LONGHORN ARMY AMMUNITION PLANT

KARNACK, TEXAS

ADMINISTRATIVE RECORD

VOLUME 1 of 1

1999

Bate Stamp Numbers
024451 - 024658

Prepared for:

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

1999

Volume 1 of 1

I999

A: Title: Letter; Certified – Notification of designated Project Manager and address for the Texas Natural Resource Conservation Commission
Location: Austin, Texas; Texas Natural Resource Conservation Commission
Author: Diane R. Poteet, (MC-143), Superfund Cleanup Section, Remediation Division, TNRCC
Recipient: James A. McPherson, Commanders Representative, Longhorn AAP
Date: 26 January 1999
Bate Stamp: 024451-024452

B: Title: Minutes – Monthly Manager's Meeting, Longhorn AAP
Location: Karnack, Texas; Longhorn Army Ammunition Plant
Author: Jonna Polk, Tulsa District, USACE
Recipient: All Parties
Date: 18 February 1999
Bate Stamp: 024453-024454

C: Title: Letters - Subject: Proposal to reduce the sampling schedule for treated water discharged from the Groundwater Treatment Plant at the Longhorn Army Ammunition Plant, Karnack, Texas
Location: Doyline, Louisiana; Longhorn/Louisiana Army Ammunition Plants
Author: James A. McPherson, Commander's Representative, Longhorn AAP
Recipient: Chris Villarreal, US Environmental Protection Agency and Mike Moore, Texas Natural Resource Conservation Commission
Date: 02 March 1999
Bate Stamp: 024455 – 024456

D: Title: Letter - Subject: Concur letter to proposal of reducing the sampling schedule for treated water discharged from the Groundwater Treatment Plant at the Longhorn Army Ammunition Plant, Karnack, Texas
Location: Austin, Texas; Texas Natural Resource Conservation Commission
Author: Michael A. Moore, Senior Project Manager, TNRCC
Recipient: James A. McPherson, Commander's Representative, Longhorn AAP
Date: 19 March 1999
Bate Stamp: 024457 – 024457

E: Title: Fax/Letter - Subject: Concur letters for reducing the sampling schedule for treated water discharged from the Groundwater Treatment Plant at the Longhorn Army Ammunition Plant, Karnack, Texas
Location: Austin, Texas; Texas Natural Resource Conservation Commission & Dallas, Texas; US Environmental Protection Agency
Author: Michael A. Moore, Senior Project Manager, TNRCC & Chris G. Villarreal, Project Manager, EPA

Recipient: David Tolbert, Project Manager, Longhorn AAP
& James A. McPherson, Commander's Representative, Longhorn AAP
Date: 23 March 1999
& 24 March 1999
Bate Stamp: 024458 – 024460

F: Title: Minutes – Technical Review Committee Meeting, Longhorn AAP
Location: Karnack, Texas; Karnack Community Center
Author: Jonna Polk, Tulsa District, USACE
Recipient: All Parties
Date: 25 March 1999
Bate Stamp: 024461-024466

G: Title: Letter - Subject: Pipeline to divert discharge to a temporary holding pond from the Groundwater Treatment Plant at the Longhorn Army Ammunition Plant, Karnack, Texas
Location: Doyline, Louisiana; Department of the Army
Author: James A. McPherson, Commander's Representative, Longhorn AAP
Recipient: Chris Villarreal, Remedial Project Manager, Superfund Div., EPA
& Mike Moore, Superfund Investigation Section, TNRCC
Date: 05 April 1999
Bate Stamp: 024467 – 024468

H: Title: Minutes – Monthly Manager's Meeting, Longhorn AAP
Location: Karnack, Texas; Longhorn Army Ammunition Plant
Author: Jonna Polk, Tulsa District, USACE
Recipient: All Parties
Date: 12 April 1999
Bate Stamp: 024469-024469

I: Title: Letter – Subject: Draft Cost and Performance Report for Burning Ground No. 3 at Longhorn Army Ammunition Plant, Karnack, Texas – January 11, 1999
Location: Dallas, Texas; U.S. EPA Region 6
Author: Chris G. Villareal, Remedial Project Manager, Superfund Division, EPA
Recipient: Cliff Murray, Tulsa District, USACE
Date: 19 April 1999
Bate Stamp: 024470-024470

J: Title: Minutes – Monthly Manager's Meeting, Longhorn AAP
Location: Karnack, Texas; Longhorn Army Ammunition Plant
Author: Jonna Polk, Tulsa District, USACE
Recipient: All Parties
Date: 19 May 1999
Bate Stamp: 024471-024472

K:
Title: Letter - Subject: Notification of TNRCC's designated Project Manager In accordance with the Federal Facility Agreement for the Longhorn Army Ammunition Plant, Karnack, Texas
Location: Austin, Texas; Texas Natural Resource Conservation Commission
Author: Wade Stone, Superfund Cleanup Section Remediation Div., TNRCC
Recipient: James A. McPherson, Commander's Representative, Longhorn AAP
Date: 28 May 1999
Bate Stamp: 024473 – 024474

L:
Title: Minutes – Technical Review Committee Meeting, Longhorn AAP
Location: Karnack, Texas; Longhorn Army Ammunition Plant
Author: Jonna Polk, Tulsa District, USACE
Recipient: All Parties
Date: 02 June 1999
Bate Stamp: 024475-024475

M:
Title: Letter - Subject: Perchlorate Action Plan for the Longhorn Army Ammunition Plant, Karnack, Texas
Location: Doyline, Louisiana; Department of the Army
Author: James A. McPherson, Commander's Representative, Longhorn AAP
Recipient: Wade Stone, Superfund Cleanup Section Remediation Div., TNRCC
Date: 24 June 1999
Bate Stamp: 024476 – 024478

N:
Title: Letter – Subject: Analytical reports for water samples collected at the Blanchard, Louisiana public water supply water treatment plant
Location: Dallas, Texas; U.S. EPA Region 6
Author: Chris G. Villareal, Remedial Project Manager, EPA
Recipient: Robert McEachern
Date: 28 June 1999
Bate Stamp: 024479-024482

O:
Title: Letter – Subject: Copy of the EPA's Interim Assessment Guidance for Perchlorate
Location: Dallas, Texas; U.S. EPA Region 6
Author: Chris G. Villareal, Remedial Project Manager, EPA
Recipient: James A. McPherson, Commander's Representative, Longhorn AAP
Date: 08 July 1999
Bate Stamp: 024483-024487

P:
Title: E-Mail - Subject: Immediate actions for Perchlorate sampling at the Longhorn Army Ammunition Plant, Karnack, Texas
Location: Austin, Texas; Texas Natural Resource Conservation Commission
Author: James S.H. Sher, P.E., TNRCC
Recipient: James A. McPherson, Commander's Representative, Longhorn AAP
Date: July 1999
Bate Stamp: 024488 – 024488

Q:
Title: Letter - Subject: Request for Immediate Initial Assessment of Perchlorate in Caddo Lake and the Longhorn Army Ammunition Plant, Karnack, Texas
Location: Austin, Texas; Texas Natural Resource Conservation Commission
Author: James S.H. Sher, P.E., Project Manager, Superfund Cleanup Section Remediation Division, TNRCC
Recipient: James A. McPherson, Commander's Representative, Longhorn AAP
Date: 09 July 1999
Bate Stamp: 024489 – 024501

R:
Title: Letter - Subject: Response to the July 9, 1999 TNRCC Request for Immediate Initial Assessment of Perchlorate in Caddo Lake and the Longhorn Army Ammunition Plant, Karnack, Texas
Location: Doyline, Louisiana; Department of the Army
Author: James A. McPherson, Commander's Representative, Longhorn AAP
Recipient: James S.H. Sher, P.E., Project Manager, Superfund Cleanup Section Remediation Division, TNRCC
Date: 12 July 1999
Bate Stamp: 024502 – 024503

S:
Title: Letter - Subject: Response to the July 12, 1999 Army Response to the TNRCC Request for Immediate Initial Assessment of Perchlorate in Caddo Lake and the Longhorn Army Ammunition Plant, Karnack, Texas
Location: Austin, Texas; Texas Natural Resource Conservation Commission
Author: James S.H. Sher, P.E., Project Manager, Superfund Cleanup Section Remediation Division, TNRCC
Recipient: David Tolbert, Program Manager, Longhorn AAP
Date: 13 July 1999
Bate Stamp: 024504 – 024505

T:
Title: Letter & Report - Subject: Final Release Version of public health assessment of the Longhorn Army Ammunition Plant, Karnack, Texas
Location: Atlanta, Georgia, Department of Health & Human Services, Agency for Toxic Substances and Disease Registry (ATSDR)
Author: Max M. Howie, Jr., Chief, Program Evaluation, Records and Information Services Branch, ATSDR
Recipient: James A. McPherson, Commander's Representative, Longhorn AAP
Date: 14 July 1999
Bate Stamp: 024506-024570

U:
Title: Letter - Subject: Response to the July 9, 1999 TNRCC Request for Immediate Initial Assessment of Perchlorate in Caddo Lake and the Longhorn Army Ammunition Plant, Karnack, Texas
Location: Doyline, Louisiana; Department of the Army
Author: James A. McPherson, Commander's Representative, Longhorn AAP

Recipient: James S.H. Sher, P.E., Project Manager, Superfund Cleanup Section Remediation Division, TNRCC
Date: 15 July 1999
Bate Stamp: 024571 – 024572

V:
Title: Minutes – Monthly Manager's Meeting, Longhorn AAP
Location: Karnack, Texas; Longhorn Army Ammunition Plant
Author: Jonna Polk, Tulsa District, USACE
Recipient: All Parties
Date: 20 July 1999
Bate Stamp: 024573-024575

W:
Title: Memorandum – Reference the July 9, 1999 TNRCC Request for Immediate Initial Assessment of Perchlorate in Caddo Lake and the Longhorn Army Ammunition Plant, Karnack, Texas
Location: Doyline, Louisiana; Department of the Army
Author: James A. McPherson, Commander's Representative, Longhorn AAP
Recipient: Memorandum For Record
Date: 24 August 1999
Bate Stamp: 024576-024576

