-of-custody documents and records in field logbooks.
- Decontaminate sampling equipment after use and between sampling locations. Collect equipment rinsate blanks as directed in section 7.

B. Analysis

Table 4-6 summarizes the sampling and analysis requirements for sand samples from 27 sumps. **Table 4-7** present the preservation methods, holding times, and sample size/containers for the required analysis. A complete list of each analyte and each method is provided in **Attachment D**. Ten percent of the field samples collected at the LHAAP site will be field splits (QC samples) and USACE splits (QA samples). The number of QA/QC

samples to be collected are also shown in **Table 4-6**. The anticipated number of trip blanks and equipment rinsates are discussed in Section 7 and presented in **Table 7-2**.

Table 4-6
SAMPLING AND ANALYSIS REQUIREMENTS FOR SAND SAMPLES COLLECTED FROM 27 SUMPS

Note that quantities are approximate, based on the assumptions described in paragraph 4.2

Field Samples	QC Samples	QA Samples	Parameter	Method	Turn Around Time
27	3	3	8 RCRA Metals	SW-846 6010A & 7000A*	14 Days
27	3	3	VOCs	SW-846 8260A	14 Days
27	3	3	SVOCs	SW-846 8270B	14 days
2	1	1	Total Cyanide	SW-846 9010A	14 Days
27**	3	3	TCLP Metals	TCLP Extraction SW-846, Method 1311; Analyses: SW-846 6010A & 7471A series	14 Days
1	1	1	Explosives	SW-846 8330	14 Days

* 7000A series methods for sand will include Cold Vapor Method 7471A for mercury, and additional methods like 7060A, 7421, 7740.
** Number is dependent on number of metals whose total value is 20 times the TCLP value.

QA/QC samples will be collected on a 10% basis, equipment rinsate samples will be collected on a 5% basis, and trip blanks will be included in each cooler containing field water samples for volatiles

TABLE 4-7
SAMPLE VOLUME, PRESERVATION, HOLDING TIMES REQUIREMENTS FOR SAND SAMPLES COLLECTED FROM 27 SUMPS

Parameter	Sample Volume	Holding Time	Preservation
SAND			
Metals	8 oz CWM	6 Months	4 ^{0} C
Volatiles	2X4 oz glass, PTFE septa cap	14 Days	4 ^{0} C Minimum Void Spaces
Semivolatile	8 oz CWM	7 Days to Extraction 40 Days to Analysis	4 ^{0} C
Cyanide	8 oz CWM	14 Days	4 ^{0} C
TCLP Metals	16 oz CWM	6 mos. (Hg-28 Days)	4 ^{0} C
Explosives	8 oz CWM	7 Days to Extraction 40 Days to Analysis	4 ^{0} C

Abbreviations

CWM - Clear Wide Mouth Glass Jar
PTFE - Polytetrafluoroethylene

4.4.4 Concrete Samples Collection for Total and TCLP Analyses from 85 Sumps

One composite sample of concrete will be collected after the sump has been emptied and decontaminated. The concrete will be spalled from the bottom of the sump in two areas and the side of the sump in one area (see **Attachment B**) with direction from the Hazardous Waste Corrective Action Section of the TNRCC. One grab sample from the middle of the sump bottom will be collected for volatile compounds. The concrete will be analyzed for total 8 RCRA metals, VOC, SVOC, total cyanide, TRPH, and explosives (see Table 4-1). Samples containing any metal at levels 20 times or greater than the EPA TCLP regulatory limit will be analyzed for that metal utilizing the TCLP protocol.

A. Sampling

- Using spalling technique collect three concrete samples. This may be accomplished by use of a chisel with a hammer or electric hammer. The sampling device will be decontaminated before and after collection of a sample. Following decontamination, aluminum foil may be wrapped around the device until it is needed for the next sample collection.
- Screen all three samples with an OVA/FID detector (additional information for the field screening methods can be found in section 5, and in OHM QP-627, **Attachment E**).
- Select sample with the highest OVA/FID reading for VOC analyses.
- Using sample gloves, transfer part of the material from the sample with the highest OVA/FID reading into appropriate sample containers, submit it for volatile analysis allowing minimum void spaces.
- Combine the remaining three concrete powder/fine chips samples collected at different sampling points into one composite sample (see Section 4.1) and submit it for the rest of analytical parameters.
- Transfer sample into an appropriate sample container.
- Check that a PTFE liner is present in the cap. Secure the cap tightly.
- Label the sample bottle with the appropriate sample label. Be sure to complete the label carefully and clearly, addressing all categories or parameters.
- Complete all chain-of-custody documents and records in field logbooks.
- Decontaminate sampling equipment after use and between sampling locations. Collect equipment rinsate blanks as directed in Section 7.

B. Analysis

Table 4-8 summarizes the sampling and analysis requirements for concrete samples from 85 sumps. **Table 4-9** present the preservation methods, holding times, and sample size/containers for the required analysis. A

complete list of each analyte and each method is provided in **Attachment D**. Ten percent of the field samples collected at the LHAAP site will be field splits (QC samples) and USACE splits (QA samples). The number of QA/QC samples to be collected are also shown in **Table 4-8.** The anticipated number of trip blanks and equipment rinsates are discussed in Section 7 and presented in **Table 7-2**.

Table 4-8
SAMPLING AND ANALYSIS REQUIREMENTS FOR CONCRETE SAMPLES COLLECTED FROM 85 SUMPS

Note that quantities are approximate, based on the assumptions described in paragraph 4.2.

Field Samples	QC Samples	QA Samples	Parameter	Method	Turn Around Time
85	9	9	8 RCRA Metals	SW-846 6010A & 7000A*	14 Days
85	9	9	VOC	SW-846 8260A	14 Days
85	9	9	SVOC	SW-846 8270B	14 Days
10	1	1	Total Cyanide	SW-846 9010A	14 Days
1	1	1	TRPH	EPA 418.1	14 days
85**	9	9	TCLP Metals	TCLP Extraction SW-846, Method 1311; Analyses: SW-846 6010A & 7470A series	14 Days
1	1	11	Explosives	SW-846 8330	14 Days

* 7000A series methods for concrete will include Cold Vapor Method 7471A for mercury, and additional methods like 7060A, 7421, 7740.
**Number is dependant on number of metals whose total value is 20 times the TCLP value.

QA/QC samples will be collected on a 10% basis, equipment rinsate samples will be collected on a 5% basis, and trip blanks will be included in each cooler containing field water samples for volatiles

TABLE 4-9
SAMPLE VOLUME, PRESERVATION, HOLDING TIMES REQUIREMENTS FOR CONCRETE SAMPLES COLLECTED FROM 85 SUMPS

Parameter	Sample Volume	Holding Time	Preservation
CONCRETE			
Metals	8 oz CWM	6 Months	4 ° C
Volatiles	2X4 oz glass, PTFE septa cap	14 Days	4 ° C Minimum Void Spaces
Semivolatile	8 oz CWM	14 Days to Extraction 40 Days to Analysis	4 ° C
Cyanide	8 oz CWM	14 Days	4 ° C
TRPH	8 oz CWM	6 mos. (Hg-28 Days)	4 ° C
TCLP Metals	16 oz CWM	28 Days	4 ° C
Explosives	8 oz CWM	14 Days to Extraction 40 Days to Analysis	4 ° C

Abbreviations

CWM - Clear Wide Mouth Glass Jar
PTFE - Polytetrafluoroethylene

4.4.5 Soil Samples Collection from Excavated Sumps

When a sump is formed to be contaminated and is removed, contaminated soil consisting of a 1 foot over excavation will be required.

One composite sample of soil per removed sump will be obtained from a minimum of three random areas of the sump. One grab sample from the middle (sidewall) of the sump will be collected for VOC. For the remaining analytical parameters, three samples will be collected at different points, and combined the samples in the stainless bowl (or equal) homogenized and placed in the appropriate containers sample container (Composite sampling technique in details is discussed in section 4.1).

The soil will be analyzed for 8 RCRA metals, VOC, SVOC, total cyanide, TPH and explosives (see **Table 4-1**). Samples containing any metal at levels 20 times or greater than the EPA TCLP regulatory limit will be analyzed for that metal utilizing the TCLP protocol.

A. Sampling

Soil sampling will be performed using one of the sampling devices discussed in details in section 4.4.3 (sand sampling).

B. Analysis

Table 4-10 summarizes the sampling and analysis requirements for soil samples. **Table 4-11** present the preservation methods, holding times, and sample size/containers for the required analysis. A complete list of each analyte and each method is provided in **Attachment D**. Ten percent of the field samples collected at the LHAAP site will be field splits (QC samples) and USACE splits (QA samples). The estimated number of QA/QC samples to be collected are also shown in **Table 4-10**. The anticipated number of trip blanks and equipment rinsates are discussed in Section 7 and presented in **Table 7-2**.

Table 4-10
SAMPLING AND ANALYSIS REQUIREMENTS FOR SOIL SAMPLES COLLECTED FROM 43 SUMPS

Note that quantities are approximate, based on the assumptions described in paragraph 4.2.

Field Samples	QC Samples	QA Samples	Parameter	Method	Turn Around Time
43	5	5	8 RCRA Metals	SW-846 6010A & 7000A*	14 Days
43	5	5	VOC	SW-846 8260A	14 Days
43	5	5	SVOC	SW-846 8270B	14 days
10	1	1	Total Cyanide	SW-846 9010A	14 Days
1	1	1	TRPH	EPA 418.1	14 Days
43**	5	5	TCLP Metals	TCLP Extraction SW-846, Method 1311; Analyses: SW-846 6010A & 7471A series	14 Days
1	1	1	Explosives	SW-846 8330	14 Days

* 7000A series methods for soil will include Cold Vapor Method 7471A for mercury, and additional methods like 7060A, 7421, 7740.
**Number is dependant on number of metals whose total value is 20 times the TCLP value.

QA/QC samples will be collected on a 10% basis, equipment rinsate samples will be collected on a 5% basis, and trip blanks will be included in each cooler containing field water samples for volatiles

TABLE 4-11
SAMPLE VOLUME, PRESERVATION, HOLDING TIMES REQUIREMENTS FOR SOIL SAMPLES COLLECTED FROM 43 SUMPS

Parameter	Sample Volume	Holding Time	Preservation
CONCRETE			
Metals	8 oz CWM	6 Months	4 ° C
Volatiles	2X4 oz glass, PTFE septa cap	14 Days	4 ° C Minimum Void Spaces
Semivolatile	8 oz CWM	14 Days to Extraction 40 Days to Analysis	4 ° C
Cyanide	8 oz CWM	14 Days	4 ° C
TRPH	8 oz CWM	28 Days	4 ° C
TCLP Metals	16 oz CWM	6 mos. (Hg-28 days)	4 ° C
Explosives	8 oz CWM	14 Days to Extraction 40 Days to Analysis	4 ° C

Abbreviations

CWM - Clear Wide Mouth Glass Jar
PTFE - Polytetrafluoroethylene

4.5 Additional Site Investigations

As specified in the Removal and Closure of Wastewater Sumps scope of work "at the direction of the Government, the contractor (i.e. OHM) will conduct limited confirmation sampling and analysis of the soil and/or water on specified sump excavation sites. The sampling will consist of the collection of soil samples from the excavation sidewalls or bottom and/or rainwater that may collect in the excavation. The chemical analysis of the soil and/or water will consist of total volatile and semivolatile organic compound and total metals."

4.6 Equipment Decontamination

4.6.1 Decontamination Procedure

Decontamination (cleaning) procedures will be employed to prevent cross-contamination during sampling. Decontamination procedures for each type of sampling to be performed at LHAAP included in OHM's SOP QP-602 or the individual SOPs (see **Attachment F**).

Reusable sampling equipment will be decontaminated between sampling events as summarized below:

1. Wipe excess soil from sampling equipment with clean paper toweling.
2. Wash equipment in 5-gallon bucket with water, a laboratory grade non-phosphate (e.g. Alconox) laboratory detergent and a brush to remove particles.
3. Rinse in tap water.
4. Rinse in deionized water.
5. Rinse with isopropanol.
6. Triple rinse with deionized water.

4.6.2 Decontamination Water Analysis

Closure derived liquids will be placed into a separate container to wait final disposition. One sample of decontamination water will be collected and analyzed for metals (SW-846 Methods 6010A/7000), volatile organics (SW-846 Method 8260A), and semivolatile organics (SW-846 Method 8270B).

For holding times, sample size, container type and preservation method see **Table 4-3**.

4.7 Sample Identification, Labeling, and Record Keeping

4.7.1 Sample Identification

A coding system will be used to identify each sample collected during the sampling program at the LHAAP site. This coding system will provide a tracking procedure to allow retrieval of information concerning a particular sample and ensure that each sample is uniquely identified. A listing of the project and sample identification numbers will be maintained by the OHM Senior Technologist. In accordance with the most current guidance from USACE-Tulsa District (May 1, 1996 teleconference) samples will be labled as follows:

1. XXX - All samples will begin with the site identifier LHS

   LHS - Longhorn Sump Area

2. ZZZ- Maximum 3 character of sump number

3. AA- 2 character designation of the sample matrix
   WW - Wastewater
   SA - Sand
   SL - Sludge
   SO - Soil
   CO - Concrete

4. CC - 2 character designation for QA/QC samples

   TB - Trip Bank
   EB - Equipment Blank (Rinsate)
   QC - QC sample (split or duplicate)
   QA - QA sample (split or duplicate) sent to the USACE SWD

5. YYY - Sample Number - 2 digits designation will be used to number the sample. The sequence of sample numbers will be maintained in the sample logbook.

For example, a proposed sample identification for the QC replicate for the first soil sample collected at Sump #123, will be:

LHS-123-SO-01-QC

4.7.2 Sample Labeling

Samples other than in situ measurements are identified by a sample label attached to the sample container. Included on the label are the following:

1) PROJECT NUMBER 18675
2) PROJECT NAME Sumps
3) DATE - Month, day, year
4) TIME - Military (i.e., 24 hour format)
5) SAMPLE NUMBER LHS-123-50-01-QC
6) LOCATION - Sample Location
7) ANALYTICAL PARAMETERS AND METHODS REQUESTED; for example: VOC-8260A, Metals-6010A/7000A, etc.
8) PRESERVATIVE - Whenever applicable
9) TAKEN BY - Sampler Initials

The information described above will be printed neatly using an indelible marker. The sampler's name and initials will be recorded clearly and legibly in the field logbook. After the sample is taken and the label is securely attached, the sample will be logged into the sample log book. An example of a label is included in **Figure 4-1**.

FIGURE 4-1 SAMPLE LABEL

PROJECT #: 18675	SAMPLE #: LHS-123-50-01-QC
PROJECT NAME: SUMPS	DATE: 1/16/96
SAMPLE LOC: Sump Area MW-01	TIME: 1415
PRESERVATIVE: HCl 4 C	ANALYSIS: VOC EPA 8260A
TAKEN BY: BW	
WITNESS: WP	

4.7.3 Sample Logbook

The Senior Technologist will maintain daily field notes on sampling activities. Items that must be included are sampling protocol, any changes to the procedures, meetings, instructions, safety precautions, level of personnel protection, and other activities pertaining to the samples. The person taking notes must be knowledgeable enough about these activities to know which details are important.

Repetition of information recorded in other pertinent logs should be avoided, but enough should be recorded to present a clear and accurate picture of technical activities. Should a question arise at a later date concerning a specific event or procedure used, it will be answered from these notes. Some items that would be considered noteworthy are as follows:

- Termination of a sample point or parameter and reasons (i.e., Terminating a well drilling due to hitting water).
- Unusual appearance of odor of a sample.
- Lithologic description of soil samples.
- Measurements, volumes of flow, temperature, and weather conditions.
- Additional samples and reasons for obtaining them.
- Levels of protection (with justification).
- Details concerning any samples split with another party (USACE).
- Details of QC samples obtained.

These notes must be dated and signed (each page) for validity in a court of law. All logbook entries will be made with indelible ink and legibly written. The language will be factual and objective. No erasures will be permitted. If an incorrect entry is made, the error will be crossed out with a single strike mark, initialed and dated.

Information on all samples will be entered in the logbook. The following information items are standard for all projects and should be entered in a column format where possible:

1) DATE - Date sample was obtained
2) SAMPLE NUMBER - Consecutive series of numbers assigned to every sample (LHS-MW-036)
3) LOCATION - Description of area sampled
4) TIME - Military time sampled (i.e., 24 hour format)
5) SAMPLERS - Initials of persons obtaining sample (at least one, usually two witnessing if not involved in the actual sampling task)
6) DESCRIPTION OF SAMPLE - Physical description of sample (e.g., clear, cloudy, or by Unified Soil Classification System for Soils)
7) WEIGHT OR VOLUME - Size of sample (1 Liter HDPE, 40 mL VOA)
8) DATE RESULTS ARE DUE - Data Analytical results should be received; TAT
9) LABORATORY - Offsite Laboratory who performed analytical work
10) FIELD RESULTS - On-site or field analysis, will vary according to project requirements; should be in consistent units (i.e., ppm, ppb, etc.)
11) CHAIN-OF-CUSTODY NUMBER - For samples sent to the laboratory or given to USACE
12) ADDITIONAL COMMENTS - Space reserved for any other information concerning a particular sample or special procedure or analysis
13) PRESERVATIVES - Preservatives used or included by lab; including 4 degree C cooling
14) DATE SAMPLES SENT - Date samples sent to analytical lab or USACE SWD Lab
15) OVERNIGHT CARRIER AIR BILL NUMBER.

4.7.4 Custody Seals

Custody seals are narrow strips of adhesive paper or glass fiber used to demonstrate that no tampering of the sample container, equipment and sample cooler has occurred. The custody seal will be signed and dated by the Senior Technologist and placed across the opening of the lid and body of the sample transfer container (e.g. cooler) on one side and the front. Cover the Custody Seals with wide, clean tape. These custody seals shall be plainly visible. A Custody Seal should also be placed from one side, across the top (lid), and to the other side to the sample container.

A sample Custody Seal is shown in **Figure 4-2**.

FIGURE 4-2 CUSTODY SEAL

CUSTODY SEAL	
PERSON COLLECTING SAMPLE BW	SAMPLE #
DATE COLLECTED 1/16/96	TIME COLLECTED

NOTE: The "Sample #" and "Time Collected" blocks would not be filled in when placing Custody Seal on the outside of the shipping container.

4.8 Chain-of-Custody (COC) Procedures

Because of the evidentiary nature of samples collected throughout the LHAAP project, the possession of samples must be traceable from the time the samples are collected until they are introduced as evidence in legal proceedings, if necessary. To maintain and document sample possession, COC procedures are followed as described below.

The COC is preprinted with a unique six-digit control number in the upper right-hand corner. The white copy always accompanies the samples and the yellow copy is retained for the project files. The COC form will be signed by each individual who has the samples in their possession. The COC forms will be completed in the field by the person collecting the samples. Each sample number, time of sampling, description, requested analysis and method numbers, and turn-around-time (TAT) shall be entered on the COC form. When the samples are shipped to the subcontract analytical laboratory or the USACE SWD Laboratory, the courier name, and waybill (or AIR BILL) number should be noted on the COC form prior to sealing the cooler. In addition, a COE Point-of-Contact (POC), telephone number, and MIPR number must be entered in the remarks section on the COC used to send the QA it samples to the SWD Laboratory in Dallas, TX. The waybill, or AIR BILL, serves as an extension of the COC.

Upon arrival at the subcontract analytical laboratory, the person accepting delivery will sign the COC form(s) with a date, time, and initials. Next, the samples in the cooler will be checked against the COC forms for sample number, description, time and date of sampling, and analysis. Any samples in question will be segregated and the field personnel will be notified immediately. The person responsible for checking the samples in the cooler against the COC form shall also complete and sign a cooler receipt form.

If a fast turn-around-time is required for some sample, these samples will be submitted to the subcontract analytical laboratory with a separate COC. In the lower right-hand section of the COC form labeled "remarks", write the word "**RUSH**" using large letters and underline in addition to the TAT (days).

A sample is under your custody if :

1) It is in your actual possession, or
2) It is in your view, after being in your physical possession, or

3) It was in your physical possession and they/you lock it up to prevent tampering, or
4) It is in a designated secure area

It is very important that the information on the COC record form match the information on the sample container label; especially sample number, time taken, description and analysis requested. A COC is shown in **Figure 4-3.**

4.9 Shipment of Samples

Samples will be shipped via Federal Express to the subcontract analytical laboratory. COCs will be prepared accordingly and are organized by sampling events and matrix; e.g., soil boring samples separate from monitoring well installation, soil samples separate from water samples. The QA samples will be also shipped via Federal Express to the USACE SWD Laboratory listed in Section 3.3, Analytical Laboratory. The QA samples will be packed and shipped in the same manner as field samples. All field and QA samples will be placed in appropriately labeled, pre-cleaned sample containers, and enclosed within a plastic zip-lock bag. The bottom of the shipping cooler will be lined with absorbent material. A sufficient quantity of ice will then be placed on the absorbent material to cover the bottom of the cooler. All ice utilized inside the cooler will be containerized within two (2) plastic freezer bags of 1 quart or larger size. All four (4) sides of the cooler will then be lined with ice packs. Each sample container will be wrapped with bubble pack or absorbent material to prevent breakage. The wrapped sample container will then be placed in a plastic, zip-lock bag and sealed. The zip-locked sample containers will then be placed in the space created from placement of the ice. Any remaining void space will then be filled with bubble pack, Styrofoam peanuts, or absorbent material to prevent movement of the sample containers during transport. Once the samples are secured, ice will be placed on top of the sample containers, thereby completely surrounding the sample containers with ice packs. The remaining headspace in the cooler, if any, will be filled with bubble pack, Styrofoam peanuts, or other absorbent materials.

Due to the adoption of IATA (International Air Transport Association) shipping regulations by Federal Express, the following instructions are for shipping samples from the LHAAP site. THESE INSTRUCTIONS MUST BE FOLLOWED EXACTLY AS WRITTEN.

1) Samples must be shipped in "strong outer packaging". A plastic cooler is acceptable.
2) Both OHM and the subcontract lab's or SWD Laboratory's addresses must appear on container
3) The following information must be printed on the container:
   OTHER REGULATED SUBSTANCES ID# 8027
4) A Class 9 hazardous material label must appear on the top of the cooler. Included in the OHM CQMP is an example of a shipping label which also includes OHM and subcontract lab's addresses.
5) Inner packages cannot exceed 1 gallon each, and the entire shipment (cooler, samples, absorbent) cannot exceed 66 pounds
6) Coolers must be packed with absorbent
7) 40-mil vials with reagent water will be used as temperature blanks. Temperature conditions will be checked and reported in the Cooler Receipt Form upon samples arrival at the laboratory. An example of Cooler Receipt Form is presented in **Figure 4-5.**
8) Inner containers should have their lids secured with tape or wire

9) Prior to sealing the cooler with Custody Seal and Tape, an OHM shipment Checklist will be completed and reviewed. A sample of the Shipment Checklist is shown in **Figure 4-4**.

10) Any hazardous material sample must be shipped using a Federal Express Dangerous Goods AIR BILL .

The completed chain-of-custody forms shall be enclosed in plastic Ziplock bags and taped to the underside of the lid of the cooler. The drain of the cooler will be taped shut. On the day of shipment, fresh ice will be added to the coolers to ensure the preservation criteria is met, the lid will be taped shut, and four custody seals or evidence tape will be fixed to the coolers. The coolers will then be sent to the subcontract analytical laboratory. For liquid samples, a "**THIS SIDE UP**" label is required.

Remediation Services Corp.

CHAIN-OF-CUSTODY

FIGURE 4-3

Tulsa TERC DACA56-94-D-0020

Rev. 5/96

OHM Remediation Services Corp. • 225 W. Airtex Blvd. • Houston, Texas 77090 • (713) 775-7500

Project Name	Project Location	Analysis and Method Desired (indicate separate containers)	Remarks
Project No.	Project Contact	Project Telephone No.	
* USACE Point of Contact Randy Bratcher USACE Telephone No. (918) 669-7505	Project Manager/Supervisor		

Item No	Sample Number	Date	Time	Comp	Grad	Matrix	Sample Description, Location	Lab ID	Number of Containers
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

Transfer Number	Item Number	Transfers Relinquished By	Transfers Accepted By	Date	Time	Remarks
1						
2						
3						
4						Fed Ex Airbill No.:
TAT: ___ Standard ___ Rush Due:		Seals Intact? ___ Y ___ N ___ N/A	Received Good Condition? ___ Y ___ N ___ Cold			Sampler's Signature

* Applicable for samples sent to USACE SWD Laboratory (QA samples)

01698

FIGURE 4-4

OHM SHIPMENT CHECK LIST

PROJECT NAME _____ PROJECT NO. 017690

STREET ADDRESS _____ DATE / / TIME _____

CITY/STATE/ZIP _____

PHONE NUMBER ( ) - _____ FAX NUMBER ( ) - _____

SAMPLE CHECK LIST

	YES	NO	COMMENTS
SAMPLE LIDS ARE TIGHT AND CUSTODY SEALS IN PLACE?	☐	☐	
ARE SAMPLE NUMBERS, DATES, TIMES AND OTHER LABEL INFORMATION LEGIBLE AND COMPLETE?	☐	☐	
HAS ALL SAMPLE NUMBERS, DATES, TIMES AND OTHER SAMPLE DATA BEEN LOGGED INTO SAMPLE LOGBOOK?	☐	☐	
DO SAMPLE NUMBERS AND SAMPLE DESCRIPTION ON THE LABELS MATCH WITH THOSE ON THE COC?	☐	☐	
HAVE THE SAMPLES BEEN PROPERLY PRESERVED?	☐	☐	
HAVE THE CHAIN OF CUSTODIES BEEN FILLED OUT COMPLETELY AND CORRECTLY?	☐	☐	
ARE THE LABELS FILLED OUT IN INDELIBLE INK AND/OR LABEL TAPED OVER WITH CLEAR TAPE?	☐	☐	
HAVE THE COC'S BEEN PROPERLY SIGNED IN THE TRANSFER SECTION?	☐	☐	

PACKAGING CHECK LIST

	YES	NO	COMMENTS
HAS EACH SAMPLE BEEN PLACED INTO AN INDIVIDUAL PLASTIC BAG?	☐	☐	
HAS THE DRAIN PLUG OF THE COOLER BEEN TAPED CLOSED WITH WATER PROOF TAPE FROM THE INSIDE?	☐	☐	
HAS THE COOLER BEEN ADEQUATELY LINED WITH CUSHIONING ABSORBANT PADS?	☐	☐	
HAVE ALL THE SAMPLES BEEN PLACED INTO THE COOLER IN AN UPRIGHT POSITION?	☐	☐	
IS THERE ADEQUATE SPACING OF SAMPLES SO THAT THEY WILL NOT TOUCH DURING SHIPMENT?	☐	☐	
HAVE AN ADEQUATE NUMBER OF BLUE ICE PACKS BEEN PLACED AROUND AND ON TOP OF SAMPLES?	☐	☐	
HAS THE COC BEEN PLACED IN A ZIPLOC BAG AND TAPED TO THE INSIDE OF THE LID OF THE COOLER?	☐	☐	
IS AN ANALYTICAL REQUEST FORM NEEDED AND IS IT IN A ZIPLOC BAG UNDER THE LID OF THE COOLER?	☐	☐	
HAVE CUSTODY SEALS BEEN PLACED OVER THE LID?	☐	☐	
HAS THE COOLER BEEN PROPERLY LABELED WITH CORRECT ADDRESS AND PROPER CERTIFICATION?	☐	☐	
HAS THE LABORATORY PERFORMING THE ANALYSIS BEEN NOTIFIED OF THE SHIPMENT OF SAMPLES?	☐	☐	

PROBLEMS/RESOLUTIONS

PREPARED BY: SIGNATURE:

COOLER RECEIPT

017691

LINS# _____

CONTRACTOR COOLER _____

QA LAB COOLER # _____

NUMBER OF COOLERS _____

PROJECT: _____ Date received: _____

USE OTHER SIDE OF THIS FORM TO NOTE DETAILS CONCERNING CHECK-IN PROBLEMS.

A. PRELIMINARY EXAMINATION PHASE: Date cooler was opened: _____

by (print) _____ (sign) _____

1. Temperature _____ °C
2. Did cooler come with a shipping slip (air bill, etc.)? YES NO

   If YES, enter carrier name and air bill number here: _____
3. Were custody seals on outside of cooler? YES NO

   How many and where: _____ seal date: _____ seal name _____
4. Were custody seals unbroken and intact at the date and time of arrival? YES NO
5. Did you screen samples for radioactivity using the Geiger Counter? YES NO
6. Were custody papers sealed in a plastic bag and taped inside to the lid? YES NO
7. Were custody papers filled out properly (ink, signed, etc.)? YES NO
8. Did you sign custody papers in the appropriate place? YES NO
9. Was project identifiable from custody papers? If YES, enter project name at the top of this form YES NO
10. If required, was enough ice used? YES NO

    Type of ice: _____
11. Have designated person initial here to acknowledge receipt of cooler: _____(date) _____

B. LOG-IN PHASE: Date samples were logged-in: _____

by (print) _____ (sign) _____

12. Describe type of packing in cooler: _____
13. Were all bottles sealed in separate plastic bags? YES NO
14. Did all bottles arrive unbroken and were labels in good condition? YES NO
15. Were all bottle labels complete (ID, date, time, signature, preservative, etc.)? YES NO
16. Did all bottle labels agree with custody papers? YES NO
17. Were correct containers used for the tests indicated? YES NO
18. Were correct preservatives added to samples? YES NO
19. Was a sufficient amount of sample sent for tests indicated? YES NO
20. Were bubbles absent in VOA samples? If NO, list by CA#: _____ YES NO
21. Was the project manager called and status discussed? If YES, give details on the back of this form. YES NO
22. Who was called? _____ By whom? _____ (date) _____

APPENDIX V

GROUP 1 (ACTIVE) SUMPS

017692

LHAAP SUMP ID #	ASSOCIATED BUILDING	TNRCC ID #
01	P-1	030
02	P-3	031
03	P-3	032
07	P-116	036
10	P-118	039
11	P-118	040
12	P-118	041
20	B-11	049
22	B-13	051
24	B-15	053
27	P-9	056
32	212-14	061
34	212-16	063
35	212-18	064
41	212-35	070
42	212-37	071
65	45-E	094
66	45-E	095
72	54-F	101
73	54-G	102
75	54-G	104
76	54-H	105
77	54-H	106
111	722-P	140
112	722-P	141
114	25-X	143
122	401-C	151
800	23T	153
NA	723	154

APPENDIX VI

GROUP 2 (TRANSITION) SUMPS

017693

LHAAP SUMP ID #	ASSOCIATED BUILDING	TNRCC ID #
38	212-33	067
40	212-33	069
44	25-C	073
45	25-C	074
47	25-D	076
48	26-E	077
51	26-E	080
53	29-D	082
55	31-G	084
61	42-H	090
70	50-G	099

APPENDIX VII

GROUP 3 (DERA) SUMPS

017694

LHAAP SUMP ID #	ASSOCIATED BUILDING	TNRCC ID #
4	P-3	033
5	P-3	034
6	P-116	035
8	P-117	037
9	P-117	038
13	P-118	042
14	B-5	043
15	B-7	044
16	B-7	045
17	B-9	046
18	B-9	047
19	B-10	048
21	B-12	050
23	B-14	052
25	B-16	054
26	SHED C	055
28	P-122	057
29	P-123	058
30	212-12	059
31	212-12	060
33	212-14	062
36	P-122	065
37	212-29	066
39	212-33	068
43	212-38	072
46	25-C	075
49	26-E	078
50	26-E	079
52	28-G	081
54	31-G	083
56	32-H	085

APPENDIX VII (continued)

GROUP 3 (DERA) SUMPS

017695

LHAAP SUMP ID #	ASSOCIATED BUILDING	TNRCC ID #
57	33-G	086
58	36-B	087
59	41-E	088
60	42-E	089
62	45-E	091
63	45-E	092
64	45-E	093
67	45-E	096
68	46-A	097
69	46-B	098
71	54-F	100
74	54-G	103
78	68-C	107
79	68-C	108
80	68-C	109
81	68-F	110
82	68-F	111
83	68-F	112
84	68-G	113
85	68-G	114
86	68-G	115
87	68-G	116
88	68-G	117
89	68-G	118
90	68-G	119
91	75-I	120
92	75-I	121
93	75-I	122
94	16-Y	123
95	34-Y	124
96	34-Y	125

APPENDIX VII (continued)

GROUP 3 (DERA) SUMPS

017696

LHAAP SUMP ID #	ASSOCIATED BUILDING	TNRCC ID #
97	38-Y	126
98	38-Y	127
99	38-Y	128
100	45-Y	129
101	45-Y	130
102	16-T	131
103	16-T	132
104	16-T	133
105	16-T	134
106	401	135
107	403	136
108	406	137
109	408	138
110	207	139
113	744	142
115	33-X	144
116	37-X	145
117	744-A	146
118	813	147
119	725	148
120	725	149
121	32-H	150
123	18-Y	152

APPENDIX IX

017697

SUMP CONSTITUENTS ANALYSIS

NOR NUMBER	AREA	REQUIRED ANALYSIS
All Sumps	ubiquitous	Volatile Organic Compounds
		Semi-volatiles Organic Compounds
		Metals (8 each)

SUMPS REQUIRING ADDITIONAL ANALYSIS

NOR NUMBER	AREA	REQUIRED ANALYSIS
083	31-G	Cyanide
084	31-G	Cyanide
090	42-H	Cyanide
091	45-E	Cyanide
092	45-E	Cyanide
093	45-E	Cyanide
094	45-E	Cyanide, RDX, HMX
095	45-E	Cyanide
096	45-E	Cyanide
099	50-G	Cyanide, TPH
142	744	TPH
146	744A	TPH
151	401-C	Cyanide, TPH,
153	23T	HMX, RDX

017698

ATTACHMENT D

ANALYTICAL METHODS/DETECTION LIMITS

Total of Anticipated Analyses Based on the "Worst Case Scenario"

Sample Type	Metals RCRA List SW-846 6010A & 7000A	Metals 20 Metals List SW-846 6010A & 7000A	TCLP Metals SW-846 1311	VOC SW-846 8260A	SVOCs SW-846 8270B	Cyanide SW-846 9010A	Explosives SW-846 8330	TRPH EPA 418.1
58 wastewater (liquid) samples	58	--	58	58	58	8	--	1
58 sludge samples	58	--	58	58	58	8	--	1
27 sand samples	27	--	27	27	27	2	1	--
85 concrete samples	85	--	85	85	85	10	1	1
43 soil samples (sump)	43	--	43	43	43	10	1	1
43 soil samples (boreholes)	--	43	--	43	43	--	--	--
10 groundwater samples	--	10	--	10	10	--	1	--

Note that quantities are approximate, based on the assumptions described in paragraph 4.2.

VOLATILE ORGANIC ANALYSES BY GCMS SW-846 8260A			
Quantity / Type	Parameter	Detection Limit	Detection Limit
58 wastewater 58 sludge 27 sand 85 concrete 43 soil (sump)	Total Volatile Organics	ug/Kg	ug/L
	Acetone	50	50
	Acrolein	50	50
	Acrylonitrile	50	50
	Benzene	5	5
	Bromodichloromethane	5	5
	Bromoform	5	5
	Bromomethane (Methyl Bromide)	10	10
	Carbon Disulfide	50	50
	Carbon Tetrachloride	5	5
	Chlorobenzene	5	5
	Chlorodibromomethane	5	5
	1,4-Dichloro-2-butene	50	50
	Chloroethane	10	10
	2-Chloroethylvinyl Ether	10	10
	Chloroform	5	5
	Dichlorodifluoromethane	5	5
	1,1-Dichloroethane	5	5
	1,2-Dichloroethane	5	5
	1,1-Dichloroethene	5	5
	1,2-Dichloroethene (total)	5	5
	1,2-Dichloropropane	5	5
	cis-1,3-Dichloropropene	5	5
	trans-1,3-Dichloropropene	5	5
	Ethyl Benzene	5	5
	2-Hexanone	50	50
	Ethyl Methacrylate	10	10

VOLATILE ORGANIC ANALYSES BY GCMS SW-846 8260A			
Quantity / Type	Parameter	Detection Limit	Detection Limit
	Methyl Chloride (Chloromethane)	10	10
	Methyl Iodide (Iodomethane)	5	5
	Methylene Bromide (Bromomethane)	5	5
	Methylene Chloride	5	5
	Methyl Ethly Ketone (2-Butanone)	100	100
	4-Methyl-2-Pentanone	50	50
	Styrene	5	5
	1,1,2,2-Tetrachloroethane	5	5
	Tetrachloroethene	5	5
	Toluene	5	5
	1,1,1-Trichloroethane	5	5
	1,1,2-Trichloroethane	5	5
	Trichloroethene	5	5
	Trichlorofluoromethane	10	10
	1,2,3-Trichloropropane	5	5
	Vinyl Acetate	10	10
	Vinyl Chloride	10	10
	Xylene (Total)	10	5

SEMIVOLATILE ANALYSES BY GCMS SW-846 8270B			
Quantity	Parameter	Detection Limit	Detection Limit
58 wastewater 58 sludge 27 sand 85 concrete 43 soil (sump)	Semivolatile Organics	ug/Kg	ug/L
	Acenaphthene	0.66	10
	Acenaphthylene	0.66	10
	Anthracene	0.66	10
	Benzidine	1.3	20
	Benz(a)anthracene	0.66	10
	Benzo(b)fluoranthene	0.66	10
	Benzo(k)fluoranthene	0.66	10
	Benzo(g,h,i)perylene	0.66	10
	Benzo(a)pyrene	0.66	10
	Bis(2-chloroethyl)ether	0.66	10
	Bis(2-chloroethoxy)methane	0.66	10
	Bis(2-chloroisopropyl)ether	0.66	10
	Bis-(2-ethylhexyl)phthalate	0.66	10
	4-Bromophenyl Phenyl Ether	0.66	10
	Butyl benzyl phthalate	0.66	10
	4-Chloraniline	1.3	20
	4-Chloro-3-methylphenol	1.3	20
	2-Chloronaphthalene	2.66	10
	2-Chlorophenol	2.66	10
	4-Chlorophenyl Phenyl Ether	2.66	10
	Chrysene	2.66	10
	Dibenz(a,h)anthracene	2.66	10
	Di-n-butyl Phthalate	2.66	10
	1,2-Dichlorobenzene	2.66	10
	1,3-Dichlorobenzene	2.66	10
	1,4-Dichlorobenzene	2.66	10
	3,3'-Dichlorobenzidine	1.3	20
	2,4-Dichlorophenol	0.66	10
	Diethylphthalate	0.66	10

SEMIVOLATILE ANALYSES BY GCMS SW-846 8270B			
Quantity	Parameter	Detection Limit	Detection Limit
	2,4-Dimethylphenol	3.3	10
	Dimethylphthalate	3.3	10
	4,6-Dinitro-2-methylphenol	0.66	50
	2,4-Dinitrophenol	0.66	50
	2,4-Dinitrotoluene	0.66	10
	2,6-Dinitrotoluene	0.66	10
	Di-n-octyl phthalate	0.66	10
	Fluoranthene	0.66	10
	Fluorene	0.66	10
	Hexachlorobenzene	0.66	10
	Hexachlorobutadiene	0.66	10
	Hexachlorocyclopentadiene	0.66	10
	Hexachloroethane	0.66	10
	Indeno(1,2,3-cd)pyrene	0.66	10
	Isophorone	0.66	10
	2-Methylnaphthalene	0.66	10
	2-Methylphenol	0.66	10
	4-Methylphenol	0.66	10
	Naphthalene	0.66	10
	2-Nitroaniline	3.3	50
	3-Nitroaniline	3.3	50
	4-Nitroaniline	1.3	20
	Nitrobenzene	0.66	10
	2-Nitrophenol	0.66	10
	4-Nitrophenol	3.3	50
	N-Nitrosodimethylamine	1.3	20
	N-Nitrosodiphenylamine	0.66	10
	N-Nitroso-di-n-propylamine	0.66	10
	Pentachlorophenol	3.3	50
	Phenanthrene	0.66	10
	Phenol	0.66	10
	Pyrene	0.66	10

SEMIVOLATILE ANALYSES BY GCMS SW-846 8270B			
Quantity	Parameter	Detection Limit	Detection Limit
	Pyridine	0.66	10
	1,2,4-Trichlorobenzene	0.66	10
	2,4,5-Trichlorophenol	0.66	10
	2,4,6-Trichlorophenol	0.66	10

METAL ANALYSIS BY AA FURNACE OR ICP SW-846 6010A(ICP) & 7000A (AA)				
Quantity/Type	Parameter	Reference Method	Reference Method	Detection Limit
58 wastewater 58 sludge 27 sand 85 concrete 43 soil (sump)	Total Metals	SW-846 6010A(ICP) & 7000(AA)	ug/Kg	
	Arsenic	SW-846 7060A	0.5	2
	Barium	SW-846 6010A	0.5	5
	Cadmium	SW-846 6010A	1.0	5
	Chromium, total	SW-846 6010A	1.0	5
	Lead	SW-846 7421	0.5	3
	Mercury	SW-846 7470A	0.05	0.15
	Selenium	SW-846 7740	0.5	2
	Silver	SW-846 6010A	1	5

EXPLOSIVES BY HPLC SW-846 8330			
Quantity/Type	Parameter	Detection Method	Detection Limit
1 sand sample 1 concrete sample 1 soil sample (sump)	Total Explosives	mg/Kg	ug/L
	HMX	0.25	0.5
	RDX	0.25	0.5
	1,3,5-Trinitrobenzene	0.3	0.5
	1,3-Dinitrobenzene	0.25	0.5
	2,4,6-Trinitrotoluene	0.25	0.25
	Tetryl	0.25	0.5
	Nitrobenzene	0.25	0.25
	2,4-Dinitrotoluene	0.25	0.25
	2,6-Dinitrotoluene	0.25	0.25
	2-Nitrotoluene	0.3	0.5
	3-Nitrotoluene	0.3	0.5
	4-Nitrotoluene	0.3	0.5
	4-Amino-2,6-dinitrotoluene	0.3	0.25
	2-Amino-4,6-dinitrotoluene	0.3	0.25

CONVENTIONAL ANALYSES				
Quantity	Matrix	Parameter	Reference Method	Detection Limit
33 9	Soil Liquid	Cyanide, Total	SW-846, 9010A	1.0 mg/Kg 0.05 mg/L
6 2	Soil Liquid	TRPH by IR	EPA-600 418.1	10 mg/Kg 1 mg/L

ATTACHMENT E

OHM STANDARD OPERATING PROCEDURES (SOPs)

017707

ATTACHMENT E

OHM STANDARD OPERATING PROCEDURES (SOPs)

017708

OHM Corporation

QUALITY POLICY AND PROCEDURE APPROVAL AND REVISION RECORD

Document # QP-601	Title Soil Sampling With Hollow Stem Augers

APPROVAL

Name	Title	Signature	Date
Willis Moody	Super. QA/QC		2/16/94
G. J. Herzig	Mngr. Field Tech.		2/16/94
Terry Sole	Dir. Tech. Svcs.		2/16/94

REVISION RECORD

Ltr.	Date	Change Description	Initials						
A		issue	-	-	-	-	-	-	-
B									
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4.0 GENERAL INFORMATION

4.1 If the boring is at a depth of more than twenty feet it will be necessary to break the center rods at either the fifteen or twenty foot joints (each center rod is five foot in length) and lay the center rods on the ground keeping the threads clean. The remainder of the center rods in the HSA shall be held in place by using a twenty-four inch pipe wrench applying upward pressure. Attach the lifting eye and the hoisting cable as quickly as possible.

4.2 To keep the threads of the center rods clean, a piece of visqueen should be placed on the ground and the threaded section of the augers should be placed on the visqueen.

4.3 The split-spoon sampler is used when taking subsurface samples through an HSA.

4.4 The sample compartment of the split spoon is 24 inches long. Split-spoon samplers are available in carbon steel and stainless steel. However, stainless steel split spoon-samplers are in common use by OHM.

4.5 Carbon steel sampling devices are not acceptable according to EPA protocols due to the amount of contaminants that can leach from the metal under normal usage.

5.0 DEFINITIONS

5.1 Split-Spoon Sampler- A hollow, tubular sampling device driven by a 140-pound weight to below the lowest auger flight to retrieve undisturbed samples of the soil formation.

5.2 Hollow Stem Auger (HSA)- Hollow interconnected auger flights.

5.3 ASTM- American Society For Testing and Materials

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7.4 Using the Safe-T-Drive cable (B-53 only) attached to the 140 lb. hammer, drive the split-spoon into the soil. The hammer is rapidly raised thirty inches and allowed to free fall. The hits (blows) are counted per every six inches. To operate the Safe-T-Drive Hoist

7.4.1 Check feed pressure, (1500 psi minimum is required for satisfactory performance.)

7.4.2 Set engine RPM speed at 2200

7.4.3 With hammer at bottom of stroke, release manual brake.

7.4.4 Close flow control valve completely (clockwise)

7.4.5 Pull control valve to rise position and slowly open flow control valve so hammer will lift. Note rate of lift as reference point for further adjustment.

7.4.6 Push control valve to "DROP" position and allow hammer to fall.

7.4.7 Repeat step 7.4.5 and note rate of lift. Suggested rate is 35 to 40 blows per minute. Continue adjustment of flow control valve until lift valve has been regulated.

7.4.8 Begin drive sampling operation with hammer at top of the thirty inch stroke.

7.4.9 Push control lever to "DROP" position. Hammer will free-fall to bottom of stroke.

7.4.10 Immediately upon impact pull control lever to "RAISE" position. This returns the hammer to the top of the thirty inch stroke and avoids back-lash in the hoist cable.

7.4.11 Push control lever to "DROP" position as hammer reaches top of stroke and hammer will again free-fall to the bottom of the stroke.

7.4.12 Repeat steps 7.4.10 and 7.4.11 until sampler has been driven to the proper depth or until it becomes obvious that the split-spoon is not moving downward.

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7.12 Remove ends from the split-spoon barrel using pipe wrenches if necessary.

7.13 Open split-spoon barrel by firmly tapping sampler on hard surface.

7.14 Record length of retrieved sample.

7.15 Discard the top and bottom one inch of retrieved soil material.

7.16 Choose a representative section or sections from the remainder of sample recovered.

7.17 Using sample gloves, place sample in the appropriate sample container.

7.18 After each use, the split spoon must be decontaminated.

8.0 EQUIPMENT AND SUPPLIES

8.1 Drill Rig equipped to use HSA's and split spoons

8.2 140 lb. Sampling Hammer (Mobile Drilling Co. Inc. P/N 67028-01) or equiv.

8.3 Split-Spoon Sampler (Mobile Drilling Co. Inc. P/N 67039-07) or equiv.

8.4 Sample Containers

8.5 Sample Gloves (Latex or PVC)

9.0 ATTACHMENTS

None

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OHM Corporation

QUALITY POLICY AND PROCEDURE APPROVAL AND REVISION RECORD 017712

Document # QP-602	Title Decontamination Procedures

APPROVAL

Name	Title	Signature	Date
Willis Moody	Super. QA/QC	Willis R. Moody	2/16/94
G. J. Herzig	Mngr. Field Tech.	G. Jack Herzig	2/16/94
Terry Sole	Dir. Tech. Svcs.	Terry Sole	2/16/94

REVISION RECORD

Ltr.	Date	Change Description	Initials						
A		issue	-	-	-	-	-	-	-
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4.3 Split-spoons and similar devices are to be decontaminated between each sample taken and prior to leaving the site.

4.4 Drilling rigs should be decontaminated prior to leaving the project site.

5.0 DEFINITIONS

None

6.0 RESPONSIBILITY

6.1 The driller is responsible for decontaminating equipment used on site.

6.2 The sample technicians are responsible for decontaminating sampling equipment used on site except for equipment associated with a drill rig and the drill rig itself.

7.0 PROCEDURE

7.1 Set up a decontamination pad using 2" x 10" x 10' pieces of lumber, visqueen, and a tarp.

7.1.1 Nail four of the 2"x 10"x 10' together making a square.

7.1.2 Lay two layers of visqueen over the form, ensuring the visqueen is extended past the wood form. The visqueen is to contain the decon water.

7.1.3 Place a tarp inside the form on top of the visqueen. The tarp will protect the visqueen from tearing.

7.1.4 Place saw horses or pallets on top of the tarp. These will be used as a work surface.

7.2 Remove all excess mud and debris from the augers or sampling gear using a putty knife or similar tool.

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7.10.1 Disconnect the water and power from the steamer and roll the hoses and cords and store them for demobilization.

Split Spoons

7.11 Split-spoon or Sampling Equipment Decontamination

7.11.1 Disassemble the split-spoon or sampling device into its component parts.

7.11.2 Fill two five-gallon buckets with water. Place a small amount of Alconox detergent in the first bucket (this will be the wash bucket).

7.11.3 Using a long handle scrub brush wash the components of the split-spoon till all visible signs of contamination are removed.

7.11.4 Rinse the split-spoon components using the clean water bucket.

7.11.5 Take the rinsed components and using a squeeze bottle filled with clean deionized or distilled water, rinse the spoon parts again, allowing the water to drain into the first rinse bucket.

7.11.6 Rinse the spoon components with the proper organic solvent using a teflon squeeze bottle and allow to dry. The solvent most commonly used will be isopropanol, but others such as hexane or acetone may be used. Site specific requirements will determine solvent needs.

7.11.7 Package the clean parts in plastic or aluminum foil and store securely until they are used again.

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017715

OHM Corporation

QUALITY POLICY AND PROCEDURE APPROVAL AND REVISION RECORD

Document # QP-604	Title Groundwater Sampling

APPROVAL

Name	Title	Signature	Date
Willis Moody	Super. Plans/Proc.		8 NOV 93
G. J. Herzig	Mngr. Field Tech.		12/17/93
Terry Sole	Dir. Tech. Svcs.		12/17/93
Daniel Buettin	VP Midwest Region		1/10/94

REVISION RECORD

Ltr.	Date	Change Description	Initials						
A		issue	-	-	-	-	-	-	-
B									
C									
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E									
F									
G									
H									
I									
J									
K									
L									
M									
N									
O									

3.0 REFERENCES

3.1 ASTM, 1986. Annual Book of ASTM Standards, Section 11. Volume 11.04, D4448-85A.

3.2 USEPA, 1992. RCRA Ground-Water Monitoring: Draft Technical Guidance. Office of Solid Waste, United States Environmental Protection Agency, Washington, D.C.

3.3 USEPA, 1982. Handbook for Sampling and Sample Preservation of Water and Wastewater, EPA/600/4-82/029.

3.4 USEPA, 1985. Practical Guide for Ground-Water Sampling, EPA/600/2-85/104.

3.5 USEPA, 1981. Manual of Ground-Water Quality Sampling Procedures. Office of Research and Development, US EPA, Ada, Oklahoma.

4.0 GENERAL INFORMATION

4.1 Wells should be sampled within three hours of purging.

4.2 Wells with poor recharge should be sampled within 24 hours of purging. Poor recharge wells are those that cannot recharge 80 percent of the original volume within 8 hours.

4.3 Applicable preservatives must be added to the sample containers before the groundwater samples are added to the container except for acid preservatives in the case of samples collected for Total Dissolved Metals analyses.

4.4 All sampling equipment must be decontaminated prior to usage.

4.5 Sample containers must be precleaned.

5.0 DEFINITIONS

5.1 Environmental Sample. Low concentration sample typically collected from on-site monitoring wells and not requiring DOT hazardous waste labelling as a high hazard sample.

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5.10 Turbidity. The reduction in transparency of a sample due to the presence of particulate matter.

5.11 Replicate Samples. Multiple grab samples, collected separately, that equally representative of a medium at a given time and location.

5.12 Equipment Blank. Samples consisting of reagent water or solvents collected from a final rinse of sampling equipment after the decontamination procedure has been performed. The purpose of rinsate blanks is to determine whether the sampling equipment is causing cross contamination of the samples.

5.13 Trip Blank. Containers of organic-free reagent water that are kept with the field sample containers from the time they leave the laboratory until the time they are returned to the laboratory. The purpose of trip blanks is to determine whether samples are being contaminated during transit or sample collection. Trip blanks pertain only to volatile organic analyses; therefore, the containers must contain no headspace. Only one trip blank is needed for one day's sampling and will satisfy trip blank requirements for all matrices for that day if the volatile samples are shipped in the same cooler.

5.14 Interface Probe. The interface probe is a hand held battery operated instrument for measuring the depth to floating organics in a well as well as the depth to water. The unit's probe head has a dual sensing mechanism that uses an optical sensor to detect organic liquids and a conductivity sensor to detect water. The probe is permanently affixed to a steel measuring tape which is used to obtain depth to product and depth to water readings.

6.0 RESPONSIBILITIES

6.1 Sample Technologist

The sample technologist will be responsible for:

- Carrying out all sampling in accordance to approved procedures and methodologies as defined in the CSAP

- Generate trip blanks, equipment blanks, and acquire replicate samples as required by the CSAP, QAPP or this SOP

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- o QA/QC Program
- o Sample preservation, volume and holding time requirements
- o Sample handling and transportation
- o Equipment decontamination

7.2.1 Sample Containers

The two major types of container materials are plastic or glass. Conventional polyethylene (a type of plastic container), when plastic is acceptable, is ideal because of reasonable cost and less absorption of metal ions. Glass containers are to be used for pesticides, oil and grease, and other organics. The specific situation will determine which will be used.

7.2.2 Well Headspace/Organic Vapor Scan

It is not uncommon around tank farms and hazardous waste sites for there to be organic vapors, even at explosive concentrations, in the headspace of wells placed in the area.

For this reason, the headspace of each well on site should be monitored for organic vapors and explosivity. This should be done, as a minimum, at the beginning of the job. All results should be reported in the field logbook. High organic-vapor readings in the well head may necessitate an increase in the level of protection required for the sampling team plus it will also serve as an indicator to the analytical laboratory that this water may be "hot" for organics and that dilution of the sample before analysis occurs may be needed.

7.2.2.1 Field Instruments

- The field instruments which will likely be available for use in headspace/organic vapor scan include the following:

1. HNU 101 Photoionization Detector (PID)
2. OVA
3. MSA Model 260/360 LEL/O_2

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7.2.4 Static-Liquid-Level Determination

The depth to water in the well must be measured to calculate the well casing volume for purging. (Note: All water-level measurements used to construct a single piezometric surface should have been made within a 24-hour period). Depths to water are measured with respect to the top of the casing, as in well-depth determinations.

Several methods are available including the following:

- o The Electric Sounder
- o The Popper (sounder)

7.2.4.1 The Electric Sounder

The electric sounder, although not the most accurate, is recommended for initial site work because of the minimal potential for equipment contamination and simplicity of use. Electric sounders usually consist of a conductivity cell at the end of a graduated wire and a battery powered buzzer. When the cell contacts the water, the increased conductivity completes the circuit and allows current to flow to the alarm buzzer. The depth to water can then be read from the graduations on the wire or the wire can be measured directly. This device, however, may not be suitable for use if a potentially flammable or explosive layer is present in the well, unless it is an intrinsically safe version.

Additional equipment needed may include the following:

- o Sample gloves, latex or nitrile
- o Measuring tape, steel, 100 ft
- o Alconox detergent
- o Several rolls of paper towels
- o Visqueen plastic sheeting
- o 3 - 1 or 2 gal plastic pails
- o Several gallons of DI water
- o Several small scrub brushes

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7.2.3.2 Poppers

The metal tape and popper is another simple and reliable method for measuring depth to water in wells more than 3.8 cm (1.5 in.) in diameter. The popper is a metal cylinder with a concave undersurface fastened to the end of the metal tape. The procedure including the health and safety and monitoring requirements for using a popper are the same as for the electrical sounders and are as follows:

1. Lower the popper until it hits the water surface, making a distinct "popping" sound.
2. Adjust the tape length so that the popper just hits the water surface.
3. Read the depth to water from the tape measure taking into account any additional length added to the tape by the presence of a popper on the end of it.
4. After the measurement is taken, reel the tape in, wiping it off with paper towels and cleaner. Decontaminate the popper as was done with the sounder before proceeding to the next point.
5. Place cap on casing.
6. Record the results on field data sheet.

"Water finder" paste, a colorimetric water indicator, is <u>not</u> to be used in any monitoring wells.

7.2.4 Immiscible Layer Determination and Sampling

7.2.4.1 Site History and Surroundings

The first indicators of the possibility of measurable layers of immiscible organics, "floaters" or "sinkers", in the ground water are site history and site surroundings. Spills and leaking underground tanks or pipes, as well as deliberate dumping, or the suspicion of any of these should cause one to suspect an immiscible layer.

7.2.4.2 Air Monitoring

Another indication is a reading with a photoionization detector or OVA that indicates organic contaminants in the well headspace at greater than background concentrations.

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gases across the interface between water and the atmosphere within the well. The result can be change in a redox condition and the pH in the well. This change can be accompanied by changes in the chemical species present, precipitation or dissolution of metals, and the removal or addition of constituents due to subsequent sorption reactions.

The chemical quality of water standing in contact with well materials such as the casing, screen, or grouting for long periods of time may also be altered by leaching or adsorption of constituents from those materials. Biological activity within the well may affect certain chemical parameters as well. A common example would be sulfate reducing or iron bacteria that can be responsible for the formation of iron sulfide and iron hydroxide in the well. These compounds may then absorb selected constituents. Biological activity may also be responsible for the degradation of certain constituents.

7.2.5.2 Steps for Purging a Well

The steps involved in purging a well are as follows:

1. Calculation of the volume of stagnant water stored in the well casing. The required data are well-casing radius, depth to well bottom (DTB), and depth to water (DTW). One must be careful that the screen radius is the same as the casing radius. This may very well not be the case for a production well (which would only need purging if it had not been pumping for half a day or so). When this is the case, the depth of the transition to a larger-diameter screen must be obtained from the drilling log. The casing volumes must then be calculated for the two sections and added together. The height (h) of the water column is DTB - DTW. The casing volume is then:

$$V = (p_i r^2 h)7.48$$

Where

$p_i = 3.142$
V = Volume in gallons
r = Radius of the well in feet
h = Height of the water in feet

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4. The best situation to encounter is when one can pump the well dry without pumping at a rate which would cause loss of volatiles in the water coming into the well. This ensures complete removal of stagnant water.

   After the well has been completely or nearly completely evacuated, the new DTW is measured and recorded. The elapsed time and new a DTW should be recorded again when the water level has risen about 1 foot. If the well recovers to half of its static volume within a reasonable period of time, it should be evacuated again. When recovery allows, volatilization sensitive parameters should be sampled for. When full recovery time exceeds 3 hours, the remaining samples should be taken as soon as there is sufficient volume.

7.2.6 Sampling Methods

The collection of a ground-water sample is made up of the following steps.

1. Set up the sample table adjacent to the well and cover the table top with clear sheet plastic to minimize contamination of the table. Tape the plastic onto the table and record the sample location, site, anticipated sample time, and field sample number onto the plastic using a indelible pen. Fill out sample labels for each of the required sample containers and place labels onto the appropriate sample containers. Labels must be waterproof to prevent water damage by covering them with clear wide packaging tape after affixing them to the containers. The following information must be included on the sample label:

   - o site name
   - o field identification or sample station number
   - o date and time of sample collection
   - o designation of the sample as grab or composite
   - o type of sample (matrix) and a brief description of the sampling location
   - o printed full name of the sampler and initials of the witness (If any).