X:
Title: Letter - Subject: Notification of TNRCC's designated Project Manager In accordance with the Federal Facility Agreement for the Longhorn Army Ammunition Plant, Karnack, Texas
Location: Austin, Texas; Texas Natural Resource Conservation Commission
Author: Wade Stone, Superfund Cleanup Section Remediation Div., TNRCC
Recipient: James A. McPherson, Commander's Representative, Longhorn AAP
Date: 25 August 1999
Bate Stamp: 024577 – 024578

Y:
Title: Letter - Subject: Routine Inspection of PWS ID No. 1020025 to evaluate compliance with applicable public water supply requirements for the Longhorn Army Ammunition Plant, Karnack, Texas
Location: Austin, Texas; Texas Natural Resource Conservation Commission
Author: C. Noel Luper, P.E., Water Section Mgr., Tyler Region Office, TNRCC
Recipient: James A. McPherson, Commander's Representative, Longhorn AAP
Date: 27 August 1999
Bate Stamp: 024579 – 024579

Z:
Title: Letter – Subject: Early Interim Remedial Action at Burning Ground No. 3 and Landfills 12 and 16 – Remedial Action Completion
Location: Dallas, Texas; U.S. EPA Region 6
Author: William K. Honker, Chief, AR/OK/TX Branch, EPA
Recipient: James A. McPherson, Commander's Representative, Longhorn AAP
Date: 31 August 1999
Bate Stamp: 024580-024581

AA:
Title: Letter - Subject: Request for confirmation of intent to pursue funding regarding Immediate and Specific Actions for Perchlorate Contamination at the Longhorn Army Ammunition Plant, Karnack, Texas
Location: Austin, Texas; Texas Natural Resource Conservation Commission
Author: Scott T. Crouch, Section Manager, Superfund Cleanup Section, TNRCC
Recipient: James A. McPherson, Commander's Representative, Longhorn AAP
Date: 03 September 1999
Bate Stamp: 024582 – 024583

BB:
Title: Memorandum - Subject: Response to September 3, 1999 TNRCC Request for confirmation of intent to pursue funding regarding Immediate and Specific Actions for Perchlorate Contamination at the Longhorn Army Ammunition Plant, Karnack, Texas
Location: Doyline, Louisiana; Department of the Army
Author: James A. McPherson, Commander's Representative, Longhorn AAP
Recipient: Memorandum For Commander, U.S. Industrial Operations Command
Date: 07 September 1999
Bate Stamp: 024584-024585

CC:
Title: Memorandums - Subject: Response pertaining to Specific Funding for Perchlorate Contamination at the Longhorn Army Ammunition Plant, Karnack,
Location: Rock Island, Illinois; Department of the Army, HQ U.S. Army Industrial Operations Command
Author: B.G. Murphy, Chief, Environmental Mgmt. and Restoration Team & P.S. Morris, Colonel
Recipient: Memorandum For Commander, U.S. Army Materiel Command
Date: 09 September 1999 & 13 September 1999
Bate Stamp: 024586-024587

DD:
Title: Minutes – Technical Review Committee Meeting, Longhorn AAP
Location: Karnack, Texas; Longhorn Army Ammunition Plant
Author: Jonna Polk, Tulsa District, USACE
Recipient: All Parties
Date: 14 September 1999
Bate Stamp: 024588-024591

EE:
Title: Letter – Subject: Capping of Perchlorate Contaminated Soils at Bldg. 25-C at the Longhorn Army Ammn. Plant, Karnack, Texas
Location: Dallas, Texas; U.S. EPA Region 6
Author: Chris G. Villareal, Remedial Project Manager, EPA
Recipient: James A. McPherson, Commander's Representative, Longhorn AAP
Date: 24 September 1999
Bate Stamp: 024592-024593

FF:
Title: Letter - Subject: Notification of Dispute regarding Immediate and Specific Actions for Perchlorate Contamination at the Longhorn Army Ammunition Plant, Karnack, Texas
Location: Austin, Texas; Texas Natural Resource Conservation Commission
Author: Jacqueline S. Hardee, PE, Director, Remediation Division, TNRCC
Recipient: James A. McPherson, Commander's Representative, Longhorn AAP
Date: 27 September 1999
Bate Stamp: 024594 – 024610

GG:
Title: Memorandum - Subject: Perchlorate Sampling Interim Guidance
Location: Washington, DC, Department of the Army, Assistant Chief of Staff for Installation Management
Author: Richard L. Freeman, Colonel, GS, Director, Environmental Programs
Recipient: Memorandum for Distribution
Date: 30 September 1999
Bate Stamp: 024611 – 024613

HH:
Title: Letter - Subject: Response to September 27, 1999 TNRCC Notice of Dispute Letter regarding Immediate and Specific Actions for Perchlorate Contamination at the Longhorn Army Ammunition Plant, Karnack, Texas
Location: Dallas, Texas, U.S. Environmental Protection Agency
Author: Myron O. Knudson, P.E., Director, Superfund Division, EPA
Recipient: Jacqueline S. Hardee, PE, Director, Remediation Division, TNRCC
Date: 07 October 1999
Bate Stamp: 024614 – 024615

II:
Title: E-Mail - Subject: Environmental Issue, Perchlorate, at the Longhorn Army Ammunition Plant, Karnack, Texas
Location: Doyline, Louisiana; Department of the Army
Author: James A. McPherson, Commander's Representative, Longhorn AAP
Recipient: Paul H. Woodhouse
Date: 07 October 1999
Bate Stamp: 024616 – 024616

JJ:
Title: Letter - Subject: Response to TNRCC Notification of Dispute Letter regarding Immediate and Specific Actions for Perchlorate Contamination at the Longhorn Army Ammunition Plant, Karnack, Texas
Location: Rock Island, Illinois, Department of the Army, HQ, U.S. Army Industrial Operations Command
Author: Dennis L. Bates, Chief, Environmental/Safety Law, Department of the Army
Recipient: Jacqueline S. Hardee, PE, Director, Remediation Division, TNRCC
Date: 14 October 1999
Bate Stamp: 024617 – 024618

KK:
Title: Letter - Subject: Data and Documents pertaining to Perchlorate at the Longhorn Army Ammunition Plant, Karnack, Texas

	Location:	Austin, Texas; Texas Natural Resource Conservation Commission
	Author:	James S.H. Sher, P.E., Project Manager, Superfund Cleanup Section, TNRCC
	Recipient:	James A. McPherson, Commander's Representative, Longhorn AAP
	Date:	04 November 1999
	Bate Stamp:	024619 – 024637
LL:	Title:	Letter - Subject: Request for Meeting on Perchlorate Environmental Restoration Plan for the Longhorn Army Ammunition Plant, Karnack, Texas
	Location:	Rock Island, Illinois, Department of the Army, HQ, U.S. Army Industrial Operations Command
	Author:	B.G. Murphy, Chief, Environmental Team, Department of the Army
	Recipient:	Jacqueline S. Hardee, PE, Director, Remediation Division, TNRCC
	Date:	10 November 1999
	Bate Stamp:	024638 – 024639
MM:	Title:	Fax/Letter - Subject: Copy of Letter sent to Mr. Myron O. Knudson, EPA, concerning Perchlorate at the Longhorn Army Ammunition Plant, Karnack, Texas
	Location:	Austin, Texas; Texas Natural Resource Conservation Commission
	Author:	James S.H. Sher, P.E., Project Manager, Superfund Cleanup Section, TNRCC
	Recipient:	David Tolbert, Program Manager, Longhorn AAP
	Date:	17 November 1999
	Bate Stamp:	024640 – 024644
NN:	Title:	Fax/Letter - Subject: Letter concerning Notification of Delegation for Dispute Resolution Proceedings concerning Perchlorate at the Longhorn Army Ammunition Plant, Karnack, Texas
	Location:	Dallas, Texas, U.S. Environmental Protection Agency
	Author:	Chris G. Villarreal, Remedial Project Manager, EPA
	Recipient:	James A. McPherson, Commander's Representative, Longhorn AAP
	Date:	30 November 1999
	Bate Stamp:	024645 – 024646
OO:	Title:	Minutes – Perchlorate Resolution Meeting, Longhorn AAP
	Location:	Austin, Texas
	Author:	Jonna Polk, Tulsa District, USACE
	Recipient:	All Parties
	Date:	01 December 1999
	Bate Stamp:	024647-02652
PP:	Title:	Fax/Letter - Subject: Letter concerning Unanimous Decision of Dispute Resolution Committee concerning Perchlorate at the Longhorn Army Ammunition Plant, Karnack, Texas
	Location:	Dallas, Texas, U.S. Environmental Protection Agency
	Author:	Chris G. Villarreal, Project Manager, Superfund Division, EPA

Recipient: James A. McPherson, Commander's Representative, Longhorn AAP
Date: 06 December 1999
Bate Stamp: 024653 – 024657

QQ: Title: Memorandum - Subject: LHAAP Request for Permission to Sample Beyond Property Boundary to determine whether Perchlorate is present in the surface water of Caddo Lake, Karnack, Texas
Location: Doyline, Louisiana; Department of the Army
Author: James A. McPherson, Commander's Representative, Longhorn AAP
Recipient: Memorandum For Commander, U.S. Industrial Operations Command
Date: 13 December 1999
Bate Stamp: 024658-024658

024451

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

January 26, 1999

James A. McPherson
Commander's Representative
Longhorn/Louisiana Army Ammunition Plant
Attn: SIOLH-CR
P.O. Box 658
Doyline, LA 71023

CERTIFIED MAIL
Z 746 032 653
RETURN RECEIPT REQUESTED

Re: Longhorn Army Ammunition Plant

Dear Mr. McPherson:

In accordance with Section IX.A.2. of the Federal Facility Agreement for the Longhorn Army Ammunition Plant, this letter is to notify you that, effective February 4, 1999, Michael Moore will be the Texas Natural Resource Conservation Commission's designated Project Manager. Lel Medford will be working on the project as alternate project manager.