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7. To ensure that ground-water samples are representative of actual conditions, samplers must work efficiently to minimize the loss of ground water contaminants and the introduction of foreign contaminants. To prevent contamination of samples, the sample bottles should be opened only when receiving sample preservatives or ground-water samples and closed immediately afterwards. To prevent introduction of foreign contaminants into the well, sample bottles should be held away from the well opening when receiving samples and the bailing rope should not be allowed to touch the ground, or other potentially contaminated objects.

   The sampler should quickly add the sample into the sample containers, while minimizing aeration and loss of volatile contaminants. Samples collected for analysis of volatile constituents will be collected first, followed by samples collected for analysis of total organic carbon (TOC), total organic halogens (TOX), and those constituents which require field filtration or field determination after collection of volatile organics. Large volume samples for extractable organic compounds, total metals, etc., should be collected last.

8. When a sample bottle is filled, the bottle must be tightly capped as soon as possible.

9. Efficiency and care must be utilized to obtain representative samples for volatile organic analysis. Unnecessary delays or poor sampling technique will lead to loss of the volatile constituents from the sample. Prevent unnecessary stripping of volatile constituents from the sample by minimizing turbulence and aeration when filling the bailer and when filling the sample container. Quickly fill the sample container until a positive meniscus is achieved above the rim of the container and cap the container immediately. Gently tap the sample container to dislodge any air bubbles and verify that no bubbles are present. If bubbles are detected, immediately uncap the sample, add additional sample from the bailer until a positive meniscus is re-established, immediately recap the sample and check the sample for bubbles. Repeat this step until the volatile organics sample contains no bubbles and all required samples are obtained.

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7.2.7.1 Bailers

The bailer is one of the oldest and simplest methods available. It consists of a container attached to a cable which is lowered into the well to retrieve a sample. Bailers can be of various designs. The simplest is a weighted bottle or basally-capped length of pipe which fills from the top as it is lowered into the well. Top-filling bailers are acceptable for well purging but not for sampling. More sophisticated bailers have a check valve located at the base which allows water to enter from the bottom as it is lowered into the well. When the bailer is lifted, the check valve closes, allowing water in the bailer to be brought to the surface.

More sophisticated bailers are available that remain open at both ends while lowered into the well, but can be sealed at both top and bottom by activating a triggering mechanism from the surface. This allows more reliable sampling at discrete depths within a well. Perhaps the best known bailer of this design is the Kemmerer sampler.

Bailers generally provide an excellent means for collecting samples from monitoring wells. They can be constructed from a wide variety of materials compatible with the parameter of interest. Only Teflon and stainless-steel bailers are acceptable for all parameters. Disposable Teflon or Polyethylene precleaned bailers are also available. Since disposable bailers are relatively inexpensive, they can easily be dedicated to an individual well to minimize cross contamination during sampling. Nylon sample string is commonly used to raise and lower bailers. Monofilament line (fishing line), however, is more acceptable.

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Peristaltic Pumps

Peristaltic pumps operate in a similar manner to centrifugal pumps but displace the fluid by mechanical peristalsis. A flexible transmission line is mounted around the perimeter of the pump chamber, and rotating rollers compress the tubing, forcing fluid movement ahead (the peristaltic effect) and inducing suction behind each roller. This design isolates the sample from the moving part of the pump and allows for easy cleaning by removal and replacement of the flexible tubing. Unfortunately, peristaltic pumps are generally capable of providing only relatively low yields unless the largest available peristaltic pumps are used. They are, therefore, not as well suited for well evacuation/purging as the centrifugal pumps. Pumping rates run from about 10 ml/min to about 50,000 ml/min.

7.2.7.3 Positive Displacement Pumps

A variety of positive-displacement pumps are available for use in withdrawing water from wells. These methods use some pumping mechanisms placed in the well that forces water from the bottom of the well to surface by some means of positive displacement. This minimizes the potential for aerating or stripping volatile organics from the sample during removal from the well. Three common examples of positive-displacement pumps are:

- o The submersible centrifugal pump
- o The piston-driven pump
- o The gas-operated squeeze pump

Submersible Centrifugal Pump

The submersible centrifugal pump works in a similar manner to the centrifugal suction lift pump previously described except the pump and electric motor are lowered into the well. As the impeller rotates and fluid is brought into the pump, fluid is displaced up the transmission line and out of the well.

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A special adaptation of this pump is available for use in ground-water monitoring. These piston-pumps use compressed gas rather than a rod connected to a driving mechanism at the surface to drive the pistons. This provides a much more convenient and portable means for collecting samples from monitoring wells. They provide good yields and can be constructed with materials compatible to many sampling programs.

Gas-Operated Squeeze Pump

The gas-operated squeeze pump or bladder pump (sometimes referred to as the Middleburg pump), consists principally of a collapsible membrane inside a long, rigid housing, compressed gas supply, and appropriate control valves. When the pump is submerged, water enters the collapsible membrane through the bottom check valve.

After the membrane has filled, gas pressure is applied to the annular space between the rigid housing and membrane, forcing the water upward through a sampling tube. When the pressure is released, the top check valve prevents the sample from flowing back down the discharge line, and water from the well again enters the pump through the bottom check valve.

Gas-operated squeeze pumps offer a number of advantages for use in ground-water-monitoring programs. They can be constructed in diameters as small as 1 inch and from a wide variety of materials. They are also relatively portable and are capable of providing a fair range of pumping rates. Most importantly, the driving gas does not contact the water sample, thus eliminating possible contamination or gas stripping. However, they do require a gas source, and withdrawal of water from substantial depths may require large gas volumes and long pumping cycles.

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7.2.10 Field QA/QC Program

The fundamental purpose of the Field QA/QC Program is the continuing assurance of reliability and validity of data and samples gathered as part of the overall ground-water-monitoring program. The most important aspect of field QA/AC is the development and implementation of the sampling plan. If this is done properly, it should ensure consistent quality results. The sampling plan should address all of the aforementioned issues as well as those which are traditionally thought of as part of QA/QC.

7.2.10.1 Background Determination

To evaluate ground-water contaminant data, it is necessary to obtain good data on the background levels of the contaminants of interest. This is accomplished by installing at least one monitoring well/well cluster upgradient of the source of contamination and sampling it periodically. If a well cluster is installed for background determination, comparisons between background and downgradient contaminant concentrations should be made within stratigraphic horizons as much as possible.

The use of only one monitoring well/well cluster upgradient for determination of the background characteristics of the groundwater on a site may result in important variations in these characteristics being missed.

Use of more than one upgradient well for background determination is recommended and will indeed be necessary for adequately constructing a piezometric surface.

Additional information on background characteristics of ground water can sometimes be obtained from downgradient wells. In the case where a spill has recently occurred and the site history is free of incidents which would have left the site globally contaminated, it is common OHM practice to install wells downgradient of the spill until a "clean" zone around the spill is defined. These wells are then monitored for intrusion of the contaminant(s) into the clean zone. These "clean zone" wells may, at least initially, provide further data on background groundwater quality.

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Collection of Split-Samples or Field Duplicates

Whenever field duplicates are collected or samples are split with another organization, the additional samples for identical analyses will be collected along with the original sample, (i.e., containers for all volatile organic analyses will be filled first and together, all semi-volatiles together and in proper sequence, and so forth until all sample parameters are in the proper containers).

Determining Amount of QA/QC Samples

The percentage of Quality Assurance/Quality Control samples should be determined prior to mobilization of the project. Ten percent QA/QC is the percentage most commonly used.

When collecting samples, the technologist(s) must be aware of the number of samples that will be needed (at a minimum) to meet the level or percentage of QA/QC selected for the project. Table 7.2-1 illustrates the number of samples needed for a sampling project which has 20 soil samples, 10 water samples, and 5 wipe samples.

S = Soil
W = Water
P = Wipe
1/C = 1 Sample per Shipping Container
OP = Optional

7.2.11 Sample Preservation, Volume and Holding Time Requirements

Sample preservation techniques and volume requirements depend on the type and concentration of the contaminant and on the type of analysis to be performed. Holding times, allowed time between sample collection and analysis for routine samples, also vary depending on the type of contaminant.

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7.2.13.1 Inorganic Constituents

If the constituents of interest are inorganic, the following steps will be followed:

1. Wash equipment with Alconox and tap water
2. Rinse with tap water
1. Rinse with dilute (o.1 N) hydrochloric acid or nitric acid
2. Rinse with tap water
3. Rinse with distilled water or deionized water

Dilute hydrochloric acid is generally preferred to nitric acid when cleaning stainless steel because nitric acid may oxidize stainless steel.

7.2.13.2 Organic Constituents

If organics are the constituents of concern, the sampler should perform the following:

1. Wash equipment with Alconox detergent and tapwater
2. Rinse with tap water
3. Rinse with distilled water
4. Rinse with pesticide free grade isopropanol

The sampling equipment should be thoroughly dried before use to ensure that the residual cleaning agents (e.g., isopropanol) are not carried over to the sample.

It is also important to note that:

- o Clean sampling equipment should not be placed directly on the ground or other contaminated surfaces prior to insertion into the well.

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8.0 EQUIPMENT

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Ideally, sample collection and well purging equipment should be completely inert, economical, easily decontaminated, reusable, able to operate at remote sites in the absence of power sources, and capable of delivering variable rates for well flushing and sample collection.

The following listed equipment may be needed to accomplish collection of ground-water samples.

8.1 Sample Containers (40 ml VOA, 8oz, 16oz,or 32oz precleaned with Teflon lined lid)

8.2 Coolers for Sample Shipping and Cooling (Rubbermaid or Coleman 48 to 54 quart size)

8.3 Chemical Preservatives (See SOP for Sample Preservation and Holding Times)

8.4 Appropriate Packing Cartons, Cans and Filler Material

8.5 Labels (OHM type)

8.6 Chain-of-Custody Documents (OHM type)

8.7 Thermocouple thermometer, digital, Type K (Cole-Parmer G-08528-40 with G-93815-10 probe).

8.8 pH / conductivity meter, digital (Cole-Parmer G-01484-44)

8.9 Dissolved Oxygen Meter, digital (Cole-Parmer G-05505-00)

8.10A Portable HNU Photoionization Detector (PID) or OVA unit (OHM supplied)

8.10B MSA Model 260 or 360 LEL/O_2 Meter

8.11 Specific-Conductivity Meter (See 8.8, Meter is pH/Cond. unit)

8.12 Paper Towels, several rolls

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8.27 Sample Tubing Such as Teflon, Polyethylene and Polypropylene: Tubing type shall be selected based on specific site requirements and must be chemically inert to ground water contaminants that may be present on-site

8.28A Teflon bailers, stainless steel bailers, PVC bailers, disposable polyethylene bailers or disposable teflon bailers. Bailer type is usually site specific, but Teflon bailers are almost universally acceptable for any type of water sampling.

8.28B Teflon bailer, with top and bottom check valves (Brainard-Kilman TF-30XXX series units that are 1.75" OD X 24" length

8.29 1/8" Teflon-Coated Multi Strand Steel Wire, 1/8" Stainless Steel multi Strand Wire, 1/4" Polypropylene Rope, 10-15lb Test Monofilament Line, or 1/4" Nylon Braided Rope can be used for retrieving bailers

8.30 Pails: Plastic, graduated, 3-5 gals. capacity

8.31 Decontamination Solutions: Distilled or deionized water that is analyte free, Alconox or Liquinox, and pesticide free Isopropanol or Hexane

8.32 Oil-Water Interface Probe, ORS, Inc. P/N 1068013

8.33 Filters, 0.45um pore size, cartridge type, disposable, Gelman P/N 12175 or VWR P/N 28145-143

8.34 Hose Fittings, polyethylene, barb type, for 3/16"- 3/8" tubing, Various types & sizes

8.35 Plastic sheeting, polyethylene, ~20' X ~100', 6 - 10 mil thickness

8.36 Popper assembly, OHM fabricated, to go on end of tape measure line

8.37 Compass, hand-held, Silva Model (Type) 3, 17 or 20, reads to 2^0 with liquid filled capsule

9.0 ATTACHMENTS

9.1 Ground-Water Sampling Form

9.2 Popper Assembly Drawing

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FIGURE 9-4

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WATER SAMPLE FIELD COLLECTION REPORT

Project Number: 017732
Project Name: _____
Site Location: _____

Sample ID Number _____
Sample Location (7) _____
Diameter of Well _____ (in.)
Depth to Bottom of Well _____ (ft.)
Static Water Level _____ (ft.),
Well Volumes Purged _____,
Type of Sample (3) _____,
Depth of Sample _____ (ft.),
Sample Collection Order _____

Date Collected _____
Time Collected _____
Sampler _____ I.D. # _____
Casing Stick Up _____
Measured From (1) _____ (ft.),
Purging Method (2) _____
Sampling Method (4) _____
Measured From (1) _____

FIELD SCREENING AND TEST RESULTS

Water Temperature _____ °C
pH _____ Units
Specific Conductance _____ umho/cm at _____ °C
OVA ☐ HNU PID ☐ Reading _____ PPM
Photovac GC (P/GC) Probable Compound _____ Reading _____ PPM

METER CALIBRATION

pH STD	METER READING	SP. COND. STD	METER READING	_____/STD (8)	METER READING

SAMPLE TYPES COLLECTED

CONTAINER #	TYPE (5)	CONTAINER TYPE	VOLUME	FILTERED	PRESERVATION (6)
_____	_____	P ☐ G ☐	_____	Y ☐ N ☐	Y_____ N ☐
_____	_____	P ☐ G ☐	_____	Y ☐ N ☐	Y_____ N ☐
_____	_____	P ☐ G ☐	_____	Y ☐ N ☐	Y_____ N ☐
_____	_____	P ☐ G ☐	_____	Y ☐ N ☐	Y_____ N ☐
_____	_____	P ☐ G ☐	_____	Y ☐ N ☐	Y_____ N ☐

WEATHER CONDITIONS: TEMP. _____ °F CLEAR ☐ CLOUDY ☐ RAIN ☐ SNOW ☐ WINDY ☐

(1) T.O.C. = Top of Protective Casing; T.O.W. = Top of Well Casing; G.S. = Ground Surface

(2) Bailed, Pumped, Air Lift, Etc.

(3) Strea. Pond, Spring, Well, Seep, Supply, Etc.

(4) Bailer, Kemmerer, Grab, Pump, Etc.

(5) General Chem., Metal, VOA, Organics, Etc.

(6) HNO^3, NaOH, H^2SO^4, $Na^2O^3S^2$, Etc.

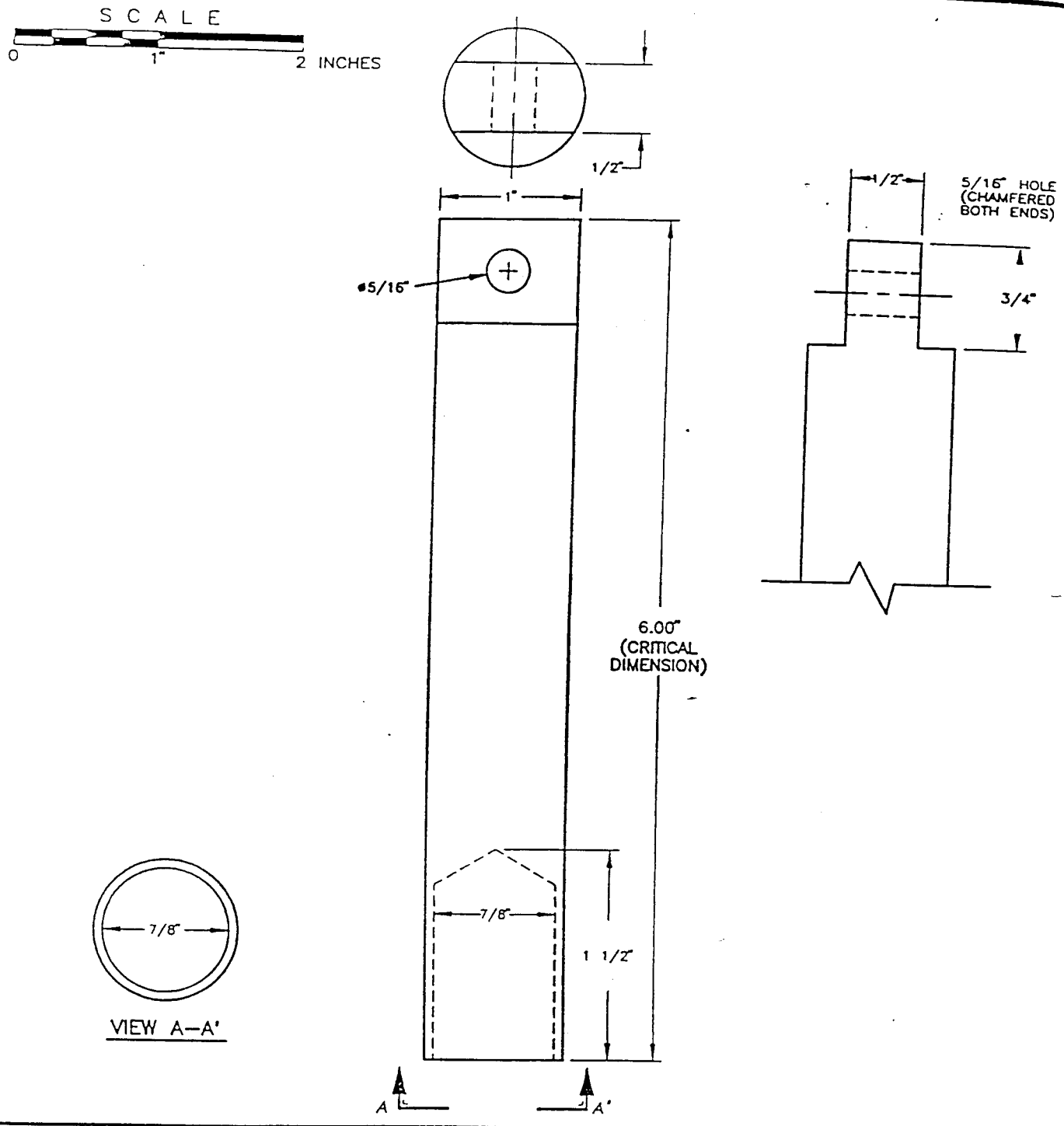
(7) If Well, Give Well I.D. Number.

(8) OVA, PID, P/GC or Other.

FIGURE 9.2

POPPER ASSEMBLY DRAWING

017733



General Notes:

NOTE: MATERIAL OF CONSTRUCTION IS ALUMINUM.

POPPER

OHM Corporation
Findlay, Ohio

Drawn By: L.DUHGG	Check'd By: W/Rm
Date: 11-8-93	Approved By:
Scale: AS SHOWN	Drawing No.

OHM Corporation

017734

STANDARD OPERATING PRODCEDURE

Title: Portable Organic Vapor Analyzer, OVA Model OVA-128 Document #: QP-627

Date Issued: September 21, 1994 Rev: 0 Date: September 21, 1994

1.0 PURPOSE

1.1 To describe the setup and operating procedure for the Century Systems Model OVA-128 Portable Organic Vapor Analyzer

2.0 SCOPE

2.1 Field screening, for volatile organic vapors in air utilizing a Portable Organic Vapor Analyzer (OVA), is a semi-quantitative technique applicable to soil, water, and gas matrix samples.

3.0 RELATED DOCUMENTS

3.1 Century Systems Corporation Operating and Service Manual for Model OVA-128, Portable Organic Vapor Analyzer, Revision C, 1980.

4.0 GENERAL INFORMATION

4.1 The Century Model OVA-128 Portable Organic Vapor Analyzer is a highly sensitive instrument designed to measure trace quantities of organic materials in the air.

4.2 The instrument utilizes the principle of hydrogen flame ionization for detection and measurement of organic vapors in air in the presence of moisture, nitrogen oxides, carbon monoxide, and carbon dioxide.

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4.3 The instrument is ideal for the determination of many organic air pollutants and in the monitoring of air in potentially contaminated areas. Factory calibration is to a methane in air standard.

5.0 DEFINITIONS

None

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6.0 RESPONSIBILITIES

6.1 Chemist

6.1.1 Calibrate and maintain the field portable OVA

6.1.2 Carry out approved analytical procedures

6.1.3 Carry out approved QA/QC methods

6.1.4 Fill out sample analysis tracking forms

6.1.5 Report QC data to the Project Chemist

7.0 PROCEDURE

7.1 Instrument Setup

7.1.1 Connect the adjustable length probe to the Readout Assembly with the captive locking unit. Ensure that the probe is seated firmly in the Readout Assembly.

7.1.2 Select the desired pickup fixture and check that a particle filter is installed.

7.1.3 Connect the pickup fixture to the probe using the knurled locking unit.

7.1.4 Connect the umbilical cord and sample hose to the Side Pack Assembly.

7.1.5 Connect the purged fuel refill hose to the refill connection on the side Pack Assembly. Turn the FILL/BLEED Valve on the instrument end of the hose in the OFF position.

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7.1.6 Open the hydrogen supply FF valve slightly. Open the REFILL VALVE and the H_2 TANK Valve on the instrument panel and place the FILL/BLEED Valve on the filling hose assembly in the FILL position. The pressure in the instrument tank will now be indicated on the H_2 TANK PRESSURE indicator.

7.1.7 After the instrument fuel tank is filled, shut off the REFILL Valve on the panel, the FILL/BLEED Valve on the filling hose assembly, and the hydrogen supply bottle valve.

7.1.8 Bleed the hose by turning the FILL/BLEED valve on the filling hose assembly to the BLEED position. When at atmospheric pressure, the FILL/BLEED Valve should be turned to the FILL position to allow the hydrogen trapped in the connection fittings to go into the hose assembly. Then turn the FILL/BLEED valve to the BLEED position and exhaust the trapped hydrogen again. Turn the FILL/BLEED valve OFF.

7.1.9 Close the H_2 TANK Valve.

7.1.10 Move the INSTR/BATT test switch to the BATT position and ensure the battery is charged.

7.1.11 Standard factory calibration is performed using methane in air. The GAS SELECT (span) control is set and locked to the position for calibration to methane (factory setting is 300). If the instrument is calibrated for other organic vapors, the reading on the GAS SELECT control must be set for that particular vapor.

7.2 Turn On Procedure

7.2.1 Move the INSTRU switch to ON and allow five minutes for warm up.

7.2.2 To set the audible alarm to a predetermined level, turn the PUMP switch to ON, then adjust the meter pointer to the desired alarm level using the CALIBRATE ADJUST (zero) knob. Turn the Alarm Level Adjust Knob on the back of the Readout Assembly until the audible alarm just comes on. Adjust speaker volume with VOLUME knob.

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7.2.3 Move the CALIBRATE switch to X10 and adjust the meter reading to zero with the CALIBRATE ADJUST (zero) knob.

7.2.4 Ensure the PUMP switch is ON and observe the SAMPLE FLOW RATE indicator. The indicator should be approximately 2 units.

7.2.5 Open H_2 TANK Valve one (1) turn and observe the H_2 TANK PRESSURE Indicator. (Approximately 150 psi of pressure is needed for each hour of operation).

7.2.6 Open the H_2 SUPPLY Valve 1/2 to 1 turn and observe the reading on the H_2 SUPPLY PRESSURE Indicator.

CAUTION: Do not leave H_2 SUPPLY valve open when the pump is not running, because this will allow hydrogen to accumulate in the detector chamber.

7.2.7 Confirm that the meter is still reading zero (readjust if required).

7.2.8 Depress ignitor button. A slight "pop" will be heard as the hydrogen ignites, and the meter pointer will move upscale of zero. Immediately after ignition, release the ignitor button. Do not depress ignitor button in excess of six seconds. If burner does not ignite, let the instrument run for several minutes and try again. After ignition, the meter pointer will indicate the background concentration. This background level is mulled out using the CALIBRATE ADJUST (zero) knob.

7.2.9 Move the instrument to an area of "lowest ambient background concentration" (cleanest air) and move the CALIBRATE switch to X1. Adjust the meter to read 1 ppm with the CALIBRATE ADJUST (zero) knob.

7.2.9.1 Adjustment to 1 ppm is necessary in the X1 range. It permits minor downward fluctuations without dropping below zero, which would actuate the flame-out alarm. Therefore, 1 ppm must be subtracted from all readings (i.e., a reading of 1.8 ppm would actually be 0.8 ppm).

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7.3 Operating Procedure

7.3.1 Set the CALIBRATE switch to the desired range. Using one hand operation, survey the areas of interest while observing the meter and/or listening for the audible alarm indication. For ease of operation, carry the Side Pack Assembly positioned on the side opposite the hand which holds the Probe/Readout Assembly.

7.3.2 When organic vapors are detected, the meter pointer will move upscale and the audible alarm will sound when the preset point is exceeded. The frequency of the audible alarm will increase as the detection level increases.

7.3.3 Using a 100 ppm air/methane cylinder standard, connect the probe inlet to the tank outlet. If the readout is not between 70-130 ppm return for recalibration.

7.4 Shut Down Procedure

7.4.1 Close the H_2 SUPPLY valve and the H_2 TANK valve.

7.4.2 Move the INSTR switch and PUMP switch to OFF.

8.0 EQUIPMENT

* Century Systems Portable Organic Vapor Analyzer (OVA) Model OVA-128
* Zero-Hydrogen, Hydrocarbon free compressed gas
* Calibration standards for the analytes of interest (if required)
* Fuel filling hose assembly
* AC battery charger
* Earphone
* Various pickup fixtures

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9.0 ATTACHMENTS

None

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APPENDIX E

SITE WASTE MANAGEMENT PLAN
(SWMP)

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Drum Labeling Checklist
Hazardous Waste Drum Labeling Instructions
Non-Hazardous Waste Drum Labeling Instructions
USACE "Pending Analysis" Drum Label
Weekly Drum/Container Inspection Log

Final
SITE WASTE MANAGEMENT PLAN
LONGHORN ARMY AMMUNITION PLANT (LHAAP)

1.0 INTRODUCTION

This Site Waste Management Plan (SWMP) describes the procedures and documentation controls OHM will execute in managing waste streams generated from the closure and/or removal of 85 wastewater sumps at the Longhorn Army Ammunition Plant (LHAAP) located in Karnack, Texas. Throughout this plan, the terms "drum" and "container" are used interchangeably as they both apply to non-bulk containers of waste.

1.1 Identification and Preliminary Characterization of Waste Streams

Presently, the scope of this plan includes wastes generated during on-site activities to either remove and dispose of , or close in place, 85 wastewater sumps. OHM has identified the waste streams that are anticipated to be generated from on-site activities and has included these below in **Table 1-1**.

Waste materials have been categorized as either process or closure derived wastes. Process wastes are those liquids, solids and sludges that remain in the sumps and closure derived wastes are materials and structures that result from the disassembly and demolition of the various units. Closure derived wastes include, but are not limited to, liquids and solids that result from the demolition and decontamination process. Final characterization of each waste stream will occur after analytical results are received and confirmed by OHM. It is OHM's understanding that LHAAP has requested a reclassification of the sumps from TNRCC and/or EPA. They are proposing to have them classified as CERCLA.

LHAAP offered to perform an approved RCRA closure of these sumps in response to allegations by TNRCC in 1991 that the sumps should be regulated as RCRA hazardous waste tanks. The regulatory requirements for closure of the sumps is described in the Closure Plan dated May, 1995 and approved by TNRCC.

All sludge from wastewater treatment operations is listed as an EPA K044 hazardous waste. K044 is the USEPA designation for the listed hazardous waste described as "wastewater treatment sludges from the manufacturing and processing of explosives". The sludge at the bottom of the sumps is considered by LHAAP to be K044 waste as well. This is not to imply that the sludge will only be disposed of as a K044 waste. Other hazardous waste codes and land disposal restrictions may apply to this sludge as appropriate; one example would be the sumps which have contained F-listed solvents. This designation stems from historical information that the sumps at one time or another received F-listed solvents such as: methylene chloride and 1,1,1-trichloroethane as part of the overall wastewater stream. The K044 sludge and wastewater from the sumps will carry the F001 waste code if analysis reveals detectable quantities of F-listed solvents. F001 is the USEPA designation for the listed hazardous waste described as solvent waste that contains any combination of one or more of applicable (from a non-specific source) solvents. The types of materials that may be encountered include petroleum and chlorinated hydrocarbons.

LHAAP has TNRCC waste codes already assigned for most of the waste streams generated on the site, however, LHAAP will electronically register or set up a one time shipment waste code for any additional streams that may be encountered.

Table 1-1
Identification and Preliminary Classification of Waste Streams

Waste Stream Name	Process Generating Waste Stream	Testing Requirements	Regulatory Restrictions	Preliminary Characterization[1]
Process Liquids	Removal of Sump Contents; Decontamination of contact scrap, debris and equipment	See CDAP- "Appendix D"	RCRA Waste	RCRA Hazardous
Process Sludges	Removal of Sump Contents; Sump Closure Activities	See CDAP- "Appendix D"	RCRA Waste	RCRA Hazardous
Process Sand	Removal of Sump Contents; Sump Closure Activities	See CDAP- "Appendix D"	RCRA Waste	RCRA Hazardous
Closure Derived Soils	Removal of Sump; Sump Closure Activities	See CDAP- "Appendix D"	RCRA Waste	RCRA Hazardous
Closure Derived Concrete	Demolition of Sumps	See CDAP- "Appendix D"	RCRA Waste	RCRA Hazardous
Closure Derived Contaminated PPE & Debris	Sump Closure Activities	See CDAP- "Appendix D"	RCRA Waste	RCRA Hazardous

[1] Unless otherwise determined using sample analysis data.

1.2 Anticipated Waste Quantities

This Site Waste Management Plan's list of anticipated waste streams and quantities is based on the OHM Final Proposal dated March 1996 and encompasses the estimated waste quantities expected to be generated from the 85 sumps.

- **Sump Sludge** - 3400 cu. ft. or 125 cu. yd.
  -assumes all sump sludge will be hazardous
  -assumes an average sludge depth of 1 foot in all sumps except those that have previously been backfilled with sand
- **Sump Liquids** - 50,500 gal.
  -assumes all liquids will be hazardous
  -assumes an average liquid depth of 2 feet in all sumps except those that have previously been backfilled with sand
- **Sand** - 1125 cu. ft. or 40 cu. yd.
  -assumes that all sand will be removed and 25% will test hazardous
- **Concrete** - 4050 cu. ft. or 150 cu. yd.
  -assumes that 50% will test hazardous and require demolition
- **Soil** - 10,200 cu.ft. or 380 cu. yd
  -assumes 1 foot of soil will be incidentally removed from sides and bottom of sump during removal of 50% of the sumps

All quantities indicated above are estimated waste quantities that were provided by USACE in the Scope of Work for this Delivery Order, dated 17 January , 1996.

1.3 Disposal Methods

Waste streams shown above in Table 1-1 will be handled in a manner that is in compliance with applicable regulatory standards and in accordance with the Closure Plan for Wastewater Sumps- May, 1995. All waste will be determined to be listed hazardous or characteristically hazardous per 40 CFR 261. If the waste is determined to be non-hazardous per 40 CFR 261, then the contaminants will be compared to 30 TAC 335 Appendix 1, Table 1 limits of Subchapter R, to determine the correct non-hazardous waste classification. It is anticipated that wastes will be disposed of according to the following:

Liquids- Hazardous wastewater will be transferred off-site to a permitted treatment facility for deep well injection. Non-hazardous wastewater will be transferred to the on-site Pilot Wastewater Treatment Plant.

Sludge- Any sludge remaining in the sumps will be removed, containerized, labeled, and transported to a permitted Hazardous Waste Storage Area until disposal at an off-site permitted incinerator.

Sand- Any sand testing non-hazardous will be removed from the sump and stockpiled for fill material. If the sand tests hazardous it will be containerized and transported to a permitted Hazardous Waste Storage Area until disposal at a RCRA Class C Landfill (it is assumed the material will meet Universal Treatment Standards (UTS) and not require any additional treatment).

Concrete- *(Scenario #1)* Hazardous concrete debris with contaminant concentrations greater than risk reduction standard #2 will be containerized in rolloffs and sent to a permitted facility for treatment to LDR standards for the contaminant subject to treatment for disposal at a RCRA Class C Landfill (it is assumed that the material will meet UTS and not require any additional treatment). *(Scenario #2)* Concrete debris that meets Risk Reduction Standard #2 will be closed in place and backfilled with sand (pending approval from TNRCC on this proposed method).

Soils- Contaminated soils from sump demolition that are classified as hazardous, will go off-site to a permitted RCRA Class C Landfill.

LHAAP will only use disposal facilities that have been audited and included on the Thiokol approved vendor list. **Table 1-2** below lists potential disposal facilities that are approved to perform final management of these waste streams. Final designation of the approved off-site disposal facilities will occur after competitive procurement of qualified and approved facilities.

Table 1-2
Approved Offsite Disposal Facility Options

Disposal Facility Name	Facility USEPA ID#	Disposal Method
Ensco Corporation	ARD069748192	Incineration
Rineco	ARD981057870	Fuel Blender
Gibraltor	TXD000742304	Deep Well Injection
CWM	LAD000777201	Landfill

2.0 OVERVIEW OF REGULATORY REQUIREMENTS

Hazardous material (includes hazardous waste) generated on-site that is offered for shipment over a public highway will be packaged and labeled in accordance with applicable Department of Transportation (DOT) regulations pertaining to packaging under 49 CFR Parts 172, 173 and 177; and pursuant to 40 CFR 262 Subpart C- Pre-Transport Requirements. Wastes will be containerized and managed pursuant to 40 CFR 264, Subpart I- Use and Management of Containers. The regulations cited above are further described as follows:

49 CFR Part 172 contains most of the critical information needed to safely prepare and ship materials and includes the Hazardous Materials Table.

49 CFR Part 173 contains general requirements for shipments and packagings and includes definitions of hazardous materials classes, packaging standards, and inspection, testing, and re-testing requirements.

49 CFR Part 177	this part is modal-specific and offers important information specific to transporting by highway.
40 CFR Part 262	contains pre-transportation requirements and refers to above Subpart C DOT regulations.
40 CFR Part 264	contains requirements for use and management of containers; such Subpart I as, condition of containers, compatibility of waste with containers, container management, and containment systems for container storage areas.

Unless permitted otherwise, the storage time for hazardous wastes will be less than 90 days from the time of containerization [40 CFR 262.34, Accumulation Time]. All wastes will immediately be containerized upon generation and containers will be labeled. Analytical data from the sampling of each waste stream, within each sump, will be used to characterize the associated waste as hazardous or non-hazardous.

3.0 WASTE MANAGEMENT REQUIREMENTS

3.1 Packaging

Sludges will be containerized in 30-gallon "poly-paks" and any free liquids controlled with the addition of a proper absorbent material, such as Slik Wik. The drummed sludges will be labeled and moved to a central temporary storage and loadout area where they will palletized for off-site treatment and disposal. The drums will be labeled with the assigned location and waste profile number. Liquid closure derived wastes such as decontamination fluids will be placed into a separate container to wait final disposition. Solid waste such as PPE and miscellaneous debris (i.e., contaminated rags/towels, brushes, rope, plastic tubing, etc.) will be placed in 1A2 removable head drums with lockable rings. Covered rolloff boxes will be used to contain concrete debris, soils and sand. Liquid process wastes will be transferred (pumped) to 6,500-gallon bulk storage tanks at which time they will be segregated into various waste profiling groups (i.e., K-Waste, F-Waste, cyanide, and decon wastes) to await proper disposal.

Drums of liquid wastes will have sufficient outage (head space) to allow for any expansion which could damage them.

3.2 Marking/Labeling

In the interim period between waste generation and subsequent disposal decision, containers will have a USACE-provided "Analysis Pending" (as applicable) sticker shown in Attachment A. After waste characterization is determined, the containers will be marked and labeled accordingly as hazardous or non-hazardous waste with the appropriate markings and labels (See Attachment A).

Hazardous waste containers that are offered for transport over public highways will be marked (markings placed on hazardous waste sticker) with the following information:

- Proper shipping name
- UN identification
- Technical name for n.o.s. descriptions
- Consignee's or consignor's name and address
- RQ and CERCLA constituent (from Appendix A to Hazardous Materials Table)
- Accumulation start date
- Orientation arrow, for liquids

Drums containing hazardous waste that will not be offered for shipment over public highways will be marked, at a minimum, with the applicable EPA waste code, accumulation start date, and a description of their contents.

Drums that contain non-hazardous waste will have a non-hazardous sticker attached that indicates its contents.

Only those containers that are offered for shipment over public highways will have an appropriate label affixed which indicates the applicable hazard class.

3.3 Container Management and Inventory

All waste containers will be handled and stored in a manner which prevents damage and the spill or release of waste. A hazardous waste container will be closed during storage except when it is necessary to add or remove waste. Container storage areas for hazardous waste must have an adequate containment system that is designed to contain leaks, spills, and accumulated precipitation until the collected material is detected and removed. The containment system must have sufficient capacity to contain 10% of the volume of containers or the volume of the largest container, whichever is greater. Containers that do not contain free liquids and do not contain ignitable or reactive wastes will not be considered in the above determination granted the storage area is sloped or is otherwise designed and operated to drain and remove liquid resulting from precipitation, or the containers are elevated (the use of pallets will suffice) or are otherwise protected from contact with accumulated liquid.

All containers will be assigned a sequential number starting with "001". A written inventory (tracking log) will be maintained for all containers containing waste. The inventory log will be kept up to date and will contain the following information (see Attachment A):

- Container number
- Container type (i.e., tank, drum, etc.)
- Date filled
- Container contents
- Source of waste (i.e., sump, well, decon water, etc.)
- Analytical sample number(s) associated with contained waste
- Storage location
- Container condition

Before loading drums onto a transport vehicle for transfer to the storage area, a drum labeling checklist will be completed (See Attachment A).

3.4 Inspections

At least weekly, OHM will inspect areas where containers are stored, looking for any leaking or deterioration of containers and containment system caused by corrosion, erosion, or other factors (See Attachment A). Any detected spills, leaks, or adverse damage to containers will be reported to USACE point of contact and measures will be taken immediately to contain releases and transfer waste from damaged containers to containers in good condition.

3.5 Containing/Collecting Spills

The initial response to any spill or release will be to protect human health and safety, and then the environment. Identification, containment, treatment, and disposal assessment will be the secondary response.

If a spill of a hazardous waste is not contained within a containment system, an area of isolation will be established around the spill. The size of the area will generally depend on the size of the spill and the materials involved. Small spills (less than or equal to 55 gallons) will require evacuation of at least 50 feet in all directions to allow cleanup and repair and to prevent exposure. Only those persons involved in overseeing or performing emergency operations will be allowed within the designated hazard area.

As called for in regulations developed under CERCLA, OHM's practice is to report a spill of a pound or more of any hazardous material for which a reportable quantity has not been established and which is listed under the Solid Waste Disposal Act, Clean Air Act, Clean Water Act, or Toxic Substances Control Act. OHM also follows the same practice for any substances not listed in the Acts noted above but which can be classified as a hazardous waste under RCRA.

Clean-up personnel will take the following measures:

- Ensure all unnecessary persons are removed from the hazard area
- Put on protective clothing and equipment
- If a flammable material is involved, remove all ignition sources and use spark- and explosion- proof equipment for recovery of material
- Remove all surrounding materials that could be especially reactive with materials in the waste. Determine the major components in the waste at the time of the spill
- If wastes reach a storm sewer, try to dam the outfall by using sand, earth, sandbags, etc. If this is done, pump this material out into a temporary holding tank or drums as soon as possible
- Place all small quantities of recovered liquid wastes (55 gallons or less) and contaminated soil into drums for directive from USACE as to the appropriate disposal method
- If volatile emissions may occur during the spill, spray the spill area with foam or other suppressant
- Apply appropriate spill control media (i.e., clay, sand, lime, etc.) to absorb any spilled liquids
- For large spills, establish diking around leading edge of spill using booms, sand, clay, or other appropriate material

Refer to the Site Safety and Health Plan for a listing of required emergency equipment and safety air monitoring requirements (performed by the PSSO).

3.6 Shipping Papers

For all hazardous material shipments over public highways, a properly completed Uniform Hazardous Waste Manifest will be prepared. In addition, only qualified transporters and drivers shall be used to transport hazardous materials. A qualified transporter and driver is one that has been registered with the EPA and has been assigned a Texas Registration Number.

The project T&D Coordinator, or designee, will prepare waste profile documents in accordance with disposal facility requirements describing the following information for each waste stream:

- Generator name, mailing address, site address, USEPA ID number, and telephone number
- Process generating waste
- Waste stream physical and chemical characteristics
- USEPA characterization, and United States Department of Transportation (USDOT) classification
- Estimated quantities and shipping frequency

The project T&D Coordinator, or designee, will provide the appropriate supporting analytical data results and site specific historical information as attachment to the waste profile documents. The project T&D Coordinator, or designee, will also prepare land disposal restriction forms (LDR) in accordance with 40 CFR 268 describing the following information for each waste stream:

- Generator name, mailing address, site address, USEPA ID number, and telephone number
- USEPA classification
- Treatment standards

The project T&D Coordinator, or designee, will prepare draft uniform hazardous waste manifests describing the following information for each waste stream, if necessary:

- Generator name, mailing address, site address, USEPA ID number, telephone number
- Transporters names, USEPA ID numbers, and emergency telephone number
- Disposal facility name, USEPA ID number, and emergency telephone number
- Estimated quantities and units
- Emergency response guidebook numbers and emergency response telephone number

The project T&D Coordinator, or designee, will submit these profile documents, land disposal restriction documents, and manifest documents via USACE representative to LHAAP for review and approval. The project T&D Coordinator, or designee will revise and resubmit any forms rejected by LHAAP. The project T&D Coordinator, or designee, will then submit approved and generator signed profile and land disposal restriction documents to the disposal facilities. The T&D Coordinator, or designee, will also include as attachment, copies of LHAAP approved manifests.

Completed shipping paperwork will be provided to USACE QAR 24 hours in advance of any shipment. OHM will schedule waste removal and transportation to satisfy the project schedule and maximum accumulation time requirements.

4.0 INSPECTION AND LOADING OF TRANSPORTER VEHICLES

The project T&D Coordinator, or designee, will inspect transporter containers and vehicles, and confirm their adequate structural integrity and regulatory compliance, to minimize liability to LHAAP and OHM.

The project T&D Coordinator, or designee, will inspect transporter containers and vehicles for the following items to insure structural integrity:

- Previous contamination
- Holes or cracks on floors or walls
- Holes or cracks in liners or tarps
- Excessive oxidation
- Cargo securement devices

The project T&D Coordinator, or designee, will inspect transporter containers and vehicles for the following items to insure regulatory compliance:

- Commercial driver's license(s) with proper HAZMAT endorsements
- Vehicle registration and insurance
- Driver's HAZWOPER training
- Driver's log book
- Applicable placards
- Contingency plan
- Emergency response guidebook
- Fire extinguisher

OHM will load wastes into inspected and approved transporter containers and vehicles after insuring the proper packaging, labeling and placarding (if necessary) of the waste is in accordance with 40 CFR and 49 CFR.

4.1 Acquisition and Submittal of Certificates of Disposal or Treatment

Certificates of disposal or certificates of treatment for all manifests prepared for waste streams removed from this site will be acquired by the project T&D Coordinator, or designee and submitted to LHAAP.

017752

ATTACHMENT A

#17753

ATTACHMENT A

OHM Corporation

DRUM INVENTORY LOG

DRUM NO. _____

PROJECT NUMBER 017754

PAGE _____ OF _____

PROJECT LOCATION _____ LOGGER _____ DATE _____

PROJECT CONTACT _____ SAMPLER _____ TIME _____

PHONE _____ WEATHER _____

DRUM TYPE: FIBER ☐ POLY-LINED ☐ STEEL ☐ POLY ☐ STAINLESS STEEL ☐ NICKEL ☐

LID TYPE: RINGTOP ☐ CLOSED TOP ☐

DRUM CONDITION: MEET DOT SPEC. ☐ GOOD ☐ FAIR ☐ POOR ☐

DRUM SIZE: 110 ☐ 85 ☐ 55 ☐ 42 ☐ 30 ☐ 16 ☐ 10 ☐ 5 ☐ OTHER ___

DRUM CONTENTS: VOLUME FULL ☐ 3/4 ☐ 1/2 ☐ 1/4 ☐ <1/4 ☐ MT ☐

OVERPACKED: NO ☐ YES ☐ Overpack Type: FIBER ☐ STEEL ☐ POLY ☐

OVERPACK CONDITION: MEET DOT SPEC. ☐ GOOD ☐ FAIR ☐ POOR ☐

	PHYS. STATE				COLOR	CLARITY			LAYER THICKNESS	
LAYERS	LIQUID	SOLID	GEL	SLUDGE	USE STD COLORS	CLEAR	CLOUDY	OPAQUE	EST. IN.	EST. GALL.
T										
M										
B										

FIELD ANALYSIS

pH _____ SU PID _____ ppm

DOSIMETER _____

OTHER _____

SOLVENTS USED IN SAMPLING _____

DRUM LABELS/MARKINGS

DOT HAZ _____ UN/NA _____

MFG NAME _____

CHEMICAL NAME _____

ADDITIONAL INFORMATION _____

LABORATORY COMPATIBILITY DATA

☐ MARK IF PHYSICAL STATE AND COLOR MATCHES THE ABOVE INFORMATION. IF NOT, STOP ANALYSIS AND NOTIFY PROJECT CONTACT. FURTHER WORK WILL NOT BE PAID FOR.

COMPATIBILITY CAT: _____

ANALYSTS: _____

DATE PERFORMED: _____

RADIATION: POS ☐ NEG ☐ ____ MREM/HR

	PHYS. STATE				COLOR	CLARITY			WATER SOL.	REACT	pH	HEX. SOL	PER	OXID	CN	SUL	BIEL-STEIN	FLASH POINT	PCBs (25ppm)	LAYER CLASS
LAYERS	LIQUID	SOLID	GEL	SLUDGE	USE STD COLORS	CLEAR	CLOUDY	OPAQUE	SOLUBILITY SPSI DENSITY H OR L	A=AIR W=WATER	STD. UNIT	S OR I	+ OR −	+ OR −	+ OR −	+ OR −	+ OR −	<60°C + OR −	+ OR −	
T																				
M																				
B																				

COMMENTS: _____

PCB CONC. _____ PPM FLASH POINT _____ °C COMPATIBILITY COMP. BULK # _____

DATA REVIEWER: _____ DATA REVIEW DATE: _____

FIELD REVIEWER: _____ FIELD REVIEW DATE: _____

TRANSFER NUMBER	TRANSFERS RELINQUISHED BY	TRANSFERS ACCEPTED BY	DATE	TIME
1				
2				
3				

017755

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Waste Disposal Activities Checklist

Job Name: _____ **No.** _____
Waste Name: _____
Profile Number: _____
Work Order: _____

Waste Type:
[ ] Dry Solid
[ ] Wet Solid/ Sludge
[ ] Liquid
[ ] Other (specify)_____

Shipment Form:
[ ] Drums (size/type)_____
[ ] Tankers
[ ] Dump Trailers
[ ] Rolloffs
[ ] Other (specify)_____

Estimated Quantity: _____
Number of Loads: _____

Disposal Facility: _____
Address: _____
_____
_____
Phone: _____
EPA ID#: _____
Contacts: _____
_____

Transporter: _____
Phone: _____
EPA ID#: _____
Contacts: _____
_____

See attached pages for:
- Checklists
- Drum labeling instructions (if applicable)
- Example manifests & LDR forms
- Drum or container lists
- Shipping tracking forms
- Special instructions

The site supervisor should review this material and the attached pages prior to performing work.

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Waste Disposal Activities Checklist

Notifications, Forms, Manifests and other Shipping Papers Checklist

Checklist of forms, notifications, manifests, and other paperwork associated with various federal, state and facility requirements and regulations. These items will be started by the T&D Coordinator, or designee, but the site supervisor should review each for completion and inclusion with the shipment.

	Checked Off On
[ ] Determine if special state manifests are required (AL, AR, LA, SC, and TX in the south)	___/___/___
[ ] Verify current manifests are being used? Get current ones if not	___/___/___
[ ] Land Disposal Restriction notification(s)	___/___/___
[ ] Facility LDR form required [ ]YES [ ] NO	
[ ] State LDR form required [ ] YES [ ] NO	
[ ] Current forms available and attached?	
[ ] Background information and data to complete form(s) in place?	
[ ] Forms completed and reviewed for accuracy	
[ ] Forms signed by OSC/Client?	
[ ] Forms included with material to be sent with shipment (i.e. manifest)	

[ ] Verify information or examples for manifests and labels is compiled and attached	___/___/___
[ ] Prepare manifests and LDR forms, and have them checked for accuracy (The disposal facility will review and verify the accuracy and completeness of these forms.-- SEND THEM ADVANCED COPIES!)	___/___/___
[ ] Prepare drum labels, hazard class labels, and compile list of drum markings required. Labeling instruction sheets attached?	___/___/___
[ ] Arrange for client/OSC signatures on manifests and LDR forms	___/___/___

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Waste Disposal Activities Checklist

Disposal Facility & Transporter Checklist

Activities conducted by the T&D Coordinator relating to scheduling and transporting waste to disposal facilities. These items will be started by the T&D Coordinator, or designee, but the site supervisor should review each for completion.

	Checked Off On
[ ] All approvals in place, or all facilities chosen?	___/___/___
[ ] Disposal windows lined up? Facilities have agreed to specific receipt date, or have agree to allow transporter to schedule material Spoke with:_____	___/___/___
[ ] Project management informed of final scheduling plans?	___/___/___
[ ] Client/OSC informed of final scheduling plans?	___/___/___
[ ] Field personnel informed of final scheduling plans?	___/___/___
[ ] Three bids obtained for all disposal facility?	___/___/___
[ ] Disposal 3-bid approval & signed by client?	___/___/___
[ ] PO Requisition for disposal completed and submitted?	___/___/___
[ ] Disposal vendor(s) given PO's?	___/___/___
[ ] Three bids obtained for all transportation?	___/___/___
[ ] Transportation 3-bid approved & signed by client?	___/___/___
[ ] PO Requisition for transportation completed and submitted?	___/___/___
[ ] Transportation vendor(s) given PO's?	___/___/___
[ ] Transporter(s) are clear on the following	___/___/___
[ ] Arrival times and dates	
[ ] Delivery times and dates	
[ ] Equipment required	
[ ] Types of trucks expected	
[ ] Directions to site	
[ ] Road and driving conditions at site	
[ ] Site contacts and phone numbers	
[ ] Subs are OK provided OHM informed	
[ ] Billing and contracting details	

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Waste Disposal Activities Checklist

Drum Checklist

The site supervisor should review each of these for completion before loading drums on the truck

	Checked Off On
[ ] Drums have been checked against inventory- there are no extra or missing drums?	___/___/___
[ ] Drums are in good shape--or they have been overpacked? [ ] No leaks [ ] No dents greater than silver dollar size [ ] No creases greater than six inches [ ] No lid, ring or bung damage [ ] No damage to the seams or chimes [ ] No waste on the outside of the drum [ ] No large discolored areas on the drum	___/___/___
[ ] ALL drums are numbered with the numbers on the top AND side?	___/___/___
[ ] ALL drums have a complete waste label- either a yellow & red hazardous waste label or a green non-hazardous label	___/___/___
[ ] Drums have hazard class labels (if required) on their tops AND sides?	___/___/___
[ ] Drums have approval numbers written on top AND side	___/___/___
[ ] Drums have the TSDF name written on the side?	___/___/___
[ ] If multiple trucks are used, an inventory record of which drums were loaded onto each truck is being made?	___/___/___

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Waste Disposal Activities Checklist

Drum Labeling Checklist

The site supervisor should review each of these for completion before loading drums on the truck

Checked Off On

[ ] Site supervisor has sufficient quantities of the appropriate drum labels? ___/___/___
- [ ] Hazardous Waste Labels (yellow and red)
- [ ] Non-hazardous labels (green)
- [ ] Hazard class labels (i.e. flammable liquid, etc.)
  (Which)_____
  _____

[ ] Site supervisor has completed drum labels or has reviewed drum labeling instructions? ___/___/___

[ ] Information on the drum labels is complete and matches the information on the manifest-- this particularly important to double check when more than one manifest or truck is being used. Manifest numbers and other information will vary from truck to truck and manifest to manifest. Drum labels must match the specific manifest and the specific truck they are loaded onto. ___/___/___
- [ ] Generator's name
- [ ] Generator's address
- [ ] Generator's EPA ID number
- [ ] DOT shipping name (Hazardous waste labels only)
- [ ] EPA waste codes (Hazardous waste labels only)
- [ ] Manifest number(s) (Hazardous waste labels only)
- [ ] Accumulation start date (Hazardous waste labels only)

OHM Remediation Services Corp.
A subsidiary of OHM Corporation

Waste Disposal Activities Checklist

Manifest Checklist

Activities conducted by the Site Supervisor relating to manifests, LDR forms and other pre-shipment paperwork.

	Where to look	Checked Off On
[ ] Site supervisor has sufficient quantities of the appropriate manifests?		___/___/___
[ ] Site supervisor has completed manifests or has reviewed manifest prepartion instructions?		___/___/___
[ ] Is a unique manifest number assigned to each manifest?	Section 1	___/___/___
[ ] Generator, Transporter, and Disposal facility information (including EPA ID numbers address, and phone numbers) complete and accurate- does it match sample manifests or manifest preparation instructions	Section3-9 & A-H	___/___/___
[ ] DOT description complete and accurate?	Section 11 lines a-d	___/___/___
[ ] Number of containers, quantities, units complete and accurate? Have the correct abbreviations been used?	Section 12-14 lines a-d	___/___/___
[ ] "Additional Description" section (including approval numbers and work order numbers) is complete and accurate	Section J	___/___/___
[ ] "Handling codes" section (including emergency response guidebook codes) is complete and accurate?	Section K	___/___/___
[ ] "Special Handling" section (including emergency phone number, and other special instructions) is complete and accurate	Section 15	___/___/___
[ ] Client has signed manifest?	Section 16	___/___/___
[ ] Transporter has signed manifest?	Section 17	___/___/___
[ ] OHM has retained last page or a copy of manifest for our records.		___/___/___

[ ] LDR form is complete and included with manifest?	___/___/___
[ ] LDR form has been signed by client?	___/___/___

017761

90-DAY WASTE ACCUMULATION LABELING INSTRUCTIONS

(These labels are required while drums are stored on site before transportation)

: EXAMPLE LABEL BELOW...
Note: Label layouts may differ

40 CFR 262.34 states that a generator may accumulate hazardous waste on-site for 90-days or less provided that:
(1) The waste is placed in containers and the generator complies with subpart I of 40 CFR 265
(2) The "Accumulation Start Date" is clearly marked on each container; and
(3) Each container is labeled clearly with the words "Hazardous Waste"

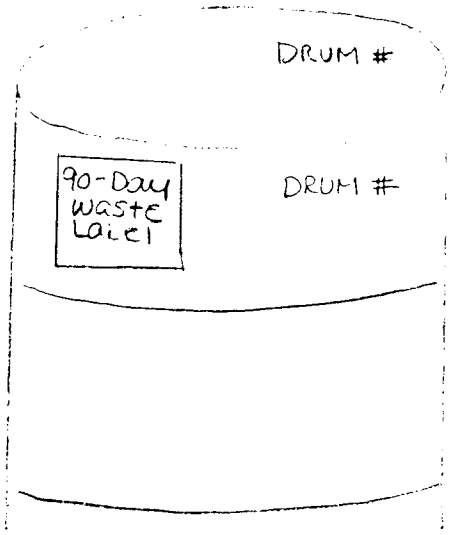
These labels comply with this rule and will be required on ALL drums OHM leaves on-site while conducting analysis and arranging disposal unless the drums are KNOWN to be non-regulated.

Drum numbers
for instructions:

_____
_____
_____
_____
_____
_____

.ments:

_____
_____
_____
_____
_____
_____



HAZARDOUS WASTE

ACCUMULATION
START DATE _____
CONTENTS _____

HANDLE WITH CARE!

CONTAINS HAZARDOUS OR TOXIC WASTES

HWAV Printed by Labelmaster, An American Labelmark Co., Chicago, IL 60646 (800) 621-5808

NON-HAZARDOUS WASTE DRUM LABELING INSTRUCTIONS

(These labels are required to transport waste drums)

te Group:_____

Profile Number:_____

SEE EXAMPLE LABEL BELOW....
NOTE: Label layouts may differ

Drums must be in good condition, this means:
-No leaks
-No dents greater than silver dollar size
-No creases greater than six inches
-No lid, ring or bung damage
-No damage to the seams or chimes
-No waste on outside of drum

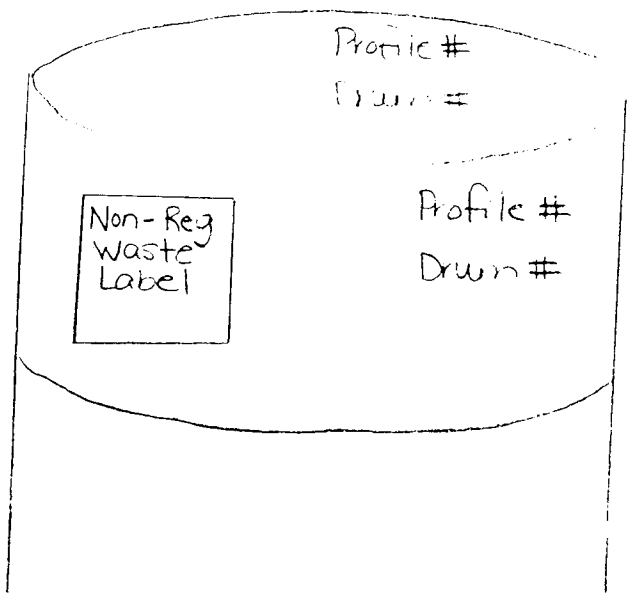
Drum Numbers for
these instructions:

_____
_____
_____
_____
_____
_____

Comments:

_____
_____
_____
_____
_____
_____

017762



NON-RCRA REGULATED WASTE

THIS WASTE NOT REGULATED BY THE U.S. ENVIRONMENTAL PROTECTION AGENCY 40CFR(RCRA) BUT MAY BE SUBJECT TO DEPT. OF TRANSPORTATION REGULATIONS, (49CFR) OR STATE OR LOCAL REGULATIONS.