Additionally, in accordance with Section XIV.C., the state's address for notification is changed as follows:

Michael Moore **(MC-143)**
Texas Natural Resource Conservation Commission
Superfund Cleanup Section
Remediation Division
P.O. Box 13087
Austin, TX 78711-3087

The physical address for overnight delivery service is:

Michael Moore **(MC-143)**
Texas Natural Resource Conservation Commission
Superfund Cleanup Section
Remediation Division
12100 Park 35 Circle, Bldg. D
Austin, TX 78753

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

Sincerely yours,

Diane R. Poteet

Diane Poteet (MC 143)
Superfund Cleanup Section
Remediation Division

cc: Chris Villarreal, EPA Region 6 (6SF-AP)
Jonna Polk, COE Tulsa District (CESWT-PP-EA)
Oscar Linebaugh, COE Eastern Area Office (CESWF-AD-E)

Monthly Managers' Meeting
Longhorn Army Ammunition Plant
18 February 1999

1. TRC changed to 25 March 1999 at 7:00 pm at the Karnack Community Center, just outside the LHAAP gate.

2. ITR – final report is scheduled to be issued week of 22 February. This copy may be distributed to Wilma Subra. ITR members will be available for discussion, as necessary, possibly a meeting in person.

3. Perchlorates at Building 25C. COE was funded to lay liner material at 25C. At time of mobilization, discovered that demolition was scheduled for Building 25C. Demolition contract scheduled for award in April – will be completed during summer. Priority may be placed on this building for demolition. Twenty buildings will be demolished. Demo is separate from IRP. A couple of sample points, in addition to those proposed, will be added to west, across the road, as background. The purpose of this sampling event is to define the area for liner placement. The decision was made, at the suggestion of TNRCC, to go ahead and sample the drainage pathway, as well. Sampling may be conducted in two phases. COE will provide TNRCC a groundwater results map. Additionally, LHAAP has been proposed to WES for a perchlorate study.

4. Harrison Bayou sampling results – no verified detections, but water was high possibly causing dilution. All non-detect including point behind BG3. Past detections appear to have been noise in analysis, according to triplicate results from last sampling.

5. Perimeter well sampling showed no problems, including reduction of mercury in this past round.

6. Sampling frequency at BG3 – would like to reduce from daily sampling, influent and effluent, to bi-weekly sampling. Chloride and sulfate sampling will be continued on a daily basis. COE will prepare letter proposing new frequency, recognizing that we will need to continue current sampling frequency if pumps are moved, until it is determined that lowering of the pumps does not affect the concentration of the plant influent. Additionally, original performance measures will be necessary if GWTP accepts water from new source area.

7. Agenda items for TRC in March. Please let David know if you have suggestions. Army will have a meeting the afternoon preceding. A meeting will be scheduled to discuss IRT report with Wilma after receipt of the report. EPA suggested update at TRC on USFWS property acquisition. USFWS is very interested in all of LHAAP. Funding will be pursued for additional demolition of buildings. Hoping for MOA as soon as possible. Will include Susan Prosperie in the TRC process.

8. TAPP has been approved with minor changes by AEC, and will go back to IOC for procurement.

9. Next meeting scheduled for Austin on 15 April at 10:30 a.m.

LONGHORN AAP
MONTHLY MANAGERS MEETING
18 FEBRUARY 1999

NAME	ORGANIZATION	PHONE NO.
CLIFF MURRAY	U.S. COE, TULSA DSTRIC	918-669-7573
STEVE NOLEN	USACE, TULSA	918-669-4395
MATTHEW MCATEE	USACHPPM, Aberdeen Proving Grnd, MD	410/436-8552
Jeff Armstrong	USAEC, APG, MD	410-436-1510
CHRIS VILLARREAL	US. EPA, DALLAS	214-665-6758
CYRIL ONEWOKAE	HQ. IOC	309 782-1350
Michael Moore	TNRCC, Superfund	(512) 239-2483
Oscar Linebaugh, Jr.	U.S.A. Corps of Engrs, Ft. Worth	(318) 676-3265 Ext. 225
Mike Ryan	Radian	903-679-3448
IRA NATHAN	LHAAP	318-459-5103
DAVID TOLBERT	"	318-459-5109
JONNA POLK	COE-TULSA	918/669-7482
CRAIG GIGGLEMAN	USFWS	817/277-1100
Dan Wall	USFWS / EPA	214/665/8467
Paul Bednarzwicki	TNRCC/RS-Tyler	903 535 5132
James McPherson	LH/LA AAP	318-459-5100
Dave Bockelmann	Sverdrup	314-770-4673
WILMA SUBRA (by phone)	Audobon-UNCERTAIN TAG	318-367-2218

DEPARTMENT OF THE ARMY
LONGHORN/LOUISIANA ARMY AMMUNITION PLANTS
P.O. BOX 658
DOYLINE, LOUISIANA 71023-0658

March 2, 1999

REPLY TO
ATTENTION OF

Mr. Chris Villarreal
Superfund Division (6SF-AT)
U.S. EPA
1445 Ross Avenue
Dallas, TX 75202-2733

Dear Mr. Villarreal:

Longhorn Army Ammunition Plant (LHAAP) requests a review of the sampling schedule for treated water discharged from the Ground Water Treatment Plant (GWTP) in operation at Burning Ground No. 3. LHAAP would like to propose reducing the sampling schedule for discharge as follows.

Currently sampling and analysis are performed on-site every day the GWTP is in operation. Off-site verification samples are taken once per month. As per the approved workplan, discharge rates are determined by chloride and sulfate levels and flow in the Harrison Bayou. The GWTP has been in operation since April, 1998. To date, there have been no contaminant levels that have exceeded the discharge criteria to bayou.

LHAAP proposes that on-site chemical analysis may be changed to once every other week versus daily; Chloride/sulfate analysis will remain daily; and off-site verification samples remain once per month. This request is only to reduce the frequency of on-site chemical sampling. The list of analytes will remain unchanged from the workplan. Please respond in writing to the undersigned as soon as possible. This action will result in substantial cost savings with the new contract at the burning ground. Your response will be added to the approved workplan.

Sincerely,

James A. McPhearson
Commander's Representative

encl
Copy Furnished:
TNRCC (Mike Moore)
CESWT-PP (Jonna Polk)
CESWF Eastern Area Office (Dudley Beene)

024456

DEPARTMENT OF THE ARMY
LONGHORN/LOUISIANA ARMY AMMUNITION PLANTS
P.O. BOX 658
DOYLINE, LOUISIANA 71023-0658

March 2, 1999

REPLY TO
ATTENTION OF

Mr. Mike Moore
TNRCC (MC-143)
P.O. Box 13087
Austin, TX 78711

Dear Mr. Moore:

Longhorn Army Ammunition Plant (LHAAP) requests a review of the sampling schedule for treated water discharged from the Ground Water Treatment Plant (GWTP) in operation at Burning Ground No. 3. LHAAP would like to propose reducing the sampling schedule for discharge as follows.

Currently sampling and analysis are performed on-site every day the GWTP is in operation. Off-site verification samples are taken once per month. As per the approved workplan, discharge rates are determined by chloride and sulfate levels and flow in the Harrison Bayou. The GWTP has been in operation since April, 1998. To date, there have been no contaminant levels that have exceeded the discharge criteria to bayou.

LHAAP proposes that on-site chemical analysis may be changed to once every other week versus daily; Chloride/sulfate analysis will remain daily; and off-site verification samples remain once per month. This request is only to reduce the frequency of on-site chemical sampling. The list of analytes will remain unchanged from the workplan. Please respond in writing to the undersigned as soon as possible. This action will result in substantial cost savings with the new contract at the burning ground. Your response will be added to the approved workplan.

Sincerely,

James A. McPhearson
Commander's Representative

Copy Furnished:
EPA (Chris Villarrreal)
CESWT-PP (Jonna Polk)
CESWF Eastern Area Office (Dudley Beene)
Longhorn AAP (David Tolbert)

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

March 19, 1999

James A. McPherson, Commander's Representative
Longhorn/Louisiana Army Ammunition Plant
Attn: SIOLH-CR
P.O. Box 658
Doyline, LA 71023

Re: Longhorn Army Ammunition Plant
Burning Ground No. 3 - Ground Water Treatment Plant

Dear Mr. McPherson:

The Texas Natural Resource Conservation Commission (TNRCC) staff have reviewed your letter, dated March 2, 1999, which proposes that the frequency of on-site chemical analysis of the treated water from the Burning Ground No. 3 interim remedial action be changed to once every other week, *vs.* the current frequency of once per day. The TNRCC concurs with the proposed revision to the work plan. If any other changes in the operation of the treatment system are planned at some future time (*e.g.*, new or additional source of waste to be treated in the system) TNRCC staff will re-evaluate the monitoring plan to determine whether additional revisions will be necessary to ensure adequate protection of the state waters and aquatic resources.

If you have any questions or comments regarding this matter, please give me a call at (512) 239-2483.

Sincerely yours,

Michael A. Moore, M.S., R.S.
Senior Project Manager
Superfund Cleanup Section
Remediation Division

cc: Chris Villarreal, EPA Region 6 (6SF-AP)
Jonna Polk, COE Tulsa District (CESWT-PP-EA)
Oscar Linebaugh, COE Eastern Area Office (CESWF-AD-E)

024458

TNRCC

Protecting Texas by Reducing and Preventing Pollution

FAX TRANSMITTAL

DATE: March 23, 1999 NUMBER OF PAGES *(including this cover sheet):* 2

TO:
Name: David Tolbert
Organization: Longhorn Army Ammunition Plant
FAX Number: (309) 782-1457

FROM: TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
Name: Michael Moore
Division/Region: Remediation Division/Superfund Cleanup Section
Telephone Number: (512) 239-2483
FAX Number: (512) 239-2449 or -2450

NOTES:

David,

Here is our concurrence letter. As we discussed on the telephone this morning, and at the last project managers meeting, we are primarily concerned with the quality of the treated water that will be discharged to the waters of the state. You are required to conduct whatever monitoring of influent water, and water at various points in the treatment process, that is necessary to meet your discharge requirements. Therefore, we also concur with your proposal to revise the monitoring schedule for the influent and partially treated waters, so long as you continue to comply with the discharge requirements.