GENERATOR INFORMATION:

SHIPPER _____

ADDRESS _____

CITY, STATE, ZIP _____

PROPER D.O.T. SHIPPING NAME _____

_____

UN OR NA NO. _____

PHONE: _____

NON-RCRA REGULATED WAST

BWMV REV.11-1-92 Printed by Labelmaster, An American Labelmark Co., Chicago, IL 60646 (800) 621-5808

017763

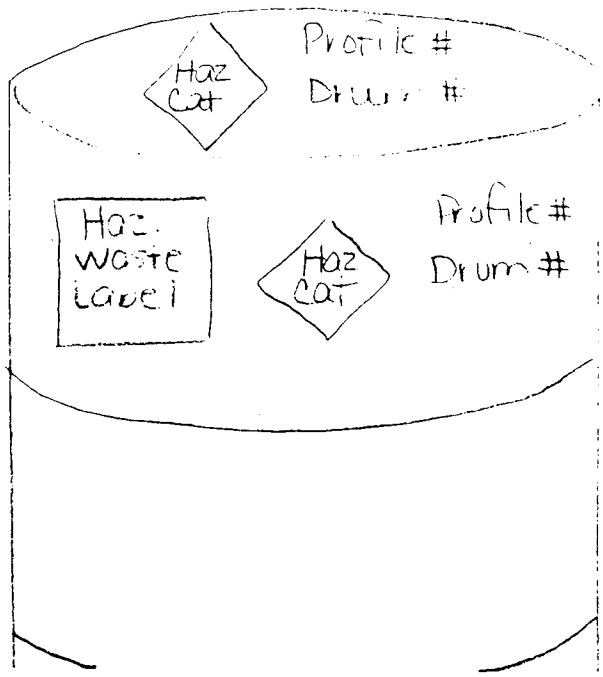
HAZARDOUS WASTE DRUM LABELING INSTRUCTIONS

(These labels are required to transport waste drums)

.ste Group:_____
Profile number:_____

Hazard Category (check all applicable)
[ ] Flammable liquids (Class 3)
[ ] Oxidizers (Class 5.1)
[ ] Poison (Class 6.1)
[ ] Corrosive (Class 8)
[ ] Miscellaneous (Class 9)
[ ] Other _____

SEE EXAMPLE LABEL BELOW...
Note: Label layouts may differ



Drums must be in good condition, this means:
-No leaks
-No dents greater than silver dollar size
-No creases greater than six inches
-No lid, ring or bung damage
-[illegible] damage to the seams or chimes
waste on outside of drum

Drum numbers for
these instructions:

_____
_____
_____
_____
_____
_____

Comments:

_____
_____
_____
_____
_____
_____

HAZARDOUS WASTE

FEDERAL LAW PROHIBITS IMPROPER DISPOSAL

IF FOUND, CONTACT THE NEAREST POLICE, OR PUBLIC SAFETY AUTHORITY, OR THE U.S. ENVIRONMENTAL PROTECTION AGENCY.

GENERATOR INFORMATION:

NAME _____

ADDRESS _____ PHONE _____

CITY _____ STATE _____ ZIP _____

EPA ID NO./ MANIFEST DOCUMENT NO. _____ / _____

ACCUMULATION START DATE _____ EPA WASTE NO. _____

_____
_____
_____

D.O.T. PROPER SHIPPING NAME AND UN OR NA NO. WITH PREFIX

HANDLE WITH CARE!

STYLE WM6

017764

Corps of Engineers Date:_____

ANALYSIS PENDING

Date Sampled:_____

Contractor:_____

Location:_____

Remarks:_____

_____

OHM Remediation Services Corp.

A subsidiary of OHM Corporation

Weekly Drum/Container Inspection Log

017765

Site Name:_____ OHM Job#_____

Project Manager:_____ Site Supervisor:_____

Site Phone:_____ Site Fax:_____

Generator/Client Name:_____ Contract #:_____

Site/Manifest Address:_____

_____

_____

Site EPA ID#:_____

Accumulation Start Date(s):_____

A weekly inspection is required by state and federal regulations for drums or containers of hazardous waste left at OHM job sites (40 CFR 265 Subpart I). If the answer to any question is YES, contact the project manager for instructions. Immediate attention will be required to fix the problem.

YES	NO	QUESTION
		Is there any evidence of leaking containers?
		Are there any containers which show signs of damage caused by corrosion, dents, creases or any other problem?
		Are there any containers which do not have properly secured lids and bungs?
		Are there any containers that are not labeled or that have labels which are not clearly visible?
		Are any accumulation dates on labels over 90 days?
		Are the drums stored more than 15 meters (50ft.) from the property line?
		Are the containers stored near a source of ignition? (i.e., open flames, cutting or welding, hot surfaces, frictional heating, or sparks)
		Are "No Smoking" signs, "Hazardous Waste" signs, or caution tape around the storage area missing or not clearly visible?
		Are containers of incompatible waste stored near each other or improperly segregated? (i.e., acids near cyanides, oxidizers near organics, or poisons near anything)

COMMENTS:_____

_____

_____

_____

Date Time Name Signature

017766

APPENDIX F

APPENDIX F

017767

CLOSURE PLAN

017768

CLOSURE PLAN

FOR

WASTEWATER SUMPS

MAY 1995

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

EPA IDENTIFICATION NO. TX6213820529
SOLID WASTE REGISTRATION NO. 30990

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017770

1.0 PURPOSE OF CLOSURE PLAN

The Texas Natural Resources Conservation Commission (TNRCC) alleged in a January 1992 Notice of Violation issued to the Longhorn Army Ammunition Plant (LHAAP) that the waste water collection sumps at the facility should be regulated as RCRA hazardous waste tanks. This allegation is based on the finding that the sumps at one time or another have received "F-listed" (EPA Hazardous Waste Classification) solvent wastes as part of the overall wastewater stream. The Notice of Violation specifically addressed the failure of these tanks to meet the double containment standard.

As an alternative to the development of such a program and the ongoing operation of the sumps as regulated hazardous waste tanks, LHAAP offered to perform an approved RCRA closure of the sumps at a meeting with the TNRCC on January 5, 1993. In addition, LHAAP assured the TNRCC that "listed" hazardous wastes would no longer be released to the sumps and that solvent usage would be reduced or eliminated wherever possible. This initiative has in fact been implemented, and "listed" hazardous waste is now drummed and disposed of as a hazardous waste in those situations where organic solvent usage is still critical to the operation.

017771

1.1 DESCRIPTION AND CLASSIFICATION OF WASTES MANAGED WITH PROCESS WASTEWATER SUMPS

Longhorn AAP manufacturing areas utilize sumps to collect manufacturing wastewater. These sumps were generally installed when the buildings were constructed. This dates some sumps to be fifty years old.

Manufacturing areas are always washed down with water to reduce propellant, explosives, and pyrotechnics(PEP) dusts which collect everywhere and are a safety hazard. Water de-activates ignition sensitive compositions. To dissolve difficult binders, chlorinated solvents were also utilized in the cleanup of manufacturing areas. These solvents and PEP compositions were washed into sumps with large volumes of water. Sumps collect a large volume of water and PEP sludge from building washdown

All sludge from wastewater treatment operations is listed as an EPA No K044 hazardous waste. The sludge in the bottom of the sumps is considered by LHAAP to be a K044 waste as well. This is not to imply that the sludge will only be disposed of as a K044 waste. Other hazardous waste codes and land disposal restrictions will apply to the sludge as necessary.

Sumps may have contained F-listed solvents. The F-listed designation stems from the historical discharge of hazardous waste such as methylene chloride and 1,1,1-trichloroethane into sumps. F-listed solvents are no longer discharged into process wastewater sumps. The K044 sludge and wastewater from sumps will carry the F001 land disposal restriction if analysis reveals detectable quantities of F-listed solvents.

017772

(section 1.1 continued)

All manufacturing area sumps will be screened for hazardous constituents. Sumps that are likely to contain unusual hazardous constituents will have additional analysis performed. Appendix IX lists analysis required for all sumps and for sumps requiring additional analysis.

Most of the sumps are of underground concrete construction that have a potential for release of waste materials into the environment because of the presence of structural joints. There is one metal aboveground sump in use. Appendix VIII lists waste sump characteristics.

2.0 CLOSURE PROCEDURE

The closure procedure to be implemented for the sumps at LHAAP consists of the following steps:

1. Sampling and analysis of sump contents;
2. Removal and containerization of sump contents;
3. Decontamination of sump surfaces;
4. Decontamination of Equipment;
5. Internal visual inspection of sump;
6. Determination of sump disposition;
7. Certification of closure actions;

2.1 SAMPLING AND ANALYSIS OF SUMP CONTENTS

LHAAP will collect one composite liquid sample and one composite sludge sample from each sump prior to any closure activities. If the sump has been "closed" in the past and filled with sand, one composite sample of sand will be collected for analysis. One sample of concrete will be obtained from the sump after the sump has been decontaminated.

(section 2.1 continued)
Two sumps (NOR No. 148 & 149) at building No 725 were filled with sand and capped with concrete. The concrete cap will be removed and sand will be sampled and analyzed as described further in the closure plan.

All samples will be collected, handled and analyzed in accordance with EPA SW-846 Test Methods for Evaluating Solid Waste Physical/Chemical Methods which satisfies the requirements of 40 CFR Part 261. Refer to flowchart for guidance on sampling procedure.

Liquid Sample - A vertical composite sample of the liquid in the sump will be obtained to ensure collection of any discrete strata. The liquid will be analyzed for total VOC's, semi-VOC's and total metals.

Sludge Sample - One composite grab sample of sludge will be obtained from a minimum of three random areas around the bottom of the sump. The sludge will be analyzed for total VOC's, semi-VOC's and total metals. Samples containing any metal at levels 20 times or greater than the EPA Toxicity Characteristic Leaching Procedure (TCLP) regulatory limit will be analyzed for that metal utilizing the TCLP, in accordance with 40 CFR 261 Appendix II.

Rinseate - Rinseate generated during the decontamination of the sump will be containerized and characterized as waste utilizing the same procedure as previously described for sump liquid samples

(section 2.1 continued)

Concrete Sample - One composite sample of concrete will be collected after the sump has been emptied and decontaminated. The concrete will be spalled from the bottom of the sump in two areas and from the side of the sump in one area with direction from the Hazardous Waste Corrective Action Section of the TNRCC. The concrete will be analyzed for total VOC's, semi-VOC's and total metals. Samples containing any metal at levels 20 times or greater than the EPA Toxicity Characteristic Leaching Procedure (TCLP) regulatory limit will be analyzed for that metal utilizing the TCLP, in accordance with 40 CFR 211 Appendix II.

Sand Sample - A sample of sand will be collected from sumps filled with sand. The sample will be obtained from the center bottom of the sump. The sand will be analyzed for total VOC's, semi-VOC's, and total metals. Samples containing any metal at levels 20 times or greater than the EPA TCLP regulatory limit will be analyzed for that metal utilizing the TCLP, in accordance with 40 CFR 261 Appendix II.

2.2 WASTES GENERATED DURING SUMP CLOSURE ACTIVITIES

All waste will be determined to be listed hazardous or characteristically hazardous per 40 CFR 261. If the waste is determined to be nonhazardous per 40 CFR 261, contaminants will be compared to 30 TAC 335 Appendix 1 Table 1 limits of Subchapter R, to determine the correct nonhazardous waste classification.

Longhorn has TNRCC waste codes for each of the waste streams listed below. If waste streams are generated that are not typical of previously generated waste, Longhorn AAP will either electronically register the waste stream or set up a one time shipment waste code.

CLOSURE GENERATED WASTE	DISPOSAL METHOD
Hazardous Wastewater	Deep Well Injection (offsite)
Hazardous/Contaminated Rinsewater	Deep Well Injection (offsite)
Hazardous Waste Sludge	Incineration (offsite)
Hazardous Debris	Landfill (offsite)
Hazardous Soil	Landfill (offsite)
Class 1 Non Hazardous Water	Pilot Wastewater Treatment Plant (onsite)

Shipments of waste offsite will use the Uniform Hazardous Waste Manifest. A Land Disposal Restriction Notification form will accompany each shipment of hazardous waste. Transporters of waste will be registered with the EPA and have a Texas registration number.

Longhorn AAP will only use waste disposal companies that are audited and on the Thiokol approved vendor list. Contracts are awarded according to Federal Acquisition Regulation (FAR). The following companies are approved vendors for the disposal of hazardous waste.

APPROVED VENDORS FOR DISPOSAL OF HAZARDOUS WASTE		
Ensco Corporation	Incinerator	EPA No. ARD069748192
Rineco	Fuel Blender	EPA No. ARD981057870
Gibraltor	Deep Well Injection	EPA No. TXD000742304
Chemical Waste Mgt.	Landfill	EPA No. LAD000777201

(section 2.2 continued)

Wastewater - Hazardous wastewater will be transferred offsite to a permitted treatment facility. Nonhazardous wastewater will be transferred to the onsite Pilot Wastewater Treatment Plant. Sumps will be covered and blocked to prevent further rainfall infiltration until decontamination can be accomplished.

Sludge - Any sludge remaining in the sumps will be removed at the direction of the LHAAP Safety Group. All sludge will be containerized, labeled, and transported to a permitted Hazardous Waste Storage area until disposal.

Sand - Any sand testing nonhazardous will be removed from the sump and stockpiled for fill material. If the sand tests hazardous it will be containerized and transported to a permitted Hazardous Waste Storage area until disposal.

Concrete Debris - Contaminated concrete debris or soil from sump demolition will be containerized in rolloffs for removal to an offsite landfill.

2.3 DECONTAMINATION OF SUMPS SURFACES

After removal of sump contents (sludge, water, or sand) has been completed, concrete surfaces will be air blasted with dry ice medium or equivalent technology (40 CFR 268.45, Table 1). Hazardous sludge or liquid generated from sump decontamination will be containerized and handled in the same manner as previously mentioned in section 2.2.

017777

2.4 EQUIPMENT DECONTAMINATION

All equipment used in the closure of the sumps will be decontaminated using a high pressure wash, or by another appropriate method. Any equipment that cannot be decontaminated will be disposed of at an authorized treatment, storage, or disposal (TSD) facility. All water used in the decontamination of the equipment will be collected, containerized, sampled, and if hazardous transferred to a permitted container storage area

2.5 INTERNAL VISUAL INSPECTION OF SUMP

All sumps will be visually inspected for structural soundness after decontamination. The inspection information will be provided to the state with the Closure Completion Report.

2.6 SUMP DISPOSITION

Non Hazardous - Only sumps which have been decontaminated to hazardous constituent levels of below detetection limits may be closed in place. Sumps determined to be nonhazardous will be closed in place by filling with sand.

Hazardous - Sumps determined to be hazardous will be removed. Concrete debris generated from sump removal will be sent to a permitted facility for treatment to Land Disposal Restriction (LDR) standards for the contaminant subject to treatment. Concrete meeting LDR standards will be disposed of in a Subtitle C landfill. The area from which the sump was removed will be filled with clean dirt.

017778

2.7 CERTIFICATION OF CLOSURE ACTIONS

All closure actions associated with this plan will be certified for compliance with this plan and all applicable state and federal regulations by an independent Professional Engineer registered in the State of Texas.. The certification will be in the form of a Closure Completion Report. In accordance with 40 CFR Part 265.115, this certification will be submitted to the TNRCC by registered mail. Included with this certification will be all analytical reports, chain-of-custody reports, and results of visual inspections, work done, and the final configuration of the subject units..

3.0 CLOSURE COST ESTIMATE

Pursuant to 40 CFR Part 265.140(c), federal facilities are exempt from the closure financial requirements. Therefore, LHAAP is not required to provide closure cost estimates.

4.0 NOTIFICATION OF CLOSURE ACTIVITIES

LHAAP is utilizing the submittal of this closure plan as notification to the TNRCC of closure activities associated with 125 process waste sumps. LHAAP will notify the TNRCC Region 5 office in writing 14 days prior to any sampling or before commencing closure, in order to allow TNRCC personnel the opportunity to observe the closure activities and split samples.

017779

5.0 CLOSURE SCHEDULE

The sumps to be closed are divided into three groups. Groups one and two will be closed first and closure will be completed within fifteen months from the approval of closure plan. Group three will be closed after groups one and two. Closure of group three will be completed within twenty-four months from the start date of December 1995 (CERCLA Funding Date). Appendix X provides milestones for accomplishment of sump closures.

Group 1 - Closure of 29 Active Sumps
Group 2 - Closure of 11 Transition/Recently Active Sumps
Group 3 - Closure of 85 Defense Environmental Restoration Act Sumps

This schedule does not account for delays which may be caused by force majeure, including without limitations, fires, floods, riots, strikes, or lack of funding. If any of the aforementioned circumstances occur, LHAAP will submit a written request to the TNRCC to extend the time allowed for closure, with the rationale substantiating that request.

017780

6.0 POST CLOSURE REQUIREMENTS

The CERCLA Installation Restoration Program will address releases from sumps in accordance with the Federal Facility Agreement between the U.S. Army, EPA, and the TNRCC. The following steps are required to address the corrective action.

Step 1 - Remedial investigation study with borings around the sump perimeter. A summary report titled Draft Final Phase I Investigations of 125 Process Waste Sumps dated February 16, 1994 is complete.

Step 2 - Remedial investigation study of groundwater zones around sumps. The field work is complete and a summary report titled Phase II Investigations of 125 Process Waste Sumps is scheduled for June 12, 1995.

Step 3 - Risk Assessment of 125 Process Waste Racks and Sumps, due 3 February 1996.

Step 4 - Remedial Investigation Report (RI), due 20 June 1996.

Step 5 - Feasibility Study Report

Step 6 - Proposed Plan

Step 7 - Record of Decision (ROD)

Step 8 - Remedial Design Work Plan

Step 9 - Remedial Design

Step 10 - Remedial Action Work Plan

Step 11 - Community Relations Plan

017781

APPENDIX I

HEALTH AND SAFETY PRECAUTIONS

All LHAAP and contractor personnel will abide by Thiokol and Army Safety Regulations. Contractors are briefed on these regulations prior to any work being accomplished.

A sample of sludge will be taken from each sump prior to removal activities. The sample will be analyzed for ignition sensitivity through electrostatic discharge (ESD), impact, and friction. Once the explosive characteristics of the sludge are determined, the LHAAP Safety group will monitor removal of sludge from sumps. The sludge will be treated offsite only if sensitivity tests determine that it is non reactive.

Prior to any entry into the sump LHAAP safety personnel will complete a confined space entry permit. Risk to entry personnel will be assessed. Level D protection will be worn by entry personnel at a minimum with additional protection added as required.

017782

APPENDIX II

SAMPLE CONTAINER, PRESERVATION & ANALYSIS REQUIREMENTS

PARAMETER	CONTAINER	PRESERVATIVE	MAXIMUM HOLDING TIME	EXTRACT
pH	1/2 pint glass	N/A	Immediate	
Metals	Plastic 1 liter	Cool 4° C Filter in field HNO_3 to pH<2	6 months (mercury = 28 days)	
(soil)	Plastic 1/2 liter	Cool 4° C	6 months	
Semi-volatiles				
(water)	Amber Glass 1 liter	Cool 4° C H_2SO_4 to pH<2	7 days	
(soil)	Glass 1/2 liter	Cool 4° C	14 days	
Volatiles				
(water)	Glass 40 ml glass	Cool 4° C No head space, air bubbles or agitation HCL to pH<2	7 days	
(soil)	Glass 1/2 liter	Cool 4° C	14 days	
Cyanide				
(water)	Plastic 1 liter	Cool 4° C NaOH to pH>12	14 days	
(soil)	Plastic 250 ml	Cool 4° C	14 days	
TPH				
(water)	Amber glass 1 liter	Cool 4° C HCL to pH<2	28 days	
(soil)	250 ml Plastic	Cool 4° C	28 days	
Organochlorine Pesticides/Herbicides				
(soil)	Glass 250ml	Cool 4° C	Extracted within 14 days Analyzed within 40 days	

NOTE: Sample containers for Volatiles have Fluorocarbon resin-lined caps.

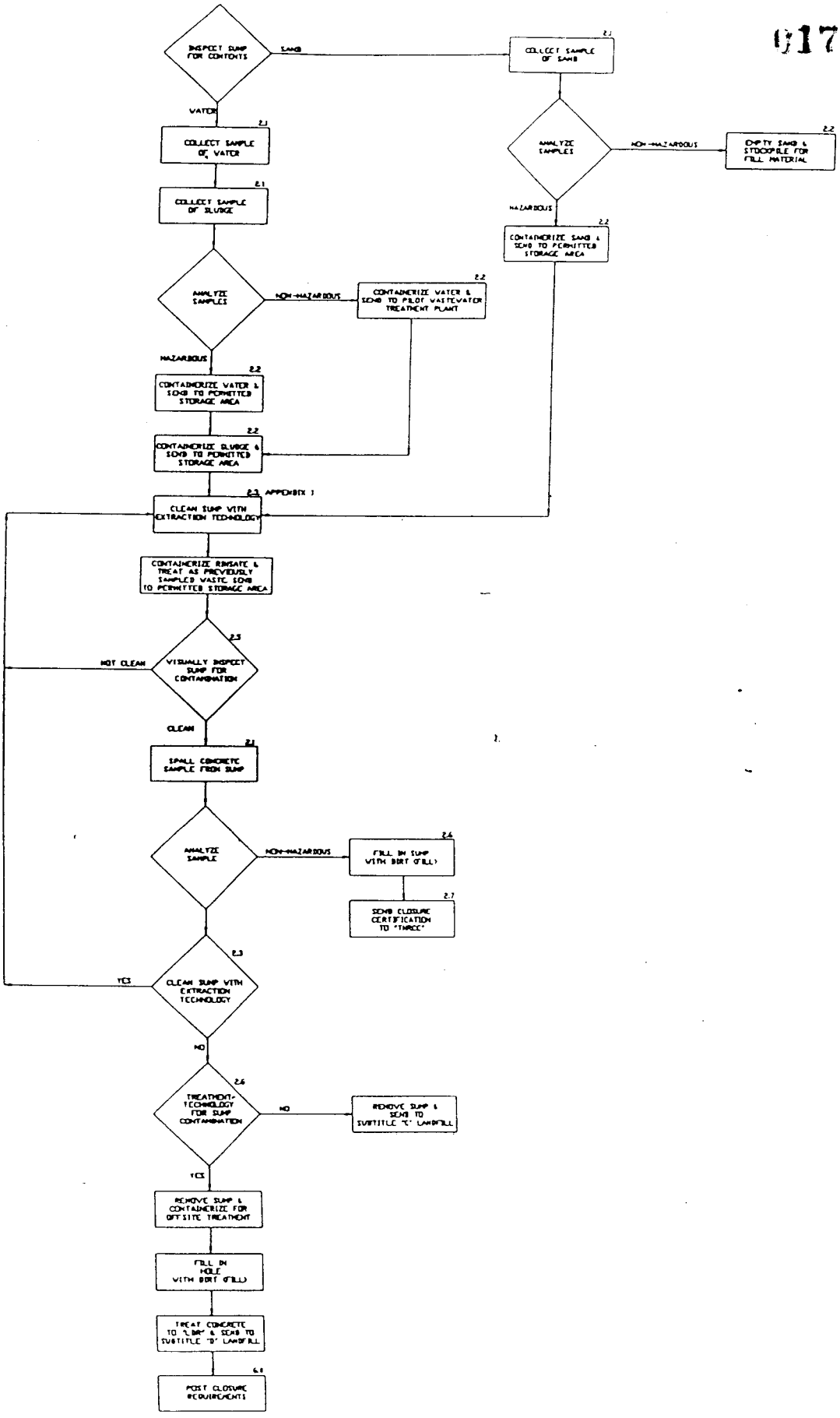
017783

APPENDIX II (continued)

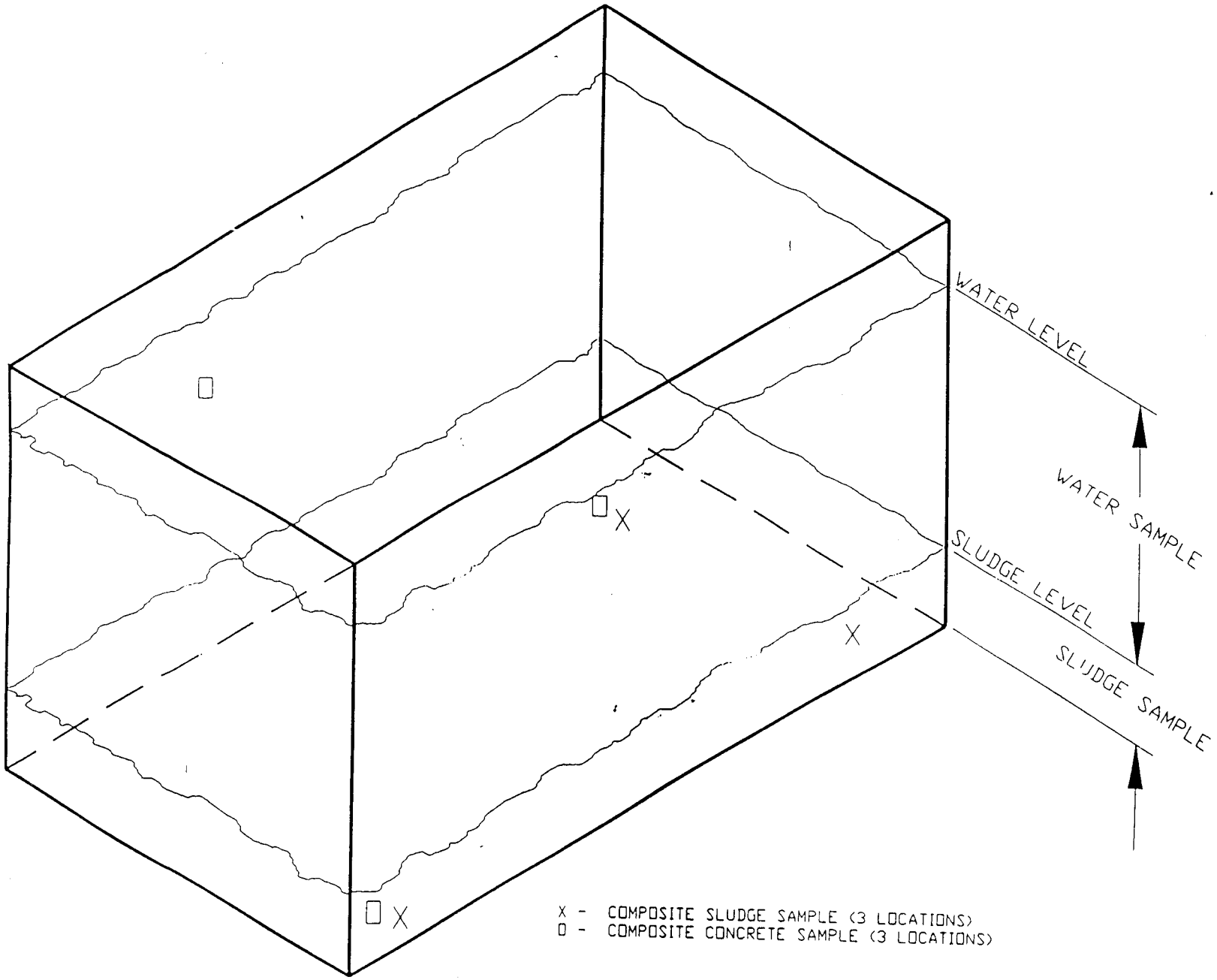
ANALYTICAL METHODS

PARAMETER	REQUIRED METHOD
Volatiles	EPA-8260A Gas Chromatographic/ Mass Spectroscopic Methods
Semi-volatiles	EPA-8270A Gas Chromatographic/ Mass Spectroscopic Methods
Metals Barium Chromium Silver Selenium	EPA-6010A Inductive Coupled Plasma Atomic Emission Spectroscopy
Cadmium	EPA-7131 (AA Furnace Technique)
Lead	EPA-7421 (AA Furnace Technique)
Mercury	(liquid) EPA-7470 Manual Cold Vapor Technique (solid) EPA-7471 Manual Cold Vapor Technique
Arsenic	EPA-6010 or 7060 Atomic Absorption Furnace
Cyanide	EPA-9010A Colorimetric Manual
TPH	EPA-418-1 (Modified for solid material)
Organochlorine Pesticides	EPA-8080A Organochlorine Pesticides by Gas Chromatography
Herbicides	EPA-8150B Chlorinated Herbicides by Gas Chromatography

APPENDIX III
SUMP CLOSURE PROCEDURE FLOW CHART



APPENDIX IV
GENERAL SAMPLING LOCATION POINTS FOR WASTEWATER SUMPS



017785

APPENDIX V

GROUP 1 (ACTIVE) SUMPS

017786

LHAAP SUMP ID #	ASSOCIATED BUILDING	TNRCC ID #
01	P-1	030
02	P-3	031
03	P-3	032
07	P-116	036
10	P-118	039
11	P-118	040
12	P-118	041
20	B-11	049
22	B-13	051
24	B-15	053
27	P-9	056
32	212-14	061
34	212-16	063
35	212-18	064
41	212-35	070
42	212-37	071
65	45-E	094
66	45-E	095
72	54-F	101
73	54-G	102
75	54-G	104
76	54-H	105
77	54-H	106
111	722-P	140
112	722-P	141
114	25-X	143
122	401-C	151
800	23T	153
NA	723	154

APPENDIX VI

GROUP 2 (TRANSITION) SUMPS

017787

LHAAP SUMP ID #	ASSOCIATED BUILDING	TNRCC ID #
38	212-33	067
40	212-33	069
44	25-C	073
45	25-C	074
47	25-D	076
48	26-E	077
51	26-E	080
53	29-D	082
55	31-G	084
61	42-H	090
70	50-G	099

APPENDIX VII

GROUP 3 (DERA) SUMPS

017788

LHAAP SUMP ID #	ASSOCIATED BUILDING	TNRCC ID #
4	P-3	033
5	P-3	034
6	P-116	035
8	P-117	037
9	P-117	038
13	P-118	042
14	B-5	043
15	B-7	044
16	B-7	045
17	B-9	046
18	B-9	047
19	B-10	048
21	B-12	050
23	B-14	052
25	B-16	054
26	SHED C	055
28	P-122	057
29	P-123	058
30	212-12	059
31	212-12	060
33	212-14	062
36	P-122	065
37	212-29	066
39	212-33	068
43	212-38	072
46	25-C	075
49	26-E	078
50	26-E	079
52	28-G	081
54	31-G	083
56	32-H	085

APPENDIX VII (continued)

GROUP 3 (DERA) SUMPS

017789

LHAAP SUMP ID #	ASSOCIATED BUILDING	TNRCC ID #
57	33-G	086
58	36-B	087
59	41-E	088
60	42-E	089
62	45-E	091
63	45-E	092
64	45-E	093
67	45-E	096
68	46-A	097
69	46-B	098
71	54-F	100
74	54-G	103
78	68-C	107
79	68-C	108
80	68-C	109
81	68-F	110
82	68-F	111
83	68-F	112
84	68-G	113
85	68-G	114
86	68-G	115
87	68-G	116
88	68-G	117
89	68-G	118
90	68-G	119
91	75-I	120
92	75-I	121
93	75-I	122
94	16-Y	123
95	34-Y	124
96	34-Y	125

APPENDIX VII (continued)

GROUP 3 (DERA) SUMPS

017790

LHAAP SUMP ID #	ASSOCIATED BUILDING	TNRCC ID #
97	38-Y	126
98	38-Y	127
99	38-Y	128
100	45-Y	129
101	45-Y	130
102	16-T	131
103	16-T	132
104	16-T	133
105	16-T	134
106	401	135
107	403	136
108	406	137
109	408	138
110	207	139
113	744	142
115	33-X	144
116	37-X	145
117	744-A	146
118	813	147
119	725	148
120	725	149
121	32-H	150
123	18-Y	152

DEPARTMENT OF THE ARMY
TULSA DISTRICT, CORPS OF ENGINEERS
POST OFFICE BOX 61
TULSA, OKLAHOMA 74121-0061

Copy: Adams
Brady Corgi
TERC FILE
DIST D 11

November 7, 1995

REPLY TO ATTENTION OF:
Contracting Division

Serial Letter No. CE-0020-64

Mr. John D. Ollsen
OHM Remediation Services Corporation
611 Lockhaven Avenue
Houston, TX 77073

017791

Dear Mr. Ollsen:

Reference Contract No. DACA56-94-D-0020, Total Environmental Restoration Contract (TERC) and Serial Letter No. CE-0020-62, dated October 31, 1995.

A revised Scope of Work, dated November 6, 1995, is enclosed for the Removal and Closure of Wastewater Sumps, Longhorn Army Ammunition Plant. A list of changes and additions to the previous version of the scope of work is also enclosed. Please incorporate the changes to the scope of work into your proposal.

As requested per the referenced letter, please forward your proposal for this work to Contracting Division by November 22, 1995.

If you have any questions, please contact me at telephone 918-669-7281.

Sincerely,

John M. Weatherly, Jr.
Contracting Officer

Enclosure

Revised Scope of Work for Removal and Closure of Wastewater Sumps
Longhorn Army Ammunition Plant

017792

06 November 1995

The following is a list of changes and additions to the previous version of the subject scope of work dated 31 October 1995.

1. Paragraph 3.2: Added requirement for 14-day notification to the Corps and LHAAP prior to removal of the sumps.

2. Paragraph 4.1: Assumptions were changed to require 100 percent removal and disposal of all 85 sumps, assumptions were refined as to the content of the sumps, assumptions were changed to require all material be classified as hazardous waste with off-site disposal, and including assumptions for removal of the piping and inlet channel structures.

3. Paragraph 4.2: Assumptions for soil removal were reduced to 1 foot overexcavation, with sump dimensions deferred to supporting GFI.

4. Paragraph 4.3: Assumptions for analytical parameters were expanded to remove limitations.

5. Paragraph 5: Added listing for GFI to include "Estimated Volumes for Sumps Removal Project".

REMOVAL AND CLOSURE OF WASTEWATER SUMPS, LONGHORN ARMY AMMUNITION PLANT, KARNACK, TEXAS

017793

SCOPE OF WORK

06 NOVEMBER 1995

1. GENERAL. The Contractor will furnish all services, materials, plant, labor, equipment, investigations, permits, supplies, superintendence, and travel, as required, in connection with the removal and closure of 85 DERA (Group 3) wastewater sumps, racks, associated structures or utilities and limited removal of contaminated soil encountered during removal of these structures. Groundwater monitoring will also be performed as a part of this delivery order. These sumps have been used in the past for collection of organic solvents, solvent laden water, and solvent contaminated sludge associated with past manufacturing processes at LHAAP.

2. BACKGROUND INFORMATION.

2.1 Project Location. Longhorn Army Ammunition Plant (LHAAP) 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 lands between State Highway 43 and the western shore of Caddo Lake. State Highways 43 and 134 access the installation. LHAAP is a "fence to fence" National Priorities List (NPL) site. A Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Section 120 Federal Facility Agreement was executed for the plant in 1991. In addition to the CERCLA requirements, Resource Conservation and Recovery Act (RCRA) closure requirements must be met for certain plant facilities as well. LHAAP has agreed to perform an approved RCRA closure of the sumps.

2.2 Site Description. The "site" includes all sumps associated with past and present plant operations. The project area covers a large portion of the northern half of the facility. Most of these are concentrated in the area referred to as the Plant Production Area which consists of 1,180 acres. Remedial Investigation of the sump areas and associated potential releases is on-going. A closure plan for the sumps has been presented by LHAAP to the Texas Natural Resource Conservation Commission and been approved. Investigations to date indicate that the sumps may be the source of metals and volatile organic compounds which have been released to soil and groundwater. A detailed inventory of all sumps has been performed and is included in the Administrative Record.

2.3 Project Description. The project consists of removal and closure of wastewater sumps and associated structures/equipment as described in the LHAAP, Closure Plan for Wastewater Sumps, May, 1995 (Closure Plan). Additionally, although not described in the scope, removal of a limited volume of contaminated soil adjacent/subjacent to the sumps may be required. The general requirements for each sump are:

1. Sampling and analysis of sump contents
2. Removal and containerization of sump contents
3. Decontamination of sump surfaces
4. Decontamination of Equipment
5. Internal visual inspection of sump
6. Determination of sump disposition
7. Certification of closure actions

In addition to sump removal activities, two rounds of groundwater sampling and analysis from approximately 70 sump groundwater monitoring wells will be conducted by the contractor.

3. TASK DESCRIPTION.

3.1 Work Plan. The contractor shall develop a draft and final Work Plan for the project based on the Closure Plan, contractor specific requirements, and additional tasks as defined above. The Work Plan will describe the methodology to perform the required removal and closure activities required by this delivery order. The Contractor will submit a Chemical Data Acquisition Plan (CDAP), Waste Management Plan (WMP), Site Safety and Health Plan (SSHP), and a Contractor Quality Control Plan (CQCP) which supplement the Work Plan. All submittals shall be approved by the Contracting Officer or his representative before any elements of the submittals are executed.

3.2 Sump Closure. The contractor shall execute the removal and closure of the sumps per the Closure Plan, Work Plans and other project requirements as identified above. This shall include preparation of appropriate documents for submission to the State of Texas as identified in the Closure Plan or otherwise required by law or regulation. Because the Closure Plan has been approved by the TNRCC, deviations from the procedures described within are not authorized unless first approved by the Contracting Officer or his representative. In addition, the contractor shall give notification to the Contracting Officer's representative and to LHAAP (Mr. David Tolbert) 14 days prior to scheduled removal of each sump.

3.3 Soil Removal. The contractor shall remove soil from around and beneath the sumps requiring removal as directed by the Government.

3.4 Groundwater Monitoring. The contractor shall conduct two rounds of groundwater sampling and analysis from approximately 70 sump groundwater monitoring wells will be conducted by the contractor.

4. ASSUMPTIONS FOR COST ESTIMATING PURPOSES.

4.1 Sump Closure. For cost proposal development purposes, the following assumptions should be used. Assume 85 sumps (identified as Group 3 DERA sumps on pages 19-21 of the Closure Plan) and associated equipment/structures will be closed. Of these 85, the contractor will assume that 100 percent will require removal and disposal per the requirements of the Closure Plan. Assume that approximately 58 of the sumps contain 1 foot of sludge and 2 feet of water and that approximately 27 are filled with sand. Assume that all material removed from the sumps will be classified as hazardous waste. Assume that incineration and disposal off site will be required for all hazardous waste. Assume all piping and/or concrete-lined inlet channels will be removed and disposed as hazardous waste and that the piping will be cut off flush with the exterior wall and grouted closed at each location.

4.2 Soil Removal. Additionally, assume that contaminated soil removal consisting of a 1 foot over excavation of the sump volume (see GFI for approximate sump dimensions) will be required. Assume that the soils will be classified as hazardous waste and incineration and offsite disposal of the soil will be required. No other remediation of soil or groundwater which may be required based on-going remedial investigation findings is addressed under this delivery order.

4.3 Groundwater Sampling. For groundwater sampling and analysis the Contractor will assume that 70 wells will be sampled once in January 1996 and again in June 1996. Average well depth is approximately 25 feet and depth to water is 10 feet. Analytical parameters shall include (but not be limited to) 15 RCRA metals, Volatile and Semi-Volatile organics (8240 and 8270), and High Explosives (8330). Additional analytical parameters may be included at a later date if required by TNRCC. Groundwater sampling activities will be conducted under a plantwide groundwater sampling CDAP, WMP, and SSHP that was developed under the Landfill Covers delivery order.

5. DELIVERABLES/SCHEDULES.

5.1 Project Plans. The contractor shall submit a project schedule from issuance of the initial Work Authorization Directive (WAD) to acceptance of work by the Contracting Officer. Work Plans and other required plans as identified above shall be submitted for approval before any field work commences.

5.2 Removal and Closure Activities. The contractor shall perform the removal and closure activities (including all related waste management and other associated functions) as outlined above and in the GFI.

5.3 Certification of Closure Actions. Required documentation and/or certifications as noted in the Closure Plan and supporting documentation will be provided by the contractor.

5.4 Cost/Schedule Reports. Biweekly cost/schedule reports shall be submitted to

CESWT-EC-FW upon approval of the initial WAD. The cost data shall be no more than 10 days old from the date of the cost report. The format and content of the reports shall be as mutually agreed by HTRW Resident office and OHM.

5.5 Project Schedule. Appendix 10 of the approved Closure Plan gives the relative regulatory schedule for accomplishment of the closure activities. The sumps are divided into three groups as noted in the Closure Plan. Section 5.0 of the Closure Plan gives the overall absolute schedule for completion of project activities and milestones for Group 1 and Group 2 sumps. Activities within this delivery order are specifically for the third group of 85 sumps. The contractor shall execute the removal and closure of the sumps within 12 months after the initial WAD. It is anticipated that a schedule of activities and milestones be developed for the Group 3 sumps similar to that done for Group 1 and Group 2 sumps.

DELIVERABLES SCHEDULE

Deliverable/Activity	Schedule	# of copies to HTRW Resident Office, Tulsa: ATTN: Mr. Clif Warren	# of copies to Eastern Area Office, ATTN: Mr. Jim Carter
Groundwater Sampling	Mobilize 16 January	NA	NA
Laboratory Data Package	30 days after completion of the collection of the last sample	Orig + 4	0
Data Validation Report	15 days after submittal of the Laboratory Data Package	Orig + 4	0
Draft Project Plans	30 days after approval of the 1st WAD	Orig + 18	2
Final Project Plans	21 days from receipt of Government comments to the Draft Project Plans	Orig + 18	2
Closure Activities	Complete 12 months from the approval of the 1st WAD	NA	NA
Certification of Closure Action	As defined in the approved Project Schedule	Orig + 18	2

Groundwater Sampling	Mobilize 17 June 1995	NA	NA
Laboratory Data Package	30 days after completion of the collection of the last sample	Orig + 4	0
Data Validation Report	15 days after submittal of the Laboratory Data Package	Orig + 4	0

5. GOVERNMENT FURNISHED INFORMATION.

- Map of sump locations
- LHAAP Closure Plan for Wastewater Sumps, May, 1995
- LHAAP Wastewater Sumps Inventory, Administrative Record
- Estimated Volumes for Sumps Removal Project

6. DELIVERY ORDER MANAGEMENT

(1) Government Points of Contact. Any questions concerning contract administration, billing, and payment should be directed to the COR for the delivery order, which will be Mr. Jim Carter, Eastern Area Office (318) 676-3365. Questions related to design or groundwater sampling should be directed to Mr. Randy Bratcher, HTRW Resident office (918) 669-7505. The Corps of Engineers project manager is Mr. Ken Kebbell @ (918) 669-7172.

(2) Distribution of Submittal. The distribution of the submittals shall be in accordance with the Delivery Schedule. All transmittal letters for the Work Plans shall be addressed to Mr. Jim Carter. All transmittal letters for other documents shall be addressed to Mr. Clif Warren. Addresses are as follows:

U.S. Army Corps of Engineers, Tulsa District
ATTN: HTRW Resident Office, Mr. Clif Warren
Post Office Box 61
Tulsa, OK 74121-0061

The street address is:

1645 South 101st E. Avenue
Tulsa, OK 74128-4629

Estimated Volumes for Sumps Removal Project at Longhorn Army Ammunition Plant

1. **Estimated Volume of Hazardous Sump Sludge: 3400 ft^3 (125 yd^3)**

   Assumes all sump sludge will be hazardous.

   Assumes an average sludge depth of 1 foot in all sumps EXCEPT those which have been backfilled with sand.

2. **Estimated Volume of Hazardous Sump Liquids: 50,500 gal.**

   Assumes all sump liquids will be hazardous.

   Assumes an average liquid depth of 2 foot in all sumps EXCEPT those which have been backfilled with sand.

3. **Estimated Volume of Hazardous Sand From Previously Backfilled Sumps: 4500 ft^3 (167 yd^3)**

   Assumes that all sand will be removed from the previously backfill sumps, and that the sand will test hazardous.

4. **Estimated Volume of Hazardous Concrete: 8200 ft^3 (300 yd^3)**

   Assumes that all of the concrete sumps will test hazardous and require removal.

   Assumes an average sump wall thickness of 6 inches for all sumps.

5. **Estimated Volume of Hazardous Soil Generated During Sump Removal: 25,350 ft^3 (950 yd^3)**

   Assumes 1 foot of soil will be incidentally removed from the sides and bottom of all sump excavations during removal of the concrete sumps.

6. **Estimated Volume of Fill Material Required: 49,850 ft^3 (1850 yd^3)**

   Assumes that all of the sumps will be removed and that 1 foot of soil will be incedentally excavated during removal of the concrete sumps.

017799

CESWT-EC-FW

22 November 1995

MEMORANDUM FOR See Distribution

SUBJECT: Longhorn Army Ammunition Plant, Sumps Project

1. Based on discussions with OHM and project management personnel here, revisions were made to the 06 November 1995 Scope of Work. A copy of the current scope (dated 20 November 1995) is enclosed.

2. Please contact Randy Bratcher or me at extension 7505 for additional information.

Kim Hunter

for RAMONA E. WAGNER
HTRW Resident Office

Encl

DISTRIBUTION:
CESWT-CT (Weatherly)
CESWT-CT-L (Moreno)
CESWT-PP-EA (Polk)
CESWT-EC-Cost (Rice)
CESWF-CD-EAO (Jim Carter)
CESWT-EC-FW (File)

OHM Remediation Services Corporation
Mr. Butch Alanis
611 Lockhaven Drive
Houston, TX 77073

REMOVAL AND CLOSURE OF WASTEWATER SUMPS,

LONGHORN ARMY AMMUNITION PLANT, KARNACK, TEXAS

SCOPE OF WORK

20 NOVEMBER 1995

1. GENERAL. The Contractor will furnish all services, materials, plant, labor, equipment, investigations, permits, supplies, superintendence, and travel, as required, in connection with the removal and closure of 85 DERA (Group 3) wastewater sumps, racks, associated structures or utilities and limited removal of contaminated soil encountered during removal of these structures. Groundwater monitoring will also be performed as a part of this delivery order. These sumps have been used in the past for collection of organic solvents, solvent laden water, and solvent contaminated sludge associated with past manufacturing processes at LHAAP.

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2.2 Site Description. The "site" includes all sumps associated with past and present plant operations. The project area covers a large portion of the northern half of the facility. Most of these are concentrated in the area referred to as the Plant Production Area which consists of 1,180 acres. Remedial Investigation of the sump areas and associated potential releases is on-going. A closure plan for the sumps has been presented by LHAAP to the Texas Natural Resource Conservation Commission and been approved. Investigations to date indicate that the sumps may be the source of metals and volatile organic compounds which have been released to soil and groundwater. A detailed inventory of all sumps has been performed and is included in the Administrative Record.

2.3 Project Description. The project consists of removal and closure of wastewater sumps and associated structures/equipment as described in the LHAAP, Closure Plan for Wastewater Sumps, May, 1995 (Closure Plan). Additionally, although not described in the scope, removal of a limited volume of contaminated soil adjacent/subjacent to the sumps may be required. The general requirements for each sump are:

1. Sampling and analysis of sump contents
2. Removal and containerization of sump contents
3. Decontamination of sump surfaces
4. Decontamination of Equipment
5. Internal visual inspection of sump
6. Determination of sump disposition
7. Certification of closure actions

In addition to sump removal activities, two rounds of groundwater sampling and analysis from approximately 70 sump groundwater monitoring wells will be conducted by the contractor.

3. TASK DESCRIPTION.

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4.1 Sump Closure. For cost proposal development purposes, the following assumptions should be used. Assume 85 sumps (identified as Group 3 DERA sumps on pages 19-21 of the Closure Plan) and associated equipment/structures will be closed. Of these 85, the contractor will assume that 100 percent will require removal and disposal per the requirements of the Closure Plan. Assume that approximately 58 of the sumps contain 1 foot of sludge and 2 feet of water and that approximately 27 are filled with sand. Assume that all material removed from the sumps will be classified as hazardous waste. Assume that all liquids will require off-site deep well injection, all sludges will require off-site incineration prior to disposal, and all remaining residue will require off-site disposal. Assume all piping and/or concrete-lined inlet channels will be removed and disposed off-site as hazardous waste and that the piping will be cut off flush with the exterior wall and grouted closed at each location.

4.2 Soil Removal. Additionally, assume that contaminated soil removal consisting of a 1 foot over excavation of the sump volume (see GFI for approximate sump dimensions) will be required. Assume that 30% of the soils will be classified as hazardous waste and off-site incineration and disposal of the soil will be required. The remaining 70% shall be assumed to be classified as hazardous waste but suitable for off-site disposal within the guidelines of the Land Disposal Restrictions without incineration. No other remediation of soil or groundwater which may be required based on-going remedial investigation findings is addressed under this delivery order.

4.3 Groundwater Sampling. For groundwater sampling and analysis the Contractor will assume that 70 wells will be sampled once in January 1996 and again in June 1996. Average well depth is approximately 25 feet and depth to water is 10 feet. Analytical parameters shall include (but not be limited to) 15 RCRA metals, Volatile and Semi-Volatile organics (8240 and 8270), and High Explosives (8330). Additional analytical parameters may be included at a later date if required by TNRCC. Groundwater sampling activities will be conducted under a plantwide groundwater sampling CDAP, WMP, and SSHP that was developed under the Landfill Covers delivery order.

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Data Validation Report	15 days after submittal of the Laboratory Data Package	Orig + 4	0
Draft Project Plans	30 days after approval of the 1st WAD	Orig + 18	2
Final Project Plans	21 days from receipt of Government comments to the Draft Project Plans	Orig + 18	2
Closure Activities	Complete 12 months from the approval of the 1st WAD	NA	NA

Certification of Closure Action	As defined in the approved Project Schedule	Orig + 18	2
Groundwater Sampling	Mobilize 17 July 1995	NA	NA
Laboratory Data Package	30 days after completion of the collection of the last sample	Orig + 4	0
Data Validation Report	15 days after submittal of the Laboratory Data Package	Orig + 4	0

5. GOVERNMENT FURNISHED INFORMATION.

- Map of sump locations
- LHAAP Closure Plan for Wastewater Sumps, May, 1995
- LHAAP Wastewater Sumps Inventory, Administrative Record
- Estimated Volumes for Sumps Removal Project

6. DELIVERY ORDER MANAGEMENT

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U.S. Army Corps of Engineers, Tulsa District
ATTN: HTRW Resident Office, Mr. Clif Warren
Post Office Box 61
Tulsa, OK 74121-0061

The street address is:

1645 South 101st E. Avenue
Tulsa, OK 74128-4629

The mailing and street address for the Eastern Area Office is:

U. S. Army Corps of Engineers, Ft. Worth District
ATTN: Eastern Area Office, Mr. Jim Carter
280 Miller Road
Bossier City, La 71112-2505

Estimated Volumes for Sumps Removal Project
Longhorn Army Ammunition Plant

SUMP ID#	INTERNAL SUMP VOLUME (FT^3)[1]	EXTERNAL SUMP VOLUME (FT^3)[2]	CONCRETE VOLUME (FT^3)[3]	SOIL EXCAVATION VOLUME (FT^3)[4]	SLUDGE VOLUME (FT^3)[5]	LIQUID VOLUME (GALLONS)[6]	SAND VOLUME (FT^3)[7]	COMMENTS
4	245.3	258.5	100.4	316.3	51.7	773.4		
5	169.9	206.8	85.5	278.5			170.0	
6	484.4	568.7	189.8	543.1	51.7	773.4		
8	390.6	431.3	138.2	408.3	86.3	1291.0		
9	473.9	563.5	169.8	485.5	80.5	1204.3		
13	390.6	465.3	160.0	467.5	51.7	773.4		
14	144.0	204.6	85.8	278.5			144.0	
15	213.4	258.5	100.4	316.3	51.7	773.4		
16	63.6	78.5	41.2	151.6	19.6	293.2		
17	96.0	117.5	59.5	212.6	47.0	703.1		
18	144.0	141.4	61.3	204.2			144.0	
19	197.3	261.3	101.2	318.3	52.3	782.4		
21	194.7	245.0	101.5	323.0	70.0	1047.2		
23	213.4	245.0	101.5	323.0	70.0	1047.2		
25	205.5	243.8	96.9	316.3	48.8	730.0		
26	212.0	252.7	95.6	303.2	72.2	1080.1		
28	50.0	54.3	31.7	124.9	18.1	270.8		
29	475.0	568.7	189.8	543.1	51.7	773.4		
30	71.5	68.7	36.9	139.2	22.9	342.6		
31	74.3	68.7	36.9	139.2	22.9	342.6		
33	21.7	58.1	34.3	133.3			21.7	
36	260.0*	295.0*	98.8*	305.0*	56.5*	845.2*		
37	44.1	43.6	27.5	113.5			44.1	

017806

SUMP ID#	INTERNAL SUMP VOLUME (FT^3)[1]	EXTERNAL SUMP VOLUME (FT^3)[2]	CONCRETE VOLUME (FT^3)[3]	SOIL EXCAVATION VOLUME (FT^3)[4]	SLUDGE VOLUME (FT^3)[5]	LIQUID VOLUME (GALLONS)[6]	SAND VOLUME (FT^3)[7]	COMMENTS
39								FILLED WITH CONCRETE
43	14.2	14.4	13.1	70.1	9.6	143.6		
46	260.0*	295.0*	98.8*	305.0*	56.5*	845.2*		
49	37.4	54.0	36.0	148.0	18.0	269.3		
50	130.6	160.0	74.4	251.2	40.0	598.4		
52	70.1	80.0	46.0	176.0			70.0	
54	130.7	162.8	75.3	253.8	32.6	487.7		
56	66.3	79.8	46.6	177.6	26.6	397.9		
57	419.9	495.0	152.8	444.1			420.0	
58								DRAIN PRESENT BUT SUMP GONE
59	352.0	385.0	140.2	420.1			352.0	
60	415.8	481.3	163.1	474.3	96.3	1440.6		
62	126.1	141.8	66.6	230.4			126.0	
63	126.1	142.5	67.3	232.5			126.0	
64	179.9	228.0	90.5	291.0			180.0	
67	126.1	162.0	72.0	244.0			126.0	
68	259.5	313.5	113.8	349.5	57.0	852.7		
69	183.4	220.8	90.5	292.2	40.1	599.9		
71	270.1	324.0	117.0	358.0	54.0	807.8		
74	67.0	83.2	46.0	174.7	27.7	414.4		
78	48.0	50.8	30.9	123.4	14.5	216.9		
79	51.6	50.8	30.9	123.4	14.5	216.9		
80	26.7	33.6	28.7	129.0	33.6	502.7		
81	1833.3	1980.0	398.0	1012.0	220.0	3291.2		
82	513.2	595.0	174.4	496.0	99.2	1484.0		

011280?

SUMP ID#	INTERNAL SUMP VOLUME (FT^3)[1]	EXTERNAL SUMP VOLUME (FT^3)[2]	CONCRETE VOLUME (FT^3)[3]	SOIL EXCAVATION VOLUME (FT^3)[4]	SLUDGE VOLUME (FT^3)[5]	LIQUID VOLUME (GALLONS)[6]	SAND VOLUME (FT^3)[7]	COMMENTS
83	731.3	842.9	226.4	620.0	99.2	1484.0		
84	26.7	45.0	41.5	135.0	30.0	448.8		
85	140.1	171.5	73.5	247.0			140.0	
86	1512.0	1617.0	328.3	850.2	231.0	3455.8		
87	59.0	75.0	42.5	165.0	30.0	448.8		
88	336.0	373.0	125.9	378.9	62.2	930.5		
89	336.0	373.0	125.9	378.9			336.0	
90	760.0	820.8	214.5	590.6	102.6	1534.9		
91	276.2	343.1	117.8	358.4	68.6	1026.3		
92	386.8	446.0	142.8	420.5	68.6	1026.3		
93	329.4	377.4	126.1	379.2	68.6	1026.3		
94	47.5	56.5	33.0	128.8			47.5	
95	268.2	317.6	112.5	345.8	57.8	864.7		
96	28.3	29.5	21.6	96.6			28.3	
97	83.4	86.6	43.8	158.3	21.6	323.1		
98	54.1	56.5	33.0	128.8			43.1	
99	21.3	21.5	17.0	82.4	10.8	161.6		
100	35.4	42.4	28.3	116.3			35.4	
101	88.4	95.0	46.5	165.2	23.8	356.0		
102	245.1	265.6	98.4	310.0			245.1	
103	320.1	346.0	117.7	357.7			320.0	
104	448.0	516.7	159.0	460.3			448.0	
105	294.0	346.0	117.7	357.7			294.0	
106	260.0*	295.0*	98.8*	305.0*	56.5*	845.2*		
107	39.7	39.3	25.5	166.5			39.7	
108	52.5	75.3	47.2	181.1			52.5	

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SUMP ID#	INTERNAL SUMP VOLUME (FT^3)[1]	EXTERNAL SUMP VOLUME (FT^3)[2]	CONCRETE VOLUME (FT^3)[3]	SOIL EXCAVATION VOLUME (FT^3)[4]	SLUDGE VOLUME (FT^3)[5]	LIQUID VOLUME (GALLONS)[6]	SAND VOLUME (FT^3)[7]	COMMENTS
109	82.5	93.0	51.9	192.9			82.5	
110	100.0	126.7	62.7	220.6	28.2	421.9		
113	36.9	38.5	26.8	113.3	9.6	143.6		
115	1239.7	1400.0	310.0	812.0	200.0	2992.0		
116	1197.1	1280.4	289.1	763.8	232.8	3482.7		
117	95.5	95.0*	98.8*	305.0*	28.3	423.4		
118	171.5	192.0	80.0	264.0	64.0	957.4		
119	159.4	196.1	83.1	273.0			159.0	SUMP FILLED WITH SAND AND CAPPED WITH CONCRETE
120	273.0	332.8	125.6	383.2			273.0	SUMP FILLED WITH SAND AND CAPPED WITH CONCRETE
121	321.8	322.0	98.8*	305.0*	56.5*	845.2*		
123	98.1	100.0	98.8*	305.0*	56.5*	845.2*		ABOVE GROUND TANK
TOTAL	21498.2	24483.4	8208.2	25342.7	3373.0	50460.1	4467.9	

* Information not available. Volumes presented are average values for all sumps.

[1] From Table 1, Waste Sump Inventory, Longhorn Army Ammunition Plant, April 1993.

[2] Calculated using the outside sump dimensions included in Table 1, Waste Sump Inventory, Longhorn Army Ammunition Plant, April 1993.

[3] Calculated using the outside sump dimensions included in Table 1, Waste Sump Inventory, Longhorn Army Ammunition Plant, April 1993. Assumes a 6-inch wall thickness for all sumps.

[4] Calculated using sump dimensions included in Table 1, Waste Sump Inventory, Longhorn Army Ammunition Plant, April 1993. Assumes that 2 foot of soil over excavation will occur during removal of all sumps.

[5] Calculated using sump dimensions included in Table 1, Waste Sump Inventory, Longhorn Army Ammunition Plant, April 1993. Assumes a sludge depth of 1 foot in all sumps. Sand filled sumps were not included.

[6] Calculated using sump dimensions included in Table 1, Waste Sump Inventory, Longhorn Army Ammunition Plant, April 1993. Assumes a liquid depth of 1 foot in all sumps. Sand filled sumps were not included.

[7] Calculated using sump volumes listed included in Table 1, Waste Sump Inventory, Longhorn Army Ammunition Plant, April 1993. Assumes the total internal volume of the sump is filled with sand.

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Roger Brady

REMOVAL AND CLOSURE OF WASTEWATER SUMPS,

LONGHORN ARMY AMMUNITION PLANT, KARNACK, TEXAS

SCOPE OF WORK

17 January 1996

1. GENERAL. The Contractor will furnish all services, materials, plant, labor, equipment, investigations, permits, supplies, superintendence, and travel, as required, in connection with the removal and closure of 85 DERA (Group 3) wastewater sumps, racks, associated structures or utilities and limited removal of contaminated soil encountered during removal of these structures. Additional limited site investigations may also be performed as a part of this delivery order. These sumps have been used in the past for collection of organic solvents, solvent laden water, and solvent contaminated sludge associated with past manufacturing processes at LHAAP.