Thanks,
Michael Moore

024459

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

March 24, 1999

VIA REGULAR MAIL AND FACSIMILE

James A. McPherson, Commander's Representative
Longhorn/Louisiana Army Ammunition Plant
Attn: SIOLH-CR
P.O. Box 658
Doyline, Louisiana 71023-0658

Re: Longhorn Army Ammunition Plant (LHAAP)
Burning Ground No. 3, Ground Water Treatment Plant

Dear Mr. McPherson:

This letter is in response to your March 2, 1999, request to reduce the frequency of the on-site chemical sampling and analysis of the treated water discharge from the Burning Ground No. 3 Ground Water Treatment Plant (GWTP). Specifically, LHAAP's request to reduce the frequency of on-site chemical analysis of discharge from the GWTP from daily to once every other week. Chloride/sulfate analysis will remain daily; off-site verification samples remain once per month; and the list of analytes will remain unchanged from the approved work plan. The Environmental Protection Agency, after consulting with the Texas Natural Resource Conservation Commission, herein approves your request. Please note that changes in the operation of the GWTP (e.g., new source areas brought on-line, treated water exceeding discharge criteria, etc.) may require subsequent modification to the list of analytes tested and/or the frequency of on-site treated water discharge sampling and analysis.

If you have any questions, please contact me at (214) 665-6758.

Sincerely,

Chris G. Villarreal

Chris G. Villarreal
Project Manager

Enclosure

cc: Jonna Polk, Core of Engineers, Tulsa District
Mike Moore, TNRCC (MC-143)
Oscar Lincbaugh, Jr., Core of Engineers Fort Worth District

bcc:

Michael Brashear, OCE/FO/Region 5/ Tyler
Paul Bruckwicki, OCE/FO/ Region 5/Tyler
Mark Weegar, WASTE/RD/Corrective Action (MC-127)

Longhorn Army Ammunition Plant
Technical Review Committee Meeting
March 25, 1999

The following is a list of participants:

James McPherson, LAAP/LHAAP
Ira Nathan, LAAP/LHAAP
Tom Walker
Susan Prosperie, TDH
Roy Darville, CLI
Judith Johnson
Joann Hodges
Paul Fortune
Carol Fortune
Janet Jacobs
Cliff Murray, COE-Tulsa
Michael Moore, TNRCC
Chris Villarreal, EPA
Jim Neal, USF&W
Vernon Hunter, Caddo Nations
Ruth Culver, UAS
Dave Bockelman, Sverdrup
H.L. "Bud" Jones, Sverdrup
Steve Brunton, Sverdrup
David Tolbert, LHAAP
Wilma Subra, UAS
Tom Erny, TNRCC
Dwight Shellman, CLI

1. Mr. McPherson welcomed the members of the TRC to the meeting.

2. Susan Prosperie gave an update on the Public Health Assessment for Longhorn AAP. The report concluded that "Longhorn poses no apparent health hazard either because people are not likely to come into contact with site contaminants or because institutional controls are sufficient to protect public health. TDH received a number of concerns from the community during the public comment period. Among them were concern that there is too much cancer among former foremen that worked at the facility. TDH will examine cancer incidence and mortality data for Harrison County to address this concern. Another concern was that potential exposure of Caddo Lake Institute investigators to site contaminants were not included in TDH's evaluation. These and other comments received are being addressed for the final public health assessment and a copy of the comments received will be included as an attachment to the final Public Health

Assessment. The final report is expected at the end of April, 1999. The Army will provide a copy of LHAAP's hunting rules to Ms. Prosperie. She will determine if these rules will have an impact on the assessment. The Army provided TDH with information (depth, chemical analyses, etc) from the two new water wells that were drilled on the Longhorn property. TDH is including that information in the public health assessment.

3. An inquiry was made regarding the status of the property transfer to U. S. Fish & Wildlife. It was explained that the Army and USF&W are currently in dialogue about the possibility of transfer and the report of transfer was somewhat positive. However, the Army is committed to the clean up of LHAAP and will stay until it is complete.

4. An inquiry was made to determine whether the attorney handling the lawsuit against the Army involved the Texas Dept. of Health. Ms. Prosperie stated that they have not been contacted.

5. Concern was expressed about the gravel trucks leaving and the timber cutting on the plant. Mr. McPherson explained that the gravel trucks are hauling ballast from the railroad bed. There has been no indication that the gravel is contaminated. McPherson also explained that the facility is required to abide by the cultural and natural resource programs required by the Army. It was explained that these programs were designed to foster the timber areas rather hinder.

6. Mr. Cliff Murray gave an overview of the remediation work going on at each of the sites as well as a brief history of the sites with no further action required. Included in the presentation was an update on perchlorate analysis and the actions being taken at building 25-C. EPA stated they issued a health advisory based on the final reference dose of 32 ppb. in February, 1999. It was also stated that LHAAP has been proactive where perchlorate is concerned.

7. Mr. Murray also gave a brief history of the sampling events on Goose Prairie Creek.

8. A discussion was held concerning the data from the lab which EPA is investigating and how LHAAP's remediation program has been impacted. McPherson stated that the remediation program at LHAAP has not been compromised.

9. It was announced that the TAPP request had been approved and the technical evaluation had been completed. The contract should be issued in approximately two weeks. The Army is to give a copy of the revised scope to the TRC members.

10. The next TRC meeting date was set for June 2, 1999 at 9:30 a.m. in the Army's office at the Burning Ground.

LONGHORN ARMY AMMUNITION PLANT
IRP STATUS SUMMARY

As Of 12 April, 1999

PROJECT NAME	PROJECT PHASE	PROJECT STATUS	NEXT MAJOR MILESTONE(S)
Group # 2 (Sites 12, 17, 18, 24, 29, and 32)	Remedial Investigation/ Feasibility Study	- Phase III RI field work completed week of 26 October 98. - Harrison Bayou sampling completed week of 22 March 99.	- Draft Final RI Report due 1 November 99.
Group # 4 Wastewater Sumps And Sites 50 & 60	Remedial Investigation/ Feasibility Study	- Phase III RI field work completed 17 December 98. - Goose Prairie Creek sampling completed week of 22 March 99.	- Draft Final RI Report due 1 November 99.
Burning Ground #3 (Sites 18 and 24)	Interim Remedial Action	- Wells sampled in January 99. - Radian completed the startup of the Groundwater Treatment Plant on 31 March 99. IOC extended contract for O&M for 60 days.	
Landfill Caps (Sites 12 and 16)	Interim Remedial Action	- Landfill caps and final inspections completed November 98. - Reseeding completed week of 5 April 99.	.
Landfill Site 16 Accelerated RI	RI/FS	- Phase III RI field work complete.	- Draft Final RI Report due 3 May 99.

LONGHORN ARMY AMMUNITION PLANT
IRP STATUS SUMMARY

As Of 12 April, 1999

SCHEDULED MEETINGS AND VISITS TO LHAAP		
Date / Time	**Purpose of Meeting / Visit**	**Location**
2 June/9:30	Technical Review Committee Meeting	LHAAP

01	Inert Burning Grounds	24	Washout &Unlined Evaporation Pond	60	Former Storage Bldg. 411 & 714
11	Suspected TNT Burial Grounds at Ave P&Q	27	South Test Area	XX(54)	Ground Signal Test Area
12	Landfill 12	29	Former TNT Production Area	52	Magazine Area
16	Landfill 16	32	Former TNT Disposal Area	63	Burial Pits
17	Burning Ground 2/Flashing Area	35	Process Wastewater Sumps		
18	Burning Ground 3	50	Former Waste Disposal Facility		

Longhorn Army Ammunition Plant
Technical Review Committee Meeting

25 March 1999
Karnack Community Center
7:00 p.m.

NAME	REPRESENTING	PHONE
Tom Walker	self	665-8279
Susan Prosperie	TX Dept Health	512-458-7269
Roy Darville	Caddo Lake Institute	(903) 935-7963 x318
Judith J Johnson	Self	903 6793130
Joann Hodges	self	9037893901
Jane Fortune	self	903 679-3949
Carol Fortune	self	"
Jo Kaiton	LHAAP	318-459-5703
Janet Jacobs	Longview News	903-237-7738
Cliff Murray	U.S Army Corps of Eng	918-669-7573
James McPherson	US Army	318-459-5100
Michael Moore	TNRCC-Superfund	(512) 239-2483
Chris Villarreal	EPA	(214) 665-6758
Jim Neal	US Fish+wildlife	(409) 569-6129
Vernon Hunter	Caddo Nation	405-656-2344
Ruth Culver	UAS	903-679-3179
Dave Beckelmann	Sverdrup	314-770-4673

Longhorn Army Ammunition Plant
Technical Review Committee Meeting

25 March 1999
Karnack Community Center
7:00 p.m.

NAME	REPRESENTING	PHONE
H.L. "Bud" Jones	Sverdrup	903-839-3690
Steve Brunton	Sverdrup	314-770-4178
DAVID TOLBERT	LHAAP	318-459-5109
WILMA LUBKA	LNEGRT. Rep	318-367-2216
Tom Erny	TRCC Region 5	(903) 535-5142
DWIGHT SHELLMAN	CLI	903 789-3247

DEPARTMENT OF THE ARMY
LONGHORN/LOUISIANA ARMY AMMUNITION PLANTS
P.O. BOX 658
DOYLINE, LOUISIANA 71023-0658

REPLY TO
ATTENTION OF

SIOLL-OR

April 5, 1999

Mr. Chris Villarreal
Remedial Project Manager, Superfund Div. (6SF-AT)
U. S. Environmental Protection Agency
1445 Ross Avenue
Dallas, TX 75202-2733

SUBJECT: GWTP Pipeline

Dear Mr. Villarreal:

Throughout the summer months effluent discharge into Harrison Bayou is limited by low flows in the bayou. In order to ensure consistent operation of the Burning Ground groundwater treatment plant (GWTP) at Longhorn Army Ammunition Plant, the Army is installing a pipeline to divert discharge to a temporary holding pond. The Intermediate-Range Nuclear Force (INF) pond will be used to hold effluent water during times of low flow in Harrison Bayou. Low flows in the bayous prevent discharge into Harrison Bayou due to naturally occurring chlorides and sulfates. Discharge of the GWTP effluent and associated loading of chlorides and sulfates in Harrison Bayou is limited, according to the Record of Decision (ROD) for the Interim Remedial Action at the Burning Ground.

The pipeline will convey the treated water from the treatment plant to the 1.4 acre, double-lined holding pond. During times of pond usage, freeboard levels in the pond will be monitored daily. When flow rates in Harrison Bayou reach levels acceptable for discharge of the water from the pond, the water will be conveyed via pipeline to the discharge point identified in the ROD. The water will be sampled for chlorides and sulfates at the point of discharge, as required in the ROD.

We are committed to carrying out the cleanup efforts at Longhorn AAP, and hope that this method of handling the effluent water during times of drought, as experienced during the summer of 1998, is acceptable. If you have any questions, please contact David Tolbert at 318/459-5109.

Sincerely,

James A. McPherson
Commander's Representative

DEPARTMENT OF THE ARMY
LONGHORN/LOUISIANA ARMY AMMUNITION PLANTS
P.O. BOX 658
DOYLINE, LOUISIANA 71023-0658

REPLY TO
ATTENTION OF

SIOLL-OR

April 5, 1999

Mr. Mike Moore
Superfund Investigation Section-MC-143
TNRCC
P.O. Box 13087
Austin, TX 78711-3087

SUBJECT: GWTP Pipeline

Dear Mr. Moore:

Throughout the summer months effluent discharge into Harrison Bayou is limited by low flows in the bayou. In order to ensure consistent operation of the Burning Ground groundwater treatment plant (GWTP) at Longhorn Army Ammunition Plant, the Army is installing a pipeline to divert discharge to a temporary holding pond. The Intermediate-Range Nuclear Force (INF) pond will be used to hold effluent water during times of low flow in Harrison Bayou. Low flows in the bayous prevent discharge into Harrison Bayou due to naturally occurring chlorides and sulfates. Discharge of the GWTP effluent and associated loading of chlorides and sulfates in Harrison Bayou is limited, according to the Record of Decision (ROD) for the Interim Remedial Action at the Burning Ground.

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We are committed to carrying out the cleanup efforts at Longhorn AAP, and hope that this method of handling the effluent water during times of drought, as experienced during the summer of 1998, is acceptable. If you have any questions, please contact David Tolbert at 318/459-5109.

Sincerely,

James A. McPherson
Commander's representative

Monthly Managers' Meeting Minutes
Longhorn Army Ammunition Plant
12 April 1999

Chris Villareal
Mike Moore
Oscar Linebaugh
Paul Bruckwicki
Mike Brashear
Bill Corrigan
Dudley Beene
Jim Neal
Ruth Culver
Rick Michaels
Ira Nathan
David Tolbert
Jonna Polk
Wilma Subra (via telephone)

1. EPA is holding a conference in Temple, Tx. on 20 May 99 regarding perchlorates.

2. Dan Wahl, USFWS, requested data from the LHAAP to input into database.

3. Letter sent to EPA and TNRCC regarding pipeline for INF pond usage as temporary holding facility for effluent from the Burning Ground groundwater treatment plant.

4. Sediment sampling in Caddo Lake planned for this year by EPA will not be funded.

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

April 19, 1999

Via Electronic Mail and Regular Mail

Cliff Murray
U.S. Army Corps of Engineers
Tulsa District
1645 S. 101 E. Ave.
Tulsa, Oklahoma 74128-4629

Re: Longhorn Army Ammunition Plant
Burning Ground No. 3
Draft Cost and Performance Report
January 11, 1999

Dear Cliff:

The Environmental Protection Agency (EPA) has completed its review of the Burning Ground No. 3 Draft Cost and Performance Report. This review focused primarily on how EPA's comments provided on the Pre-Draft Cost and Performance Report (October 23, 1998) were addressed. Based upon this review, the EPA has no additional comments. If you have any questions or need additional information, feel free to give me a call at (214)665-6758.

Sincerely,

Chris G. Villarreal

Chris G. Villarreal
Remedial Project Manager
Superfund Division

cc: Mike Moore
David Tolbert

Monthly Managers' Meeting Minutes
Longhorn Army Ammunition Plant
19 May 1999

Chris Villareal
Mike Moore
Wade Stone
Dave Bockelmann
James McPherson
Steve Nolen
Cliff Murray
James Sher
Ira Nathan
David Tolbert
Jonna Polk
Wilma Subra (via telephone)

1. The Executive Summary was reviewed. An additional topic for the Independent Technical Review (ITR) will be added to the Executive Summary in the future. The Army will send EPA, TNRCC and Wilma Subra copies of the ITR report. TNRCC also requested a copy of the minutes of the ITR meeting. The Corps of Engineers will schedule a meeting with Waterways Experiment Station to discuss some of the recommendations of the ITR report.

2. The Executive Summary will be issued to the team every two weeks because of interest regarding perchlorates.

3. A presentation regarding the perchlorate investigations at LHAAP was made. The source for perchlorates at LHAAP is considered to be the Perchlorate Grinding Building (Building 25C). Perchlorates have been detected in the soils, groundwater, and surface water near the building. Results indicating the presence of perchlorates in the effluent from the Burning Ground Groundwater Treatment Plant were presented. TNRCC suggested that chlorides and sulfates present in the water may interfere with the perchlorate analysis. The COE will check with the laboratories regarding possible interference. EPA presented results of sampling of surface water at Blanchard. The purpose of the sampling was to determine whether discharge containing perchlorates into Harrison Bayou had affected the drinking water supply for Blanchard. The analytical results were "non-detect" for perchlorates with a detection limit of 10 ppb. EPA stated that the groundwater treatment plant should continue to run for its intended purpose, and that the plant has been shown to be effective in removing TCE and methylene chloride. California and

Nevada have established standards for perchlorate. Wilma Subra requested that the wells at the Burning Ground be sampled for perchlorates. The Army will work toward preparing a preliminary and qualified plan within 30 days to address the presence of perchlorates. The plan will consist of a summary of data gathered to date, sampling planned, and a conceptual approach. The COE will contact USACHPPM to determine whether Matt MacAtee is assigned to LHAAP.

4. The contract for operation of the groundwater treatment plant with Radian has been extended 60 days. Effective, 1 June 1999, Radian will be the operating contractor for a year.

5. The Army would like for all stakeholders to participate in development of the Installation Action Plan to be submitted in March 2000. A meeting for this purpose is tentatively planned for October 1999 in San Antonio, TX. The dates will be coordinated such that all stakeholders interested in attending can be present. Future funding plans, on a site by site basis, will be discussed and formulated.

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

May 28, 1999

James A. McPherson, Commander's Representative
Longhorn/Louisiana Army Ammunition Plant
Attn: SIOLH-CR
P.O. Box 658
Doyline, LA 71023

Re: Longhorn Army Ammunition Plant

Dear Mr. McPherson:

In accordance with Section IX.A.2. of the Federal Facility Agreement for the Longhorn Army Ammunition Plant, this letter is to notify you that, effective June 8, 1999, Peter Waterreus will be the Texas Natural Resource Conservation Commission's designated Project Manager. James Sher will be working on the project as alternate project manager.

Additionally, in accordance with Section XIV.C., the state's address for notification is changed as follows:

Peter Waterreus (MC-143)
Texas Natural Resource Conservation Commission
Superfund Cleanup Section
Remediation Division
P.O. Box 13087
Austin, TX 78711-3087

The physical address for overnight delivery service is:

Peter Waterreus (MC-143)
Texas Natural Resource Conservation Commission
Superfund Cleanup Section
Remediation Division
12100 Park 35 Circle, Bldg. D
Austin, TX 78753

If you have any questions or comments regarding this matter, please give me a call at (512) 239-2487.

Sincerely,

for wade

Wade Stone (MC 143)
Superfund Cleanup Section
Remediation Division

cc: Chris Villarreal, EPA Region 6 (6SF-AP)
Jonna Polk, COE Tulsa District (CESWT-PP-EA)
Oscar Linebaugh, COE Eastern Area Office (CESWF-AD-E)

Technical Review Monthly Managers' Meeting Minutes
Longhorn Army Ammunition Plant
2 June 1999

Chris Villareal
Mike Moore
Wade Stone
Dave Bockelmann
James McPherson
Steve Nolen
Cliff Murray
James Shear
Ira Nathan
David Tolbert
Jonna Polk
Wilma Subra (via telephone)

1. Toxicity test (7 day) was conducted at GWTP. The minnows passed at 100%. Questions about daphnia – has been discussed with EPA and TNRCC. At 100% concentration, 70% daphnia lived. For reproduction, the minnows reproduced at a higher rate in the sample water (10,000 ppb perchlorate) vs. control. For daphnia, water reproduction rate was 10 vs. 17 for control. Army has requested a determination from TNRCC, and awaiting answer. Report will be available on 8 June, and will be forwarded to EPA and TNRCC.

2. Perchlorates have been detected at Building 25C, the Perchlorate Grinding Building. Surface samples collected (9). Primary exposure point is ingestion. Does not absorb into skin. EPA sampled Blanchard water supply, and perchlorates were not detected. EPA feels that probably by the time it hits the lake it can't be detected. Perimeter wells have not shown the presence of perchlorates, and are sampled quarterly. The Army is just trying to be proactive in addressing the concern of perchlorates. EPA – this is a problem throughout the nation. Susan Propsperie offered a copy of EPA's fact sheet, along with some additional health information regarding perchlorates. Building 25C is scheduled for demolition due to structural problems within the next 10 months. Once the building is demolished, excess landfill liner will be placed over the area where soils contain perchlorates. Effluent from groundwater treatment plant has been sampled, and perchlorates have been detected in the water discharging into Harrison Bayou. Additionally, the sumps at the Burning Ground have been sampled to determine the variability of perchlorate concentrations among the various sumps. The Army is preparing a plan for submittal to TNRCC and EPA, to address possibilities for treatment, however, at this time, treatment options are being researched but have not yet been fully developed. The Army will aggressively pursue alternatives, working within the parameters of the FFA, in cooperation with TNRCC and EPA. Currently, perchlorate is not regulated by EPA, but the Army will continue working toward a solution, and will continue to monitor perimeter wells quarterly. TNRCC suggested sampling dust in building prior to demolition, so that workers are properly protected during demolition. The Army will research this issue.

3. Radian will present a summary of operations at the next TRC meeting – will be added to agenda.

4. IAP meeting tentatively scheduled for the week of 18 October 99. – 10/18

5. Next TRC will be held on 14 September 99 at 10:00. Next Monthly Managers' meeting will be held in Austin at the TNRCC offices, Building D, Room 200-33 at 1:00 p.m.

SIOLL-CR

24 June 1999

Mr. Wdae Stone
Superfund Investigation Section-MC-143
P.O. Box 13087
Austin, TX 78711-3087

SUBJECT: Longhorn Army Ammunition Plant's Perchlorate Action Plan

Dear Mr. Stone:

Enclosed is the plan of action being taken by Longhorn AAP pertaining to perchlorate as per your request. This plan will be amended as more information and guidance is obtained.

Sincerely,

James A. McPherson
Commander's Representative

Enclosures

Copy Furnished:
Peter Waterreus - TNRCC
Chris Villerreal - EPA Region 6
Cyril Onewokae - AMSIO-IBI-REST
Jeff Armstrong - AEC
Paul Bruckwicki - TNRCC Region 5
Jonna Polk - COE - Tulsa
Wilma Subra - Audubon TAG

Longhorn Army Ammunition Plant's Perchlorate Action plan

Introduction

In early 1998, U. S. EPA Region 6 brought to the attention of personnel at Longhorn Army Ammunition Plant (LHAAP) that a chemical, ammonium perchlorate, was being found at a number of facilities in the west that had used or manufactured explosives, pyrotechnics, and/or solid rocket propellants. LHAAP records were reviewed and it was found that at least one building, Bldg. 25-C, had contained processes that would have utilized ammonium perchlorate. This building was listed on facility maps as the AP Grinding Bldg. or Ammonium Perchlorate Grinding Bldg. LHAAP was also utilized for the decommissioning of Pershing I and II rocket motors in accordance with the Intermediate Range Nuclear Forces (INF) Treaty in effect between the United States and the former Union of Soviet Socialist Republics. Wastewater from the washout of the rocket motors was collected within the Unlined Evaporation Pond (Site 24). This is one of the areas where groundwater is currently being extracted and treated for methylene chloride, trichloroethene, and specific metals.

Current Status

Information concerning perchlorate, specifically, toxicological information is still under development and potentially effective treatment technologies are still in the bench and pilot scale stage of development. Regulatory standards have not been set for perchlorates, and data for assessing the potential for risk is unavailable.

The Army samples the LHAAP boundary/perimeter wells on a quarterly basis, and perchlorate has not been detected. Additionally, EPA collected samples in April, 1999 from the nearest drinking water influent location on Caddo Lake at Blanchard. EPA's results showed that perchlorate was **not** detected in any of their drinking water samples. In August, 1998, soil samples were collected from runoff areas in the production area (Bldg. 25-C). These soil samples were found to contain perchlorate at a maximum concentration of 165 mg/kg. Surface water runoff discharges into Caddo Lake via Harrison Bayou and Goose Prairie Creek. Samples collected at the entrance to Caddo Lake were near detection limits.

Effluent samples from the groundwater treatment plant (GWTP) for this area were collected in April and May, 1999 and were found to contain perchlorate at a maximum concentration of 14.5 mg/l. Groundwater samples were also collected from each of the 28 extraction well sumps at Burning Ground No. 3 and several were found to contain perchlorate at varying concentrations. These sampling activities were proactively initiated by the Army.

Objectives

The Army is considering the following objectives in regard to perchlorate.

1. Continue to be proactive in addressing perchlorate at LHAAP within the established parameters of DOD and Army funding priorities. These priorities are based on demonstrated risk to human health or the environment. To date no risk has been demonstrated at LHAAP.
2. Work with research groups to identify potential solutions to address contaminated media according to identified receptors and risk. Cooperative work with Texas Tech University has been initiated. Also, contact will be established with the DOD Task Force.
3. Obtain available information from other facilities on what technologies they are currently evaluating/investigating to treat groundwater or wastewater contaminated with perchlorate.
4. Obtain any additional information on LHAAP's groundwater influent to allow for the evaluation of whether any of the technologies currently being evaluated would be applicable at LHAAP.
5. Take a proactive and protective action at Bldg. 25-C by covering the ground with a liner to prevent further surface migration into Goose Prairie Creek.

Conclusion

The Army has been responsive to the concerns of EPA and TNRCC regarding perchlorate investigations at LHAAP, and will continue to be proactive in addressing this issue. The Army will continue to conduct research to ensure that all areas which may have been affected by perchlorates have been identified, and will continue to conduct quarterly sampling as established (boundary wells, Goose Prairie Creek and Harrison Bayou), with presentation of the data to the stakeholders. The Army will continue to monitor emerging data and information being provided by the DOD/EPA/TNRCC Task Force on Perchlorates, and determine how that information may be used to address perchlorates at LHAAP, and will work with research entities to gather information regarding treatment technologies for treatment of water containing perchlorate.

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

June 28, 1999

Mr. Robert McEachern
P.O. Box 428
Blanchard, LA 71009

Re: Blanchard Louisiana Water Treatment Plant
Analytical Sampling Results

Dear Mr. McEachern:

Enclosed for your information are copies of the analytical reports for the water samples collected on May 6, 1999, at the Blanchard, Louisiana public water supply water treatment plant. These water samples were analyzed for perchlorate, volatiles, semi-volatiles, and metals. The perchlorate analysis was conducted by Columbia Analytical Services, Inc. The remaining analyses were conducted by the Environmental Protection Agency's (EPA's) Region 6 Houston Laboratory. As we discussed during the sample collection activities on May 6, 1999, the primary purpose of the water sampling was for the perchlorate analysis. I am happy to inform you that the collected water samples measured non-detect at 10 ug/l for perchlorate. Copies of the photographs taken during the sampling event are also provided.

If you have any questions, please feel free to give me a call at (214)665-6758,

Sincerely,

Chris G. Villarreal

Chris G. Villarreal
Remedial Project Manager

Enclosures

cc: Leroy Biggers
Texas Natural Resource Conservation Commission
Region 5 - Tyler
2916 Teague Drive
Tyler, Texas 75701

David Davis
Texas Natural Resource Conservation Commission
Superfund Cleanup Section
P.O. Box 13087
Austin, Texas 78711-3087

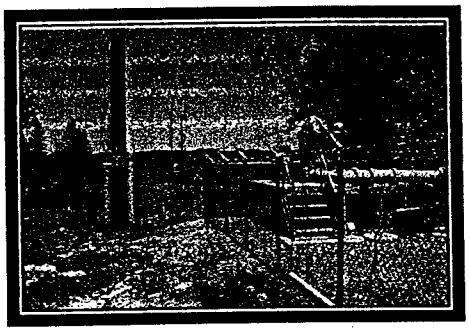
Susan Prosperie
Texas Department of Health
1100 West 49th Street
Austin, Texas 78756-3199

Malcolm Sayes
Louisiana Department of Health and Hospitals
Office of Public Health Environmental Health Services Division, Box 4
6867 Bluebonnet
Baton Rouge, LA 70810

James S. H. Sher, P.E.
Texas Natural Resource Conservation Commission
Superfund Engineering Section
Pollution Cleanup Division (MC-144)
P.O. Box 13087
Austin, Texas 78711-3087

David Tolbert
Longhorn/Louisiana Army Ammunition Plant
Attn: SIOLH-CR
P.O. Box 658
Doyline, LA 71023

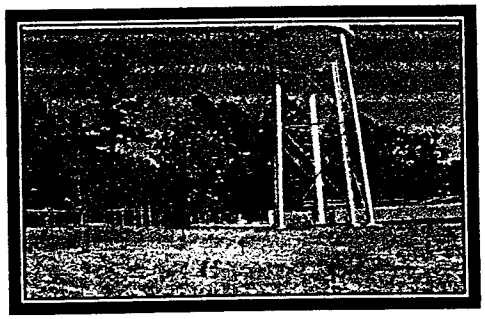
Blanchard, Louisiana
Public Water Supply
Water Treatment Plant Sampling Event - May 6, 1999



Caddo Lake Pump Station for Blanchard, Louisiana.

2:30 p.m.

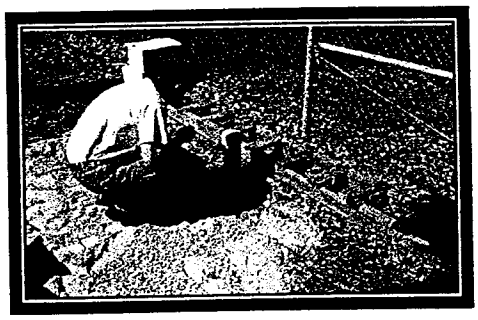
Photographed by Chris Villarreal
- EPA Remedial Project Manager



Water is pumped from Caddo Lake to the Blanchard Utilities Water Treatment Plant. This photograph shows the location were pretreatment water samples were collected (inside fence near water tower).

10:25 a.m.

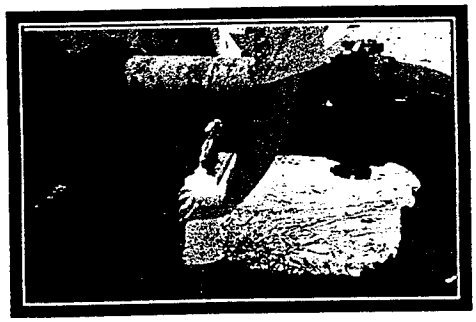
Photographed by Chris Villarreal
- EPA Remedial Project Manager



EPA START Contractor collecting pretreatment water sample.

10:20 a.m.

Photographed by Chris Villarreal
- EPA Remedial Project Manager



EPA START Contractor collecting treated water sample.

10:50 a.m.

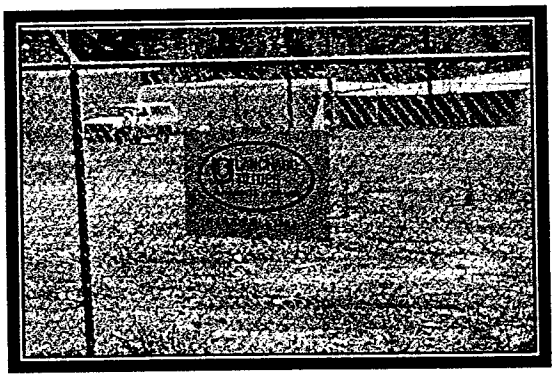
Photographed by Chris Villarreal
- EPA Remedial Project Manager

Blanchard, Louisiana
Public Water Supply
Water Treatment Plant Sampling Event - May 6, 1999

Blanchard, Louisiana
Public Water Supply - Water Treatment Plant

10:30 a.m.

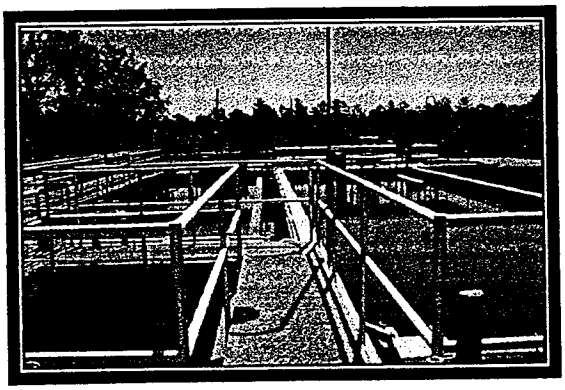
Photographed by Chris Villarreal
- EPA Remedial Project Manager



Blanchard Utilities
Facility Fence and Sign

10:30 a.m.

Photographed by Chris Villarreal
- EPA Remedial Project Manager



Blanchard Utilities
Water Treatment Plant

10:35 a.m.

Photographed by Chris Villarreal
- EPA Remedial Project Manager

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

July 8, 1999

James A. McPherson, Commander's Representative
Longhorn/Louisiana Army Ammunition Plant
Attn: SIOLH-CR
P.O. Box 658
Doyline, LA 71023

Re: Office of Research and Development
Interim Assessment Guidance for Perchlorate

Dear Mr. McPherson:

Enclosed for your information is a copy of the Environmental Protection Agency's Interim Assessment Guidance for Perchlorate. If you have any questions, feel free to give me a call at (214) 665-6758.

Sincerely,

Chris G. Villarreal

Chris G. Villarreal
Remedial Project Manager

Enclosure

cc: Jonna Polk - COE - Tulsa

Susan Prosperie - Texas Department of Health

James S. H. Sher, P.E. - Texas Natural Resource Conservation Commission

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JUN 18 1999

OFFICE OF
RESEARCH AND DEVELOPMENT

SUBJECT: Interim Assessment Guidance for Perchlorate

FROM: Norine E. Noonan Norine E. Noonan
Assistant Administrator (8101R)

TO: Regional Administrators
Regional Waste Management Division Directors
Regional Water Management Division Directors

The purpose of this memorandum is to transmit the attached interim assessment guidance from the Office of Research and Development (ORD) relevant to Agency activities related to perchlorate. The development of this guidance is in response to requests to ORD from some of the Regional offices, as well as from individual States.

As you know, the Office of Solid Waste and Emergency Response (OSWER) has recently forwarded to you the final report of the February 1999, External Peer Review of the document entitled "Perchlorate Environmental Contamination: Toxicology Review and Risk Characterization." The external review document (ERD), subject of the peer review, was developed by ORD's National Center for Environmental Assessment (NCEA).

The human health and ecological assessment issues related to environmental contamination by perchlorate are complex. The ERD addressed an immediate need to bring more science into the assessment process, but at the time of the February 1999 peer review meeting, several key studies on perchlorate were underway or planned. These studies will provide some critical assessment information. These new data will be incorporated into the revised assessment document that will undergo a second external peer review in January 2000. Because ORD is committed to bringing the latest available science to bear on the human and ecotoxicology estimates, ORD is recommending that until the completion of the second review, EPA risk assessors and risk managers follow the attached interim guidance. This guidance has been reviewed by the Office of Water (OW), Office of Solid Waste and Emergency Response (OSWER), and the Office of General Counsel and is supported by both OW and OSWER.

The Agency has committed to another external peer review as part of the process to more completely and accurately characterize the human and ecotoxicological risks associated with perchlorate contamination and to make this information available through the Integrated Risk Information System (IRIS). In the next assessment, NCEA will address comments made in the February 1999 report, as well as review and incorporate data from additional studies that were either nearing completion or recommended at that time. In addition to recommended studies on pharmacokinetics, developmental effects testing in another species and repeat motor activity evaluations are underway. Another important recommended activity underway is a National Toxicology Program-sponsored pathology working group (PWG) review of the thyroid and brain tissue from all previous and pending studies. This PWG review will provide for a common nomenclature of lesions and for a consistent pathology review across studies, with the goal to reduce variability in the data. Further, an interlaboratory validation study of the hormone analyses (T4, T3, and TSH) across participating laboratories will be performed. Additional ecotoxicology studies, including some site-specific and farm gate analyses of food crops, are also either being reviewed or already underway.

The purpose of the next external peer review will be to evaluate these additional data and to review the draft final NCEA assessment. All of the perchlorate testing and study activities, whether underway, in review, or planned, are being timed to support the goal of the next external peer review in January 2000. As mentioned above, this next peer review is intended as part of the IRIS process. After revision to reflect any additional comments or recommendations, the final NCEA assessment will then go to IRIS consensus review.

Because new analyses and data are to be considered, we can predict that the human and ecotoxicology benchmarks are likely to change. The new estimates will reflect greater accuracy and may be either higher or lower than the harmonized benchmark proposed in the February 1999 document (0.0009 mg/kg-day). *Therefore, ORD recommends that Agency risk assessors and risk managers continue to use the standing provisional RfD range of 0.0001 to 0.0005 mg/kg-day because of continued uncertainty with respect to the impact of the pending data and analyses on the final estimate.* This recommendation helps to ensure that the Agency bases its risk management decisions on the best available peer reviewed science and is in keeping with the full and open participatory process embodied by the proposed series of peer review workshops. It should be noted, that due to the uncertainty of whether the final oral human health risk benchmark will increase or decrease based on the new data and analyses, the standing provisional RfD range is the more conservative of the estimates available at this time and, therefore, more likely to be public health protective in the face of this uncertainty. This is also consistent with Agency practice that existing toxicity estimates remain in effect until the review process to revise them is completed.

This document provides guidance to EPA Regions concerning Agency activities related to perchlorate. It also provides guidance to the public and the regulated community on how EPA intends to exercise its discretion in carrying out these activities. The guidance is designed to implement national policy on these issues. The document does not, however, substitute for EPA statutes or regulations; nor is it a regulation itself. Thus, it cannot impose legally-binding requirements on EPA or the regulated community, and may not apply to a particular situation based upon the circumstances. EPA decisionmakers retain the discretion to adopt approaches on a case-by-case basis that differ from this guidance where appropriate. EPA may change this guidance in the future.

ORD Interim Guidance for Perchlorate

Because of remaining significant concerns and uncertainties that must be addressed in order to finalize a human health oral risk benchmark for perchlorate, the Office of Research and Development (ORD) recommends that Agency's risk assessors and risk managers continue to use the standing provisional RfD range of 0.0001 to 0.0005 mg/kg-day for perchlorate-related assessment activities. This recommendation is based on the determination that important new emerging data may have an impact on the proposed revised oral human health risk benchmark contained in the February 1999 External Review Document (ERD). Some background information and the reasons for this recommendation are detailed below.

In February 1999, an external peer review meeting was held in San Bernadino, California to review the document entitled "Perchlorate Environmental Contamination: Toxicology Review and Risk Characterization." This ERD was developed by ORD's National Center for Environmental Assessment (NCEA). The ERD, available on the Internet at http://www.epa.gov/ncea/perch.htm, was developed as part of a wider interagency effort to address environmental contamination issues related to perchlorate. More information on this effort is available at http://www.epa.gov/ogwdw/ccl/perchlor/perchlo.html. The external peer review was sponsored by the Office of Solid Waste and Emergency Response (OSWER) and the Office of Water. The final peer review report of the February 1999 meeting has recently been transmitted to you by OSWER.

As explained in the ERD, the current range of a provisional RfD value for perchlorate spans from 0.0001 mg/kg-day to 0.0005 mg/kg-day; this range was issued by the NCEA Superfund Technical Support Center based on assessments in 1992 and revised in 1995. If state or local environmental authorities decide to pursue site-specific clean-up or other water management decisions based on this provisional RfD range by applying the standard default body weight (70 kg) and water consumption level (2 L/day), the resulting provisional clean-up levels or action levels would range from 4-18 parts per billion (ppb). It should be noted that no cancer assessment was performed at this time.

The ERD presented an updated human health risk assessment as well as a screening-level ecological assessment of newly performed studies on the toxicity of perchlorate. The updated health assessment harmonizes noncancer and cancer approaches to derive a single oral risk benchmark based on precursor effects for both neurodevelopmental effects and thyroid neoplasia. Both of these are historically established effects often observed after disturbances in the hypothalamic-pituitary-thyroid feedback system. By their nature, each of these effects is likely to have a biological threshold. The proposed revised oral human health risk benchmark is protective of potential carcinogenic effects based on new perchlorate data on the lack of its genotoxicity and the reversibility of induced thyroid hypertrophy/hyperplasia. The proposed revised oral human health risk benchmark is 0.0009 mg/kg-day. No traditional RfD or cancer slope factor was proposed in the ERD. If state or other local environmental authorities choose to apply the same default values as above to the revised oral benchmark, a site-specific clean-up or action level of 32 ppb would result.

We look forward to working with you as we come to closure on this aspect of the perchlorate contamination issues over the next nine months. If there are any questions or if you require additional information, do not hesitate to contact Annie Jarabek at 919-541-4847 (voice); 919-541-1818 (FAX); or jarabek.annie@epa.gov (E-mail).

Attachment

cc: Tim Fields, OSWER
Jonathan C. Fox, OW
William Farland, NCEA
Lt. Col. Dan Rogers, DoD
Annie Jarabek, NCEA

Email from S Sher

Longhorn Army Ammunition Plant (LHAAP)

The Army must immediately take the following actions:

The Army must immediately add perchlorate to the analytical parameters for the groundwater treatment plant effluent.

The Army must immediately reduce the perchlorate concentration in the Groundwater Treatment Plant effluent by reducing the pumping rate from extraction sumps with high perchlorate concentrations. The Army must accomplish the reduction while maintaining and monitoring hydraulic control of the groundwater contaminant plume at the Burning Ground.

- The Army must immediately collect and analyze storm water samples for perchlorate and conduct monthly sampling for perchlorate in Goose Prairie Creek, Harrison Bayou and Caddo Lake.

- The Army must conduct monthly sampling for perchlorate in all public drinking water system intakes downstream from LHAAP.

- The Army must immediately sample the perimeter wells for perchlorate and report the results to TNRCC within 45 days of receiving this notice. Additionally, the perimeter wells must continue to be monitored for perchlorate on a quarterly basis.

- The Army must cover the areas surrounding Building 25-C within 45 days of demolition of the building.

The Army must immediately provide a milestone schedule to address the following:

The Army must immediately gather data to support and initiate a pilot perchlorate treatability study for the groundwater treatment plant system. The study must be designed to identify technology that can be used to treat groundwater such that the effluent water from the groundwater treatment plant will meet the discharge criteria set by the State of Texas for perchlorate.

- The Army must immediately begin a plant wide Remedial Investigation specifically to identify additional perchlorate source areas and the presence and extent of perchlorate in all media including surface water, groundwater, soil and sediment.

Note: Timelines for completion of specific corrective actions will be identified in a follow up letter.

024489

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

July 9, 1999

VIA E-MAIL, FAX AND MAIL

James A. McPherson, Commander's Representative
Longhorn/Louisiana Army Ammunition Plant
Attn: SIOLH-CR
P.O. Box 658
Doyline, LA 71023-0658

Re: Longhorn Army Ammunition Plant (LHAPP)
Request For Immediate Initial Assessment of Perchlorate in Caddo Lake

Dear Mr. McPherson:

The Texas Natural Resource Conservation Commission (TNRCC) recently established 22 parts per billion (ppb) as the interim action level for perchlorate in drinking water (See enclosed TNRCC memorandum dated June 28, 1999). Based on the 22 ppb perchlorate action level, the TNRCC has calculated the daily average discharge limit for the LHAPP groundwater treatment plant at 375 ppb with 795 ppb for the daily maximum limitation. (See enclosed effluent limitations calculation)

On April 28, 1999, perchlorate concentrations of 14,500 ppb and 97.3 ppb were detected in Harrison Bayou at the discharge point from the groundwater treatment plant and 200 feet upstream from Caddo Lake, respectively (See enclosed report titled Perchlorate Sampling Results Groundwater/Surface Water April/May 1999). The analytical results of the February 10, 1998 sampling in Goose Prairie Creek showed perchlorate at 11 ppb, 210 ppb, and 11,000 ppb from the plant boundary adjacent to Caddo Lake, several hundred feet upstream from Caddo Lake, and surface runoff southeast of Building 25-C during a heavy rain, respectively (See enclosed Goose Prairie Creek Sampling Results).

Based on the analytical results and the potential for impact to Caddo Lake which is a drinking water source for six public drinking water systems, the TNRCC believes that an expeditious survey to assess the potential presence of perchlorate contamination in the lake water adjacent to LHAPP is warranted. The TNRCC considers this an urgent issue and hereby requests the Army to take the following immediate actions:

- Minimize perchlorate migration via the surface water runoff by covering the building 25-C area with a liner as temporary remedial action. More frequent sampling of runoff from the Building 25-C area and Goose Prairie Creek should also be conducted until the perchlorate source(s) has been remediated.

- Assess the potential presence of perchlorate in Caddo Lake by collecting and analyzing water samples from the following locations:
  1. The mouth of Goose Prairie Creek.
  2. The mouth of Central Creek located between Goose Prairie Creek and Harrison Bayou.
  3. The mouth of Harrison Bayou.
  4. Any other areas of Caddo Lake that the Army suspects may have detectable levels of perchlorate.

Please provide your response regarding both requests by the close of business July 16, 1999. If the Army agrees to cover the building 25-C area with a liner, the Army should provide a schedule to complete the task within a reasonable time frame. If the Army agrees to collect water samples from Caddo Lake, the Army should provide a sampling and analysis plan which includes proposed sample locations and a schedule which ensures completion of all field work no later than July 31, 1999. If the Army cannot comply with the TNRCC's request, the TNRCC will use state funding to take necessary actions to protect human health and environment and may seek cost recovery under the Tex. Health & Safety Code.

The TNRCC will provide comments regarding your June 24, 1999 Perchlorate Action Plan under separate cover. Your prompt response to this matter will be greatly appreciated. If you have any questions, please give me a call at (512) 239-2444.

Sincerely yours,

James S.H. Sher, P.E.
Project Manager
Superfund Cleanup Section
Remediation Division

Enclosure

cc: Chris Villarreal, EPA Region 6 (6SF-AP)

Texas Natural Resource Conservation Commission

INTEROFFICE MEMORANDUM

To: Distribution

Date: June 28, 1999

Thru: JoAnn Wiersema, Manager
Toxicology & Risk Assessment
Chief Engineer's Office

From: Michael Honeycutt, Ph.D.
Toxicology & Risk Assessment
Chief Engineer's Office

Subject: Interim Action Level for Perchlorate

Concern about perchlorate contamination at two sites in Texas has prompted staff from the Office of Waste and the Office of Water to request that the Toxicology & Risk Assessment Section develop an action level for perchlorate in drinking water. Currently, there is neither an USEPA- promulgated Maximum Contaminant Level nor Advisory Level. After consulting with USEPA Regions 6 and 9, the Agency for Toxic Substances and Disease Registry, the Texas Department of Health, and several states that also have perchlorate contamination, we have developed an interim action level of 22 μg/L (ppb) for perchlorate.

The interim action level of 22 μg/L was derived using the interim provisional reference dose (RfD) of 0.0009 mg/kg·day published on December 31, 1998 by USEPA's National Center for Environmental Assessment. USEPA cautions that this RfD is in an interim status and that a range of older provisional RfDs (0.0001 mg/kg·day to 0.0005 mg/kg·day) should be used until the interim provisional RfD is finalized. However, in reviewing the interim provisional RfD, I have found it to be based on the best scientific information available to date and therefore more scientifically-defensible than the older provisional RfDs. Numerous toxicologists from other agencies I have consulted on the matter concur. Please note that we fully expect that the interim provisional RfD published by USEPA will change once the final review currently ongoing is complete (tentatively at the end of this year). In any event, the general concensus is that the interim provisional RfD is conservative and is not expected to change drastically in either direction. Given the interim status of the RfD, the action level we are deriving should also be considered interim and subject to change when more data become available.

Please note that, based on perchlorate's mechanism of toxicity, we would expect children to be the most susceptible subpopulation. Therefore, we are using child exposure factors (0.64 L/day ingestion rate, 15 kg body weight) rather than adult exposure factors (2 L/day ingestion rate, 70 kg body weight) to calculate the interim action level for perchlorate.

Also note that in developing the interim action level for perchlorate, we considered other perchlorate action levels that are being used in other states. One such value being used in California, 18 μg/L, is based on the older provisional RfD of 0.0005 mg/kg·day and uses adult

exposure factors. Another value used in Nevada, 32 $\mu g/L$, is based on the interim provisional RfD of 0.0009 mg/kg·day and also uses adult exposure factors. Again, we are confident that the interim action level of 22 $\mu g/L$ which was developed using the interim provisional RfD and child exposure factors is the most appropriate and scientifically-defensible.

If you have any questions, please call me at extension 1793.

Distribution:

Ken Peterson, Water Administration, MC-145
Leigh Ing, Waste Administration, MC-122
Sally Gutierrez, Water Administration, MC-150
Mike Cowan, Water Administration, MC-145
James Davenport, Standards and Assessment, MC-150
Dan Wittliff, Chief Engineer, MC-110
Ata ur Rahman, Corrective Action, MC-127
James Sher, Remediation, MC-143
Wade Stone, Remediation, MC-143
Barbara Daywood, Remediation, MC-225
Paul Bruckwicki, Region 5, MC-R5
Ken May, Public Drinking Water, MC-155
Michael Pfeil, Standards and Assessment, MC-150
Vickie Reat, Remediation Technical Support, MC-225
Scott Crouch, Remediation Technical Support, MC-221
Allison Woodall, Clean Rivers Program, MC-150
Patricia Wise, Clean Rivers Program, MC-150
Mark Arthur, Corrective Action, MC-127

FACT SHEET FOR DEVELOPMENT OF EFFLUENT LIMITATIONS
LHAAP - Perchlorate

General

Discharge Route - to Harrison Bayou (intermittent stream with perennial pools) thence to Caddo Lake, Stream Segment No. 0401 of the Cypress Creek Basin.

Segment 0401 uses - Contact Recreation, High Aquatic Life Use, and Public Water Supply.

Mixing Zone - There is no mixing zone established for this discharge to an intermittent stream. Acute toxic criteria apply at the point of discharge. Human health criteria are, however, applied at the point where the discharge reaches Caddo Lake. A mixing zone of 200 feet, and an effluent concentration of 8 % at the edge of that mixing zone, are utilized in calculation of human health-based effluent limitations.

Human Health Criteria - 0.22 parts per billion perchlorate, 100% availability

Aquatic Life Protection - Review of biomonitoring tests indicate that there will be no adverse effect to aquatic life in the receiving waters if effluent is treated to levels established for the protection of human health.

Calculation of Effluent Limitations *

22 ppb ÷ [(1) (.08)] = 275 as a WLA **

LTA*** = (0.93) (WLA)
LTA = (0.93) (275) = 255.7

Daily Average Effluent Limitation = (255.7) (1.47) = 375 parts per billion
Daily Maximum Effluent Limitation = (255.7) (3.11) = 795 parts per billion

* For a detailed description of the procedure for calculation of effluent limitations refer to "Implementation of the Texas Natural Resource Conservation Commission Standards Via Permitting," August 23, 1995.

** Waste Load Allocation

*** Long Term Average


Goose Prairie
Pine Island
Sand Island
Twin Island
Rag Island
Goose Island
C
A
BIG
BOUNDARY
Long