2. BACKGROUND INFORMATION.

2.1 Project Location. Longhorn Army Ammunition Plant (LHAAP) 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 lands between State Highway 43 and the western shore of Caddo Lake. State Highways 43 and 134 access the installation. LHAAP is a "fence to fence" National Priorities List (NPL) site. A Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Section 120 Federal Facility Agreement was executed for the plant in 1991. In addition to the CERCLA requirements, Resource Conservation and Recovery Act (RCRA) closure requirements must be met for certain plant facilities as well. LHAAP has agreed to perform an approved RCRA closure of the sumps.

2.2 Site Description. The "site" includes all sumps associated with past and present plant operations. The project area covers a large portion of the northern half of the facility. Most of these are concentrated in the area referred to as the Plant Production Area which consists of 1,180 acres. Remedial Investigation of the sump areas and associated potential releases is on-going. A closure plan for the sumps has been presented by LHAAP to the Texas Natural Resource Conservation Commission and been approved. Investigations to date indicate that the sumps may be the source of metals and volatile organic compounds which have been released to soil and groundwater. A detailed inventory of all sumps has been performed and is included in the Administrative Record.

2.3 Project Description. The project consists of removal and closure of wastewater sumps and associated structures/equipment as described in the LHAAP, Closure Plan for Wastewater Sumps, May, 1995 (Closure Plan). Additionally, although not described in the scope, removal of a limited volume of contaminated soil adjacent/subjacent to the sumps may be required. The general requirements for each sump are:

1. Sampling and analysis of sump contents
2. Removal and containerization of sump contents
3. Decontamination of sump surfaces
4. Decontamination of Equipment
5. Internal visual inspection of sump
6. Determination of sump disposition
7. Certification of closure actions

In addition to sump closure and removal activities, additional limited investigations of the soil and groundwater may be performed by the contractor on specified sump removal sites as determined by the government based upon the findings and results of the sump removal activities. These investigations may consist of the installation of soil borings and/or groundwater monitoring wells with associated sampling and analytical activities as deemed necessary.

3. TASK DESCRIPTION.

3.1 Work Plan. The contractor shall develop a draft and final Work Plan for the project based on the Closure Plan, contractor specific requirements, and additional tasks as defined above. The Work Plan will describe the methodology to perform the required removal and closure activities required by this delivery order. The Contractor will submit a Chemical Data Acquisition Plan (CDAP), Waste Management Plan (WMP), Site Safety and Health Plan (SSHP), and a Contractor Quality Control Plan (CQCP) which supplement the Work Plan. All submittals shall be approved by the Contracting Officer or his representative before any elements of the submittals are executed.

3.2 Sump Closure. The contractor shall execute the removal and closure of the sumps per the Closure Plan, Work Plans and other project requirements as identified above. This shall include preparation of appropriate documents for submission to the State of Texas as identified in the Closure Plan or otherwise required by law or regulation. Because the Closure Plan has been approved by the TNRCC, deviations from the procedures described within are not authorized unless first approved by the Contracting Officer or his representative. In addition, the contractor shall give notification to the Contracting Officer's representative and to LHAAP (Mr. David Tolbert) 14 days prior to scheduled removal of each sump.

3.3 Soil Removal. The contractor shall remove soil from around and beneath the sumps requiring removal as directed by the Government.

3.4 Additional Investigations. The contractor shall conduct additional limited investigations of the soil and groundwater on specified sump removal sites as determined by the government based upon the findings and results of the sump removal activities. These investigations may consist of the installation of soil borings and/or groundwater monitoring wells with associated sampling and analytical activities as deemed necessary.

4. ASSUMPTIONS FOR COST ESTIMATING PURPOSES.

4.1 Sump Closure. For cost proposal development purposes, the following assumptions should be used. Assume 85 sumps (identified as Group 3 DERA sumps on pages 19-21 of the Closure Plan) and associated equipment/structures will be closed. Of these 85, the contractor will assume that 50 percent will require removal and disposal per the requirements of the Closure Plan. Assume that approximately 58 of the sumps contain 1 foot of sludge and 2 feet of water and that approximately 27 are filled with sand. Assume that all sand will be removed from the sand-filled sumps and that approximately 25% of the sand will be classified as hazardous waste and require off-site disposal. Assume that all liquids and sludges removed from the sumps will be classified as hazardous waste. Assume that all liquids will require off-site deep well injection, all sludges will require off-site incineration prior to disposal, and all remaining residue will require off-site disposal. Assume that 50% of all piping and/or concrete-lined inlet channels will be removed and disposed off-site as hazardous waste and that the piping will be cut off flush with the exterior wall and grouted closed at each location.

4.2 Soil Removal. Additionally, assume that contaminated soil removal consisting of a 1 foot over excavation of the sump volume (see GFI for approximate sump dimensions) will be required from the sites requiring sump removal. Assume that 30% of the soils will be classified as hazardous waste and off-site incineration and disposal of the soil will be required. The remaining 70% shall be assumed to be classified as hazardous waste but suitable for off-site disposal within the guidelines of the Land Disposal Restrictions without incineration.

5. DELIVERABLES/SCHEDULES.

5.1 Project Plans. The contractor shall submit a project schedule from issuance of the initial Work Authorization Directive (WAD) to acceptance of work by the Contracting Officer. Work Plans and other required plans as identified above shall be submitted for approval before any field work commences.

5.2 Removal and Closure Activities. The contractor shall perform the removal and closure activities (including all related waste management and other associated functions) as outlined above and in the GFI.

5.3 Certification of Closure Actions. Required documentation and/or certifications as noted in the Closure Plan and supporting documentation will be provided by the contractor.

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5.4 Cost/Schedule Reports. Biweekly cost/schedule reports shall be submitted to the HTRW Resident Office (CESWT-EC-FW) upon approval of the initial WAD. The cost data shall be no more than 10 days old from the date of the cost report. The format and content of the reports shall be as mutually agreed by HTRW Resident office and OHM.

5.5 Project Schedule. Appendix 10 of the approved Closure Plan gives the relative regulatory schedule for accomplishment of the closure activities. The sumps are divided into three groups as noted in the Closure Plan. Section 5.0 of the Closure Plan gives the overall absolute schedule for completion of project activities and milestones for Group 1 and Group 2 sumps. Activities within this delivery order are specifically for the third group of 85 sumps. The contractor shall execute and complete the removal and closure of the sumps within 12 months after the initial WAD. It is anticipated that a schedule of activities and milestones be developed for the Group 3 sumps similar to that done for Group 1 and Group 2 sumps.

DELIVERABLES SCHEDULE

Deliverable/Activity	Schedule	# of copies to HTRW Resident Office, Tulsa: ATTN: Mr. Clif Warren	# of copies to Eastern Area Office, ATTN: Mr. Jim Carter
Draft Project Plans	30 days after approval of the 1st WAD	Orig + 18	2
Final Project Plans	21 days from receipt of Government comments to the Draft Project Plans	Orig + 18	2
Closure Activities	Complete 12 months from the approval of the 1st WAD	NA	NA
Certification of Closure Action	As defined in the approved Project Schedule	Orig + 18	2
Laboratory Data Package (As required for additional investigations if needed)	30 days after completion of the collection of the last sample	Orig +4	0

Data Validation Report (As required for additional investigations if needed)	15 days after submittal of the Laboratory Data Package	Orig + 4	0

5. GOVERNMENT FURNISHED INFORMATION.

- Map of sump locations
- LHAAP Closure Plan for Wastewater Sumps, May, 1995
- LHAAP Wastewater Sumps Inventory, Administrative Record
- Estimated Volumes for Sumps Removal Project

6. DELIVERY ORDER MANAGEMENT

(1) Government Points of Contact. Any questions concerning contract administration, billing, and payment should be directed to the COR for the delivery order, which will be Mr. Jim Carter, Eastern Area Office (318) 676-3365. Questions related to design or other pre-construction activities should be directed to Mr. Randy Bratcher, HTRW Resident office (918) 669-7505. The Corps of Engineers project manager is Mr. Ken Kebbell @ (918) 669-7172.

(2) Distribution of Submittal. The distribution of the submittals shall be in accordance with the Delivery Schedule. All transmittal letters for the Work Plans shall be addressed to Mr. Jim Carter. All transmittal letters for other documents shall be addressed to Mr. Clif Warren. Addresses are as follows:

U.S. Army Corps of Engineers, Tulsa District
ATTN: HTRW Resident Office (CESWT-EC-FW), Mr. Clif Warren
Post Office Box 61
Tulsa, OK 74121-0061

The street address is:

1645 South 101st E. Avenue
Tulsa, OK 74128-4629

The mailing and street address for the Eastern Area Office is:

U. S. Army Corps of Engineers, Ft. Worth District
ATTN: Eastern Area Office (CESWF-AO-E), Mr. Jim Carter
280 Miller Road
Bossier City, La 71112-2505

The mailing and street address for the Eastern Area Office is:

U. S. Army Corps of Engineers, Ft. Worth District
ATTN: Eastern Area Office, Mr. Jim Carter
280 Miller Road
Bossier City, La 71112-2505

017816 Roger Brady

Revised Assumptions for Sumps Removal Project at Longhorn Army Ammunition Plant (4 January 1996)

1. **Estimated Volume of Hazardous Sump Sludge:** 3400 ft³ (125 yd³)

   Assumes all sump sludge will be hazardous.

   Assumes an average sludge depth of 1 foot in all sumps EXCEPT those which have been backfilled with sand.

   Note: These volumes appear to be consistent with the sludge volumes generated by Thiokol during the current sumps removal project.

2. **Estimated Volume of Hazardous Sump Liquids:** 50,500 gal.

   Assumes all sump liquids will be hazardous.

   Assumes an average liquid depth of 2 foot in all sumps EXCEPT those which have been backfilled with sand.

   Note: These volumes appear to be consistent with the volume of liquid removed by Thiokol during the current sumps removal project.

3. **Estimated Volume of Hazardous Sand From Previously Backfilled Sumps:** 1125 ft³ (40 yd³)

   Assumes that all sand will be removed from the previously backfill sumps, and that 25% of this sand will test hazardous.

4. **Estimated Volume of Hazardous Concrete:** 4050 ft³ (150 yd³)

   Assumes that 50% of the concrete sumps will test hazardous and require removal.

   Assumes an average sump wall thickness of 6 inches for all sumps.

5. **Estimated Volume of Hazardous Soil Generated During Sump Removal:** 10,200 ft³ (380 yd³)

   Assumes 1 foot of soil will be incidentally removed from the sides and bottom of all sump excavations during removal of the "hazardous" 50% of the concrete sumps.

6. **Estimated Volume of Fill Material Required:**
   Soil Backfill 22,400 ft³ (830 yd³)
   Sand Backfill 7,400 ft³ (275 yd³)

   Assumes that 50% of the sumps will test hazardous, and will be removed and incidentally overexcavated by approximately 1 foot. These will be backfilled using clean soil. The external sump volume including 1 foot of overexcavation was used to estimate the soil backfill volume.

   Assumes that 50% of the sumps will test non-hazardous, and will be left in place and filled with sand. Also assumes that the non-hazardous sand removed from previously backfilled sumps (estimated 125 yds³) will be stockpiled and used as a source of backfill material. The internal sump volume was used to estimate the required sand backfill volume.

Estimated Volumes for Sumps Removal Project
Longhorn Army Ammunition Plant

SUMP ID#	INTERNAL SUMP VOLUME (FT^3)[1]	EXTERNAL SUMP VOLUME (FT^3)[2]	CONCRETE VOLUME (FT^3)[3]	SOIL OVER-EXCAVATION VOLUME (FT^3)[4]	SLUDGE VOLUME (FT^3)[5]	LIQUID VOLUME (GALLONS)[6]	SAND VOLUME (FT^3)[7]	COMMENTS
4	245.3	258.5	100.4	254.5	51.7	773.4		
5	169.9	206.8	85.5	220.7			170.0	
6	484.4	568.7	189.8	457.3	51.7	773.4		
8	390.6	431.3	138.2	338.2	86.3	1291.0		
9	473.9	563.5	169.8	408.5	80.5	1204.3		
13	390.6	465.3	160.0	389.7	51.7	773.4		
14	144.0	204.6	85.8	219.2			144.0	
15	213.4	258.5	100.4	254.5	51.7	773.4		
16	63.6	78.5	41.2	113.9	19.6	293.2		
17	96.0	117.5	59.5	161.8	47.0	703.1		
18	144.0	141.4	61.3	160.2			144.0	
19	197.3	261.3	101.2	256.2	52.3	782.4		
21	194.7	245.0	101.5	259.0	70.0	1047.2		
23	213.4	245.0	101.5	259.0	70.0	1047.2		
25	205.5	243.8	96.9	246.8	48.8	730.0		
26	212.0	252.7	95.6	243.2	72.2	1080.1		
28	50.0	54.3	31.7	90.9	18.1	270.8		
29	475.0	568.7	189.8	457.3	51.7	773.4		
30	71.5	68.7	36.9	103.3	22.9	342.6		
31	74.3	68.7	36.9	103.3	22.9	342.6		
33	21.7	58.1	34.3	97.8			21.7	
36	260.0*	295.0*	98.8*	248.4*	56.5*	845.2*		
37	44.1	43.6	27.5	81.1			44.1	

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SUMP ID#	INTERNAL SUMP VOLUME (FT^3)[1]	EXTERNAL SUMP VOLUME (FT^3)[2]	CONCRETE VOLUME (FT^3)[3]	SOIL OVER-EXCAVATION VOLUME (FT^3)[4]	SLUDGE VOLUME (FT^3)[5]	LIQUID VOLUME (GALLONS)[6]	SAND VOLUME (FT^3)[7]	COMMENTS
39								BILLED WITH CONCRETE
43	14.2	14.4	13.1	45.0	9.6	143.6		
46	260.0*	295.0*	98.8*	248.4*	36.5*	845.2*		
49	37.4	54.0	36.0	106.0	18.0	269.3		
50	130.6	160.0	74.4	195.9	40.0	598.4		
52	70.1	80.0	46.0	130.0			70.0	
54	130.7	162.8	75.3	198.2	32.6	487.7		
56	66.3	79.8	46.6	131.4	26.6	397.9		
57	419.9	493.0	152.8	370.8			420.0	
58								DRAIN PRESENT BUT SUMP GONE
59	352.0	385.0	140.2	346.3			352.0	
60	415.8	481.3	163.1	396.2	96.3	1440.6		
62	126.1	141.8	66.6	177.8			126.0	
63	126.1	142.5	67.3	179.5			126.0	
64	179.9	228.0	90.5	232.0			180.0	
67	126.1	162.0	72.0	190.0			126.0	
68	239.5	313.5	113.8	284.5	57.0	852.7		
69	183.4	220.8	90.5	232.6	40.1	599.9		
71	270.1	324.0	117.0	292.0	54.0	807.8		
74	67.0	83.2	46.0	129.3	27.7	414.4		
78	48.0	50.8	30.9	89.5	14.5	216.9		
79	51.6	50.8	30.9	89.5	14.5	216.9		
80	26.7	33.6	28.7	89.2	33.6	502.7		
81	1833.3	1980.0	398.0	900.0	220.0	3291.2		
82	513.2	595.0	174.4	418.3	99.2	1484.0		

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SUMP ID#	INTERNAL SUMP VOLUME (FT^3)[1]	EXTERNAL SUMP VOLUME (FT^3)[1]	CONCRETE VOLUME (FT^3)[2]	SOIL OVER-EXCAVATION VOLUME (FT^3)[4]	SLUDGE VOLUME (FT^3)[3]	LIQUID VOLUME (GALLONS)[4]	SAND VOLUME (FT^3)[3]	COMMENTS
83	731.3	842.9	226.4	532.3	99.2	1484.0		
84	26.7	45.0	41.5	95.0	30.0	448.8		
85	140.1	171.5	73.5	193.0			140.0	
86	1512.0	1617.0	328.3	749.4	231.0	3455.8		
87	59.0	75.0	42.5	121.0	30.0	448.8		
88	336.0	373.0	125.9	311.3	62.2	930.5		
89	336.0	373.0	125.9	311.3			336.0	
90	760.0	820.8	214.5	505.8	102.6	1534.9		
91	276.2	343.1	117.8	293.0	68.6	1026.3		
92	386.8	446.0	142.8	349.1	68.6	1026.3		
93	329.4	377.4	126.1	311.7	68.6	1026.3		
94	47.5	56.5	33.0	94.3			47.5	
95	268.2	317.6	112.5	373.5	57.8	864.7		
96	28.3	29.5	21.6	66.7			28.3	
97	83.4	86.6	43.8	119.8	21.6	323.1		
98	54.1	56.5	33.0	94.3			43.1	
99	21.3	21.5	17.0	55.0	10.8	161.6		
100	35.4	42.4	28.3	83.2			35.4	
101	88.4	95.0	46.5	125.9	23.8	356.0		
102	245.1	265.6	93.4	249.4			245.1	
103	320.1	346.0	117.7	292.5			320.0	
104	448.0	516.7	159.0	385.1			448.0	
105	294.0	346.0	117.7	292.5			294.0	
106	260.0*	295.0*	93.8*	248.4*	56.5*	845.2*		
107	39.7	39.3	25.5	76.2			39.7	
108	52.5	75.3	47.2	133.8			52.5	

03/01/96 13:34 ☎918 669 7495 CONTR DIV 004

017819

SUMP ID#	INTERNAL SUMP VOLUME (FT^3)[1]	EXTERNAL SUMP VOLUME (FT^3)[2]	CONCRETE VOLUME (FT^3)[3]	SOIL OVER-EXCAVATION VOLUME (FT^3)[4]	SLUDGE VOLUME (FT^3)[5]	LIQUID VOLUME (GALLONS)[6]	SAND VOLUME (FT^3)[7]	COMMENTS
109	82.3	93.0	51.9	144.3			92.5	
110	100.0	126.7	62.7	169.0	28.2	421.9		
113	36.9	38.5	26.8	80.3	9.6	143.6		
115	1239.7	1400.0	310.0	712.0	200.0	2992.0		
116	1197.1	1280.4	289.1	667.0	232.8	3482.7		
117	95.5	95.0*	98.8*	248.4*	28.3	423.4		
118	171.5	192.0	60.0	208.0	64.0	957.4		
119	159.4	196.1	83.1	215.6			159.0	SUMP FILLED WITH SAND AND CAPPED WITH CONCRETE
120	273.0	332.8	125.6	313.3			273.0	SUMP FILLED WITH SAND AND CAPPED WITH CONCRETE
121	321.8	322.0	98.8*	248.4*	56.5*	845.2*		
123	98.1	100.0			56.5*	845.2*		ABOVE GROUND TANK
TOTAL	21498.2	24483.4	8109.4	20367.0	3373.0	50460.1	4467.9	

* Information not available. Volumes presented are average values for all sumps.

[1] From Table 1, Waste Sump Inventory, Longhorn Army Ammunition Plant, April 1993.

[2] Calculated using the outside sump dimensions included in Table 1, Waste Sump Inventory, Longhorn Army Ammunition Plant, April 1993.

[3] Calculated using the outside sump dimensions included in Table 1, Waste Sump Inventory, Longhorn Army Ammunition Plant, April 1993. Assumes a 6-inch wall thickness for all sumps.

[4] Calculated using sump dimensions included in Table 1, Waste Sump Inventory, Longhorn Army Ammunition Plant, April 1993. Assumes that 1 foot of incidental soil-over excavation will occur during removal of each sump.

[5] Calculated using sump dimensions included in Table 1, Waste Sump Inventory, Longhorn Army Ammunition Plant, April 1993. Assumes a sludge depth of 1 foot. Sand filled sumps were not included.

[6] Calculated using sump dimensions included in Table 1, Waste Sump Inventory, Longhorn Army Ammunition Plant, April 1993. Assumes a liquid depth of 2 foot. Sand filled sumps were not included.

[7] Calculated using sump volumes listed included in Table 1, Waste Sump Inventory, Longhorn Army Ammunition Plant, April 1993. Assumes the total internal volume of the sump is filled with sand.

03/01/98 13:35 ☎918 669 7495 CUNIK DIV 005

017820

APPENDIX IX

SUMP CONSTITUENTS ANALYSIS

NOR NUMBER	AREA	REQUIRED ANALYSIS
All Sumps	ubiquitous	Volatile Organic Compounds
		Semi-volatiles Organic Compounds
		Metals (8 each)

SUMPS REQUIRING ADDITIONAL ANALYSIS

NOR NUMBER	AREA	REQUIRED ANALYSIS
083	31-G	Cyanide
084	31-G	Cyanide
090	42-H	Cyanide
091	45-E	Cyanide
092	45-E	Cyanide
093	45-E	Cyanide
094	45-E	Cyanide, RDX, HMX
095	45-E	Cyanide
096	45-E	Cyanide
099	50-G	Cyanide, TPH
142	744	TPH
146	744A	TPH
151	401-C	Cyanide, TPH,
153	23T	HMX, RDX

..endix X
Sump Closure Schedule

Longhorn Army Ammunition Plant

Group I & Group II	**No.**	MONTH 1				MONTH 2				MONTH 3				MONTH 4				MONTH 5				MONTH 6				MONTH 7				MONTH 8			
		Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4
Approval of Closure Plan	1	sc																															
Verify Existing Conditions and Provide Explosives Testing & Results	2	ss		(p	ha	se	1)	sc	ss			(	ph	as	e2	)				sc		ss			(	ph	as	e3	)				sc
Notification of Sampling & Closure Activities in writing to TNRCC	3		ss	sc						ss	sc		ss	sc							ss	sc										
Sample sump wastewater for contaminants analysis	4					ss	sc						ss	sc										ss	sc							
Recieve results on sump wastewater analysis	5						ss	(p	ha	se	1)	sc		ss	(p	ha	se	2)	sc								ss	(p	ha	se	3)	sc
Sample sump sludge for contaminants analysis	6					ss	sc						ss	sc										ss	sc							
Recieve results on sump sludge analysis	7						ss	(p	ha	se	1)	sc		ss	(p	ha	se	2)	sc								ss	(p	ha	se	3)	sc
Onsite disposal of sump wastewater (PWTP)	8												ss																				
Offsite disposal of sump wastewater (direct removal from sump)	9												ss	(p	ha	se	1)	sc			ss	(p	ha	se	2)								
Clean sludge from sumps (8-hrs each)	10												ss	(p	ha	se	1)	sc			ss	(p	ha	se	2)							sc	
Containerize sludge and send to Hazardous Waste Storage Area	11												ss	(p	ha	se	1)	sc			ss	(p	ha	se	2)							sc	
Decon sump to workable condition	12												ss	(p	ha	se	1)	sc			ss	(p	ha	se	2)							sc	
Block off trough to sump	13												ss	(p	ha	se	1)	sc			ss	(p	ha	se	2)							sc	
Cover sump to prevent rainfall infiltration	14												ss	(p	ha	se	1)	sc			ss	(p	ha	se	2)							sc	
Decon sump (Dry Ice Blasting or equivalent technology) & Containerize rinseate	15																			ss		sc										sc	
Send to Hazardous Waste Storage Area	16																			ss		sc											
Visual inspection of sump condition	17	ss																		ss		sc											
Concrete sample for contaminants analysis	18																			ss		sc											
Recieve results on concrete sample analysis	19																						sc										
Fill in sump with clean sand if concrete's clean	20																													ss			
Decon sump (Dry Ice Blasting or equivalent technology) if concrete's contaminated	21																																
Schedule is based on preliminary & unforseen circumstances																																	

017822

Sump Closure Schedule

Longhorn Army Ammunition Plant

Group I & Group II	No.	MONTH 1				MONTH 2				MONTH 3				MONTH 4				MONTH 5				MONTH 6				MONTH 7				MONTH 8		
		Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3
Not treatable (Remove Sump and dispose to Subtitle C Landfill	22																															
Professional Engineering Certification	23																						SS									
Containerize water and send to Hazardous Waste Storage Area	24													SS																		
Offsite Disposal of Hazardous Waste Sludge	25																											SS				
Offsite Disposal of Hazardous Waste Debris	26																															
Purchase Order for offsite disposal of sump sludge	27																					SS				SC						
Purchase Order for offsite disposal of wastewater	28					SS				SC								SS			SC											
Purchase order for drums, safety supplies, etc.	29					SS				SC																						
Purchase Order for lab analysis	30	SS				SC																										
Services Contract for Professional Engineer	31	SS				SC																										
Work Order & Schedule for Maintenance	32	SS	SC			SS			SC																							
Purchase Order for Dry Ice Blasting	33						SS								SC																	
Closure Completion Report	34									SS																						
Prepare Subcontract for Closure or Removal	35					SS				SC																						
Revise SOP for Cleaning of Sumps	36	SS					SC																									
Schedule is based on preliminary & unforseen cirumstances																																

Phase 1: Eight (8) each from group 1 sumps
Phase 2: Sixteen (16) each from group 1 sumps
Phase 3: Five (5) each from group 1 sumps and all sumps from group 2

SS Scheduled Start **SC** Scheduled Complete
AS Actual Start **A** Actual Complete

017823

Appendix X
Sump Closure Schedule

5/23/95

Longhorn Army Ammunition Plant

Group I & Group II	**No.**	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4
		MONTH 9				MONTH 10				MONTH 11				MONTH 12				MONTH 13				MONTH 14				MONTH 15															
Approval of Closure Plan	1																																								
Verify Existing Conditions and Provide Explosives Testing & Results	2																																								
Notification of Sampling & Closure Activities in writing to TNRCC	3																																								
Sample sump wastewater for contaminants analysis	4																																								
Recieve results on sump wastewater analysis	5																																								
Sample sump sludge for contaminants analysis	6																																								
Recieve results on sump sludge analysis	7																																								
Onsite disposal of sump wastewater (PWTP)	8																sc																								
Offsite disposal of sump wastewater (direct removal from sump)	9	ss			(p	ha	se	3)					sc																												
Clean sludge from sumps (8-hrs each)	10	ss			(p	ha	se	3)					sc																												
Containerize sludge and send to Hazardous Waste Storage Area	11	ss			(p	ha	se	3)					sc																												
Decon sump to workable condition	12	ss			(p	ha	se	3)					sc																												
Block off trough to sump	13	ss			(p	ha	se	3)					sc																												
Cover sump to prevent rainfall infiltration	14	ss			(p	ha	se	3)					sc																												
Decon sump (Dry Ice Blasting or equivalent technology) & Containerize rinseate	15	ss		sc											ss		sc																								
Send to Hazardous Waste Storage Area	16	ss		sc											ss		sc																								
Visual inspection of sump condition	17	ss		sc											ss		sc																								
Concrete sample for contaminants analysis	18	ss		sc											ss		sc																								
Recieve results on concrete sample analysis	19			ss	(p	ha	se	2)	sc								ss	(p	ha	se	3)	sc																		
Fill in sump with clean sand if concrete's clean	20									ss		sc												ss		sc														
Decon sump (Dry Ice Blasting or equivalent technology) if concrete's contaminated	21			ss							sc				ss		sc																								
Schedule is based on preliminary & unforseen circumstances																																								

51784

Longh... ...ny Ammunition Plant

Appendix X

Sump Closure Schedule

5/23/95

Group I & Group II

	No.	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4
		MONTH 9				MONTH 10				MONTH 11				MONTH 12				MONTH 13				MONTH 14				MONTH 15							
Not treatable (Remove Sump and dispose to Subtitle C Landfill	22																									SS	SC						
Professional Engineering Certification	23																															SC	
Containerize water and send to Hazardous Waste Storage Area	24																									SS	SC						
Offsite Disposal of Hazardous Waste Sludge	25																																
Offsite Disposal of Hazardous Waste Debris	26																																
Purchase Order for offsite disposal of sump sludge	27																									SS	SC						SC
Purchase Order for offsite disposal of wastewater	28																																
Purchase order for drums, safety supplies, etc.	29																																
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Services Contract for Professional Engineer	31																																
Work Order & Schedule for Maintenance	32																																
Purchase Order for Dry Ice Blasting	33																																
Closure Completion Report	34																																
Prepare Subcontract for Closure or Removal	35																																
Revise SOP for Cleaning of Sumps	36																																SC
Schedule is based on preliminary & unforseen circumstances																																	

517825

APPENDIX X

017826

SUMP CLOSURE SCHEDULE (continued)

Group 3 Sumps

Group 3 sumps will use the same milestones as Group 1 and Group 2. Closure will begin in December of 1995 upon receipt of CERCLA funding and will finish 24 months afterwards.

Brady

OHM Remediation Services Corp.
A Subsidiary of OHM Corporation

017827

January 3, 1996

Ms. Ramona Wagner
U.S. Army Corps of Engineers, Tulsa District
HTRW Resident Office
1645 South 101st East Avenue
Tulsa, Oklahoma 74128

Re: Total Environmental Restoration Contract (TERC)
Contract No. DACA56-94-D-0020
Transmittal of 2 Diskettes: Updated Version of OHM's Project Estimating System and PE Estimates for Vance AFB and Longhorn Army Ammunitions Plant

Dear Ms. Wagner:

Enclosed is a diskette with version 4.7 of OHM's project estimating system. To install the new version:

- Create a new subdirectory
  C: MD PE47

- Copy files into the new subdirectory
  C: CD PE47
  C: Copy A:*.*

When running the new system, you will notice that the program has not been modified to indicate that it is version 4.7. The screen report will still show version 4.6, however, the databases have been updated to reflect our new forward labor and equipment pricing.

Effects on current outstanding proposals are as follows:

Proposal	Original	Revised	Change
Vance GWTP	2,598,407	2,617,195	18,728
LAAAP Sumps	2,946,605	2,973,412	26,807

Additionally, enclosed is a diskette with copies of the PE estimates that were not supplied with the last two proposals sent.

- Vance Air Force Base construction of GWTP located in subdirectory Vance PE file name "VAFBGW4".

- Longhorn Army Ammuntion Plant sump closure is located in subdirectory Longhorn and PE file name "109411A".

If you have any difficulties installing these files, please call me at (713) 775-7653.

Sincerely,

Roger Brady
Manager of Govt. Estimating, Cost & Scheduling

RB/mw

cc: TERC File

\\RADY\RW0\0396.LTR

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

017829

May 20, 1996

CERTIFIED MAIL: RETURN RECEIPT REQUESTED - P373 363908

James A McPherson, Commander's Representative
Longhorn Army Ammunition Plants
Attn: SIOLH-CR
P.O. Box 30058
Shreveport, LA 71130-0058

Re: Longhorn Army Ammunition Plant
Draft Final Group 4 Baseline Risk Assessment Work Plan
and Draft Final Remedial Investigation Report Group 1 Sites

Dear Mr. McPherson:

In accordance with the Federal Facility Agreement for the Longhorn Army Ammunition Plant, the Environmental Protection Agency (EPA) is requesting a twenty (20) day extension of the comment period for the Draft Final Group 4 Baseline Risk Assessment Work Plan (work plan). The EPA's comments on the work plan were due to the Army by May 24, 1996. Regarding the Draft Final Remedial Investigation Report Group 1 Sites (report), the EPA's comments were due to the Army May 15, 1996. Comments on this report have not yet been provided due in part to the following: the Army's request for a two week review of the Draft Final Project Work Plans for the Interim Remedial Action - Landfills 12 & 16 Caps (EPA concurrence letter provided May 15, 1996); the need for additional risk assessment sampling for Group 1 sites as discussed during the May 7, 1996 monthly managers meeting; and time-off from work I took when my son was born. As discussed with Mr. David Tolbert last week, comments on the report will be provided shortly. It is anticipated that the EPA will transmit its comments on the work plan and report prior to the tentatively scheduled June 10, 1996 meeting at the Longhorn Army Ammunition Plant. The purpose of this meeting is to resolve the Group 1 risk assessment sampling requirements and to discuss EPA comments on the work plan. If you have any questions about this or any other matter, please contact me at (214) 665-6758.

Sincerely,

Chris G. Villarreal

Chris G. Villarreal
Remedial Project Manager
Superfund Division

Recycled/Recyclable • *Printed with Vegetable Oil Based Inks on 100% Recycled Paper (40% Postconsumer)*

017830

cc: David Tolbert (via facsimile)
Longhorn/Louisiana Army Ammunition Plant
P.O. Box 30058
Shreveport, LA 71130-0058

Jonna Polk
Tulsa District Core of Engineers
P.O. Box 641
CESWT-PP-E
Tulsa, OK 74121-0061

Diane Poteet
Texas Natural Resource Conservation Commission
Pollution Cleanup Division
Superfund Engineering Section MC144
P.O. Box 13087
Austin, Texas 78711-3087

Barry R. McBee, *Chairman*
R. B. "Ralph" Marquez, *Commissioner*
John M. Baker, *Commissioner*
Dan Pearson, *Executive Director*

017831

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

01

May 22, 1996

CERTIFIED MAIL
P 836 901 728
RETURN RECEIPT REQUESTED

James A. McPherson, Commander's Representative
Longhorn/Louisiana Army Ammunition Plant
Attn: SIOLH-CR
P.O. Box 30058
Shreveport, LA 71130-0058

Re: Longhorn Army Ammunition Plant
Group 2 - Time Critical Removal Action at Landfill Site 16
Draft Design Analysis Report

Dear Mr. McPherson:

The Texas Natural Resource Conservation Commission (TNRCC) staff has completed their review of the above referenced document, which was received on May 20, 1996. Our comments are enclosed. If you have any questions or comments regarding this matter please call me at (512) 239-2502.

Sincerely,

Diane R. Poteet

Diane R. Poteet
Project Manager (MC-143)
RI/FS II Unit
Superfund Investigation Section
Pollution Cleanup Division

enclosure

cc: Chris Villarreal, EPA Region 6 (6SF-AT)
Jonna Polk, COE Tulsa District (CESWT-PP-EA)

017832

No.	Section/Page	Comment
1	General	Were the pumping (extraction) wells partially penetrating or fully penetrating? It should be stated right up front. This is very important for it affects all the equations you have used. A partially penetrating well will have turbulence below the well and this turbulence will affect the ground water flow velocities.
2	Table 4.2	Please put all parameters from the pump test equation in this table. It is more meaningful to have hydraulic conductivity and aquifer thickness along with transmissivity. Please also include total drawdown (both corrected and measured).
3	4.2.2/4-7	For most aquifer/pump test equations, "Q" (or discharge) is required to be constant. Should your test results be considered invalid when a pneumatic pump was used?
4	5.1/5-1	There are other possible parameters which can be used in this model. Did you calculate vertical hydraulic conductivities for your model? If so, what were the values? Was recharge from the surface water or from diffuse recharge from the surface parameters in your model? What about the configuration of drains? I do not feel completely comfortable about your model without knowing a little more about it.
5	5.1/5-1	A problem with using MODFLOW is that a cell with a well in it may not capture all drawdown. The assumption that is used when the cell does not capture all drawdown is that the drawdown in the cell is equal to 50% of the actual drawdown at the well. Please determine if this is a problem with your model.

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

REPLY TO
ATTENTION OF

May 22, 1996

SIOLH-CR

017833

Mr. H.L. Jones
Texas Natural Resource Conservation
Commission
2916 Teague Drive
Tyler, TX 75701

SUBJECT: Final Project Work Plans, Removal and Closure of Wastewater Sumps

Enclosed is one copy of the subject document.

If you have any questions, please contact Mr. David Tolbert, at 903-679-2728.

Sincerely,

for James McPherson
Commander's Representative

Enclosure

05-22-1996 03:40PM FROM TO 26509428191866972235 P.01

DEPARTMENT OF THE ARMY
U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE
5158 BLACKHAWK ROAD
ABERDEEN PROVING GROUND, MARYLAND 21010-5422

017834

REPLY TO
ATTENTION OF

MCHB-DC-EHR (40)

22 MAY 1996

MEMORANDUM FOR District Engineer, U.S. Army Engineering District, Tulsa
ATTN: CESWT-PP-EA/Ms. Jonna Polk, Post Office Box 61,
Tulsa, OK 74121-0061

SUBJECT: Review of the Draft Comprehensive Chemical Data Acquisition Plan for the Remedial Investigation/Feasibility Study at the Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas, April 1996

1. The U.S. Army Center for Health Promotion and Preventive Medicine reviewed the subject document on behalf of the Office of The Surgeon General. A comment and recommendation are enclosed for your consideration.

2. The scientists reviewing this document were Mr. Mark A. Dossey and Ms. Jacqueline M. Howard, Environmental Health Risk Assessment and Risk Communication Program. Our point of contact is Mr. Dossey at DSN 584-7282 or commercial (410) 612-7282.

FOR THE COMMANDER:

Encl

for ARTHUR P. LEE, P.E.
MAJ, MS
Program Manager, Environmental Health Risk
Assessment and Risk Communication

CF:
HQDA(DASG-HS-PE) (w/o encl)
CDR, USAMEDCOM, ATTN: MCHO-CL-P (w/encl)
CDR, CEMRD, ATTN: CEMRD-ET-EH (w/encl)
CDR, USAEC, ATTN: SFIM-AEC-IRP (w/encl)
CDR, LHAAP, ATTN: SMLO-EN (w/encl)

Readiness thru Health

017835

Comment and Recommendation
U.S. Army Center for Health Promotion and Preventive Medicine

SUBJECT: Review of the Draft Comprehensive Chemical Data Acquisition Plan for the Remedial Investigation/Feasibility Study at the Longhorm Army Ammunition Plant (LHAAP), Karnack, Texas, April 1996

1. Page 4-27, Section 4.5.4, J. Howard
Soil Sampling
Comment: A shallow soil sample is defined as the uppermost foot of soil. Typically a surface soil sample is considered to be limited to the uppermost six inches of soil. Disturbance of surface soil rarely occurs below the uppermost six inches of soil.
Recommendation: Redefine a shallow soil sample as the uppermost six inches of soil.

Encl

DEPARTMENT OF THE ARMY
U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE
5158 BLACKHAWK ROAD
ABERDEEN PROVING GROUND, MARYLAND 21010-5422

017836

REPLY TO
ATTENTION OF

MCHB-DC-EHR (40)

22 MAY 1996

MEMORANDUM FOR District Engineer, U.S. Army Engineering District, Tulsa
ATTN: CESWT-PP-EA/Ms. Jonna Polk,
Post Office Box 61, Tulsa, OK 74121-0061

SUBJECT: Review of Final Air Monitoring Plan, Interim Remedial Action at Burning Ground No. 3, Longhorn Army Ammunition Plant, Karnack, TX, prepared by Dow Environmental Inc., 16 April 1996

1. The U.S. Army Center for Health Promotion and Preventive Medicine has reviewed the subject document on behalf of the Office of The Surgeon General. Comments and recommendations are enclosed for your consideration.

2. The scientists reviewing this document were Mr. Mark A. Dossey, Environmental Health Risk Assessment and Risk Communication Program; and Ms. Amy Birks, Ambient Air Quality Management Program. Our point of contact is Mr. Dossey at DSN 584-7282 or commercial (410) 612-7282.

FOR THE COMMANDER:

Encl

Dennis E. Druck
for ARTHUR P. LEE, P.E.
MAJ, MS
Program Manager, Environmental Health Risk
Assessment and Risk Communication

CF:
HQDA(DASG-HS-PE)
CDR, USAMEDCOM, ATTN: MCHO-CL-P
CDR, CEMRD, ATTN: CEMRD-ET-EH
CDR, USAEC, ATTN: SFIM-AEC-IRP
CDR, LHAAP, ATTN: SMCLO-EN

Readiness thru Health

Comments and Reccommendations
U.S. Army Center for Health Promotion and Preventive Medicine

SUBJECT: Review of Final Air Monitoring Plan, Interim Remedial Action at Burning Ground No. 3, Longhorn Army Ammunition Plant, Karnack, TX, prepared by Dow Environmental Inc., 16 April 1996

1. Page 4, Section 3.1, A. Birks
Applicable Federal Standards
Comment: There is no mention in this section of any ARARs pertaining to the Clean Air Act Amendments. There are National Ambient Air Quality Standards that may pertain to this site.
Recommendation: Discuss any requirements of the Clean Air Act that may pertain to this site.

2. Page 6, Section 4.1, A. Birks
Soil Treatment Plant Emissions
Comment: This section discusses the method for determining the **potential** emissions from the STP. Emissions were calculated using the average historical soil concentration for each VOC detected in the soil. This method of calculating emissions would represent an average emissions estimate and not a potential emissions estimate. The calculation of potential emissions assumes the worst case emissions and would use the worst case concentrations from the soil data.
Recommendation: Clarify the emissions that are being calculated.

3. Page 6, Section 4.1, A. Birks
Soil Treatment Plant Emissions
Comment: Potential air emission were estimated using a variety of assumptions. There are no references provided with any of these assumptions
Recommendation: Provide reference were necessary to back-up all assumptions made throughout the study.

4. Page 9, Section 4.1, A. Birks
Soil Treatment Plant Emissions
Comment: The two contaminants that were detected at the highest concentrations are methylene chloride and trichloroethylene. It is then stated that these two contaminants would be considered to be the compounds of concern. High concentrations of a particular contaminant is only one factor in determining compounds of concern. The other factor is the compounds toxicity based on EPA risk factors or threshold limit values. Compounds with lower concentrations could still be a chemical of concern due to the inherent risk associated with that compound.
Recommendation: Consider the risk factors associated with each compound before identifying contaminants of concern. If methylene chloride and trichloroethylene pose the greatest risk as well as having the highest concentrations explain this in section 4.1.

Encl

SUBJECT: Review of Final Air Monitoring Plan, Interim Remedial Action at Burning Ground No. 3, Longhorn Army Ammunition Plant, Karnack, TX, prepared by Dow Environmental Inc., 16 April 1996

5. Page 18, Section 5.2.1, A. Birks
Baseline Monitoring Program
Comment: Section 5.4 states that there will be several collocated samplers during the course of the sampling; however, the use of collocated samplers is not discussed in section 5.2.1.
Recommendation: Discuss the use of collocated samplers in section 5.2.1.

6. Pages 18 and 19, Section 5.2.2, A. Birks
Remedial Action Monitoring Program
Comment: The discussion of air sampling during excavation states that if first-alert stations are triggered there will be a reduction in activity until levels are reduced to background levels. The discussion of sampling during treatment states that monitoring will be performed to ensure health effect screening levels are not exceeded. These two statements appear to be reversed. It is likely that background emissions would be exceeded during excavation since emissions would be highest at this time. Standards should be set to ensure health effect screening levels are not exceeded. On the other hand, the treatment operations should reduce the emissions to the atmosphere and should not exceed background levels.
Recommendation: Clarify the discussion of monitoring standards in this section.

7. Appendices, A. Birks
Comment: The following appendices are not included in this final report: Appendix E, Appendix F, and Appendix G.
Recommendation: Include these Appendices in this report.

Barry R. McBee, *Chairman*
R. B. "Ralph" Marquez, *Commissioner*
John M. Baker, *Commissioner*
Dan Pearson, *Executive Director*

017839

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

May 23, 1996

CERTIFIED MAIL
P 836 901 732
RETURN RECEIPT REQUESTED

James A. McPherson, Commander's Representative
Longhorn/Louisiana Army Ammunition Plant
Attn: SIOLH-CR
P.O. Box 30058
Shreveport, LA 71130-0058

Re: Longhorn Army Ammunition Plant
Group 4 Sites - Baseline Risk Assessment Work Plan

Dear Mr. McPherson:

The Texas Natural Resource Conservation Commission (TNRCC) staff have completed our review of the above referenced document, which was received on April 26, 1996. Our comments are enclosed. If you have any questions or comments regarding this matter please call me at (512) 239-2502.

Sincerely,

Diane R. Poteet

Diane R. Poteet
Project Manager (MC-143)
RI/FS II Unit
Superfund Investigation Section
Pollution Cleanup Division

enclosure

cc: Chris Villarreal, EPA Region 6 (6SF-AT)
Jonna Polk, COE Tulsa District (CESWT-PP-EA)

TNRCC Technical Support Comments
Longhorn Army Ammunition Plant
Group 4 Sites - Baseline Risk Assessment Work Plan

Comments By Allison Jenkins (Human Health Issues): The above document is well-written and is a very thorough work plan. I reviewed the document, and have the following comments:

1. Section 3.4 and Section 5.1.1

Analyzing soil data for dioxins/furans is included in the new soil sampling effort (Section 5.1.1). You may consider including in Section 3.4 how dioxins/furans will be handled if they are included in the risk assessment, similar to what was done for PAHs.

2. Section 3.7

What is the rationale for calculating PRGs with a hazard index of 10?

3. Section 5.1.2

Were the background soil samples analyzed for the chemicals that were not included in the Phase I and Phase II Investigations (e.g., beryllium, nickel, etc.)?

TNRCC Technical Support Comments
Longhorn Army Ammunition Plant
Group 4 Sites - Baseline Risk Assessment Work Plan

Comments By Larry Champagne (Ecological Issues): Much effort appears to have been put forth in the ecological risk assessment (ERA) portion of this Work Plan and some good information is presented. However, this "work plan" also includes "results" from many of the elements of the problem formulation and conceptual model steps of the ERA. Furthermore, it presents a statistical manipulation of the existing data, thus serving as a data compilation report. These combined factors serve to somewhat complicate the review process. In addition, many of the previous comments made on the ERA for the Group 1 Sites are applicable to this work plan, especially since no response to those comments has ever been received.

General Comments:

1. The Problem Formulation step of the ERA should discuss the toxicity profile associated with each contaminant. The profile should describe the toxic mechanisms and the exposures (i.e., concentrations or doses) that cause specified adverse effects in likely receptors.

2. It is recommended that a screening-level ERA, as described in U.S.EPA (1994), be conducted initially to focus the assessment on those contaminants and their pathways that pose the greatest risk to ecological receptors.

3. Tables should be prepared which document the toxicity literature search. Information on several representatives from each functional group (e.g., herbivores, omnivores) of receptors likely to be exposed needs to be included. Selection of the least shrew, white-footed mouse, American woodcock, chipping sparrow, river otter, belted kingfisher, bald eagle, and alligator snapping turtle was premature and not sufficiently justified (i.e., the sensitivity of these receptors was not discussed; see following comment).

4. Much emphasis appears to have been placed on whether or not the selected indicator species is on a threatened/endangered list. Instead, selection should be primarily based on sensitivity, and to a lesser extent, on functional group and ecological relevance.

5. The work plan states that surface water data from Caddo Lake will be incorporated into the ERA. Considering the ecological significance of the lake and the potentially numerous pathways for site contaminants to enter it, sediment data should also be collected and evaluated as part of the assessment (see Specific Comment #5).

Specific Comments:

P.4-14 and 15, Figures 4-2 and 4-3; Sensitivity of a top-level carnivore (or its surrogate) to contaminants must be considered, particularly for those contaminants with the potential to bioaccumulate/biomagnify. This information is available in the literature.

P.4-15, Figure 4-3; All pathways between mammals, reptiles, and birds are not reflected.

P.4-19, §4.3.1.1; Just because a species has the "greatest potential for exposure", does not mean it is an appropriate indicator species. In order for a species to truly be an indicator species, it needs to be shown that its sensitivity to a contaminant or group of contaminants is protective of other species in that same functional group.

P.4-21, §4.3.1.2 Mammalian Species (River Otter); Total risk to the river otter will not be reflected by ingestion of fish and surface water alone. It is inappropriate to ignore other exposure routes (e.g., ingestion of crayfish and other benthic organisms; incidental ingestion of sediment) which will contribute to the overall risk of the otter. Also, it is unclear why only the groundwater pathway was specified, when other lake contaminant pathways (e.g., feeder streams, runoff) exist.

P.4-23, §4.3.1.2 Aquatic Life; Obviously, in order to evaluate exposure of aquatic life to potentially contaminated sediments in Caddo Lake, data on sediment quality from the lake must first be collected.

P.4-31, §4.4.1; TERRETOX, which contains ecotoxicological effects information for terrestrial wildlife, should be added to the list of databases to be reviewed.

P.4-36, Last Sentence; The hazard quotients for those contaminants that have the same toxic effect mechanism for a receptor should be added.

P.4-41, §4.6.3; Screening levels for sediments presented in Long and Morgan (1990) include freshwater environments and thus would be more appropriate than Long et al.(1995).

P.4-49, Table 4-3; As described in the preceding comments, insufficient information on toxicity profiles and receptor sensitivities has been provided to justify the appropriateness of these assessment and measurement endpoints. Also, the second assessment endpoint does not seem to fit the definition or meet the criteria presented on page 4-12.

References:

Long, E.R.,D.D. MacDonald, S.L. Smith and F.D. Calder. 1995. *Incidence of Adverse Biological Effects Within Ranges of Chemical Concentrations in Marine and Estuarine Sediments*. Environmental Management 19 (1): 81-97.

Long, E.R. and L.G. Morgan. 1990. *The Potential for Biological Effects of Sediment-Sorbed Contaminants Tested in the National Status and Trends Program.* NOAA Tech. Memo. NOS OMA 62. National oceanic and Atmospheric Administration, Seattle, WA.

U.S.EPA. Draft September 26, 1994. Ecological risk assessment guidance for superfund: Process for designing and conducting ecological risk assessments. U.S.Environmental Protection Agency, Environmental Response Team, Edison, New Jersey.

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

017844

May 23, 1996

CERTIFIED MAIL: RETURN RECEIPT REQUESTED - P 239 543 680

James A. McPherson, Commander's Representative
Longhorn/Louisiana Army Ammunition Plants
Attn: SIOLH-CR
P.O. Box 30058
Shreveport, LA 71130-0058

Re: Longhorn Army Ammunition Plant
EPA's Comments on the Draft Design Analysis Report
for the Site 16 (Old Landfill) Time Critical Removal Action

Dear Mr. McPherson:

Pursuant to the Federal Facility Agreement, the Environmental Protection Agency (EPA) is providing comments on the Draft Design Analysis Report for the Site 16 (Old Landfill) Time Critical Removal Action (Sverdrup, May 1996). EPA's comments are included as an enclosure to this letter.

If you have any questions about this or any other matter, please contact me at (214)665-6758.

Sincerely,

Chris G. Villarreal

Chris G. Villarreal
Remedial Project Manager

Enclosure

cc: David Tolbert (via facsimile)
Longhorn/Louisiana Army Ammunition Plants

Jonna Polk (via regular mail & facsimile)
Tulsa District Core of Engineers

Diane Poteet (via regular mail & facsimile)
Texas Natural Resource Conservation Commission

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EPA'S COMMENTS ON THE DRAFT DESIGN ANALYSIS REPORT SITE 16 (OLD LANDFILL) TIME CRITICAL REMOVAL MAY 1996

17845

#1 SECTION 2.3 PREVIOUS INVESTIGATIONS, PAGE 2-2, FIRST PARAGRAPH:

Text states

"Three monitoring wells (BH-14, BH-15, and BH-16) were installed at the locations shown on Figure 2-1 (Appendix I)."

EPA Comment

Monitoring well locations are not shown on Figure 2-1.

#2 SECTION 2.4 ASSESSMENT OF HISTORICAL DATA PRELIMINARY ASSESSMENT/SITE INVESTIGATIONS (PA/SI)

General Comment

It would be helpful if the data discussed in this section was also summarized in table format.

#3 SECTION 2.4 ASSESSMENT OF HISTORICAL DATA PRELIMINARY ASSESSMENT/SITE INVESTIGATIONS (PA/SI), PAGE 2-4, FIRST PARAGRAPH:

Text states

"A summary of compounds detected in surface water, sediment, soil, and groundwater samples from previous investigations are provided in Table 4-1."

EPA Comment

Table 4.1 is not a summary of previously detected compounds. Table 4.1 shows Pump Test Parameters.

#4 SECTION 2.4 ASSESSMENT OF HISTORICAL DATA PRELIMINARY ASSESSMENT/SITE INVESTIGATIONS (PA/SI), PAGE 2-4, SECOND PARAGRAPH:

Text states

"Surface soil samples contained detectable concentrations of 1,3,5-Trinitrobenzene, below 153 ug/kg, **with none identified in soils at-Dichloroethene (1,1-DCE)**, and . . . "

EPA Comment

Please revise, bolded text above does not make sense.

#5 SECTION 2.4 ASSESSMENT OF HISTORICAL DATA PRELIMINARY ASSESSMENT/SITE INVESTIGATIONS (PA/SI), PAGE 2-6, FOURTH PARAGRAPH:

TYPO

Ten of twelve groundwater samples collected ~~form~~ from the monitoring wells . ."

#6 PHASE 2 SEDIMENT SAMPLE RESULTS, PAGE 2-8, TOP SENTENCE:

Text mentions "Soil Screening Levels (SSLs). On what are these based? Please discuss.

#7 MONITORING WELL GROUNDWATER RESULTS, PAGE 2-9, SECOND PARAGRAPH:

Text states

"Only TNT was detected at a concentration above the **SSL**. 1,3,5-trinitrobenzene was detected in two of the nineteen groundwater samples collected, but at concentrations below the **SSL**."

EPA Comment

Why are groundwater sample concentrations being compared to Soil Screening Levels?

#8 SECTION 3.0 SUMMARY OF FIELD ACTIVITIES, GROUNDWATER SAMPLING, PAGE 3-2:

TYPO

"Extraction well groundwater sample data is summarized in Table 3.3 and Table IV-1 (Appendix ~~I~~ IV)

#9 SECTION 5.1 MODEL PARAMETERS, PAGE 5-2, FIRST PARAGRAPH, LAST SENTENCE:

TYPO

"Layer 7 is designed to simulate the top of the Midway Formation which acts as a confining layer.

#10 SECTION 5.2 IDENTIFICATION AND SCREENING OF GROUNDWATER CONTROL ALTERNATIVES, PAGE 5-4, FIRST PARAGRAPH:

TYPO & MODIFICATION

"The following sections describe each of the groundwater control alternatives and evaluates their effectiveness~~;~~ ~~relative installation~~ costs, and assess their implementability.'

EPA Comment

The evaluation of the various control alternatives (discussed in sections 5.2.2 - 5.2.8) need to address effectiveness, costs, and implementability as defined below:

Effectiveness

Effectiveness is evaluated based on the ability of the process option to meet the project objectives. Both short-term and long-term effectiveness are evaluated within this criterion. Short-term effectiveness considers the length of time required to implement the process option and any adverse effects on human health or the environment during the construction or implementation period. Long-term effectiveness considers the ability of the process option to limit contaminant migration following the construction period and includes a relative assessment of the reduction in contaminant toxicity, mobility, or volume provided by the process option. Removal actions shall, to the extent practicable, contribute to the efficient performance of any anticipated long-term action with respect to the release concerned.

Costs

This criterion evaluates the capital, operations, and maintenance costs of the process option. This criterion is used to identify whether the costs of the process option is grossly disproportionate to other process options when compared to the level of effectiveness achieved.

Implementability

This criterion evaluates both the technical and administrative implementability of the process option. Technical implementability considers the ability to construct and reliably operate and maintain the process option and to monitor the process option after implementation. Administrative implementability considers: (i) the ability to obtain necessary regulatory approvals; (ii) the type and availability of necessary treatment, storage, and disposal services; and (iii) the availability of necessary equipment and technical expertise.

General Comments:

i) In the discussion of the various process options, site access, soil materials, and construction methods are listed as "limiting factors" or "primary factors" in regards to the implementability of the process options. Please discuss why site access, soil materials, and construction methods are limiting factors in the discussions of the various process options.

ii) In the discussion of the various process options, costs of the various process options are defined as "no additional costs" (only installation costs considered) "lowest" for alternatives requiring additional site work, "moderate to high", "high", "higher than those alternatives requiring the installation of extraction wells only in the shallow saturated sand zone", "high to very high", etc. What are the estimated costs for the various process options?.

#11 SECTION 5.2.4 INTERCEPTION TRENCHES IN THE SHALLOW SATURATED ZONE, PAGE 5-6, LAST SENTENCE:

Text states

"Possible problems associated with the installation of an interception trench could significantly limit its effectiveness."

EPA Comment

What possible problems? Please discuss.

#12 SECTION 5.2.8 ADDITIONAL EXTRACTION WELLS IN THE SHALLOW AND INTERMEDIATE SATURATED ZONES WITH A SLURRY CUTOFF WALL, PAGE 5-9, FIRST PARAGRAPH:

TYPO

"These additional wells extraction wells would be nested and sufficient in number to achieve the objective of hydraulic control of the shallow and intermediate saturated sand zones and to capture the entire ~~of the~~ contaminant plumes . . ."

Second paragraph

TYPO

"The implementation of ~~T~~this alternative. . ."

#13 SECTION 5.4 SCENARIO NO.1, PAGE 5-13, SECOND PARAGRAPH:

TYPO

"The results of the groundwater flow model under this scenario indicates that the two existing wells are ~~excreting~~ exerting some hydraulic control, . . . Figures 5-~~2~~1 and 5-~~3~~2 shows flow nets for the shallow saturated sand zone and the intermediate saturated sand zone."

SECTION 5.5 SCENARIO NO. 2, PAGE 5-14:

TYPO

"Figures 5-4~~3~~ and 5-~~6~~4 shows flow nets for both the shallow saturated sand zone and the intermediate saturated sand zone respectively,"

#14 SECTION 6.0 RECOMMENDATIONS, PAGE 6-2:

General Comment

Scenario No. 5 (additional nested wells with slurry wall) was the recommended contaminant plume control option. As stated in Section 5.6, page 5-15 (Scenario No. 4 - additional nested wells without slurry wall), "Results of the groundwater flow model under this scenario indicate that the two existing extraction wells coupled with the six additional extraction wells, exert enough hydraulic control to impart complete capture of the contaminant plume in both the shallow sand zone and intermediate saturated sand zone." Primary concerns with the addition of the slurry wall include the following:

(i) Has the geology of layer 5 been adequately investigated to make the

determination that it would provide an impermeable layer in which to tie the base of the slurry wall? Layer 5 is defined as a silt and silty clay semi-confining layer. This is particularly important given the fact that TCE - one of the primary contaminants this action is to address - has a density of 1.462 g/cc (at 20°C) and therefore is a DNAPL.

(ii) Given the anticipated high capital cost of installing a 600' long by 75 feet deep slurry wall, is the expenditure of funds for the construction of slurry wall cost effective? Would it be more cost effective to install and operate additional extraction wells if the wells planned in Scenario 4 are not sufficient to capture the contaminant plume from landfill 16?

#15 SECTION 7.4 SLURRY CUTOFF WALL, PAGE 7-9, FIRST PARAGRAPH:

TYPO

The slurry cutoff wall will obstruct horizontal migration of groundwater.

#16 APPENDIX V, FIGURES 7-1, 7-3 AND 7-5:

Figure 7-1 (Extraction Well Construction Information) shows the that the well is screened 30 to 35 feet below ground surface (bgs). Figures 7-3 (Monitoring Well Construction Information - Intermediate Monitoring Well) and Figure 7-5 (Piezometer Construction Information - Intermediate (50') Piezometer) show that the well and piezometer screened 40 to 50 feet bgs and 45 to 50 feet bgs respectively.

EPA Comment

The extraction wells need to be screened at the based of the water bearing units. This is especially important given the nature of the contaminants (i.e., TCE - DNALP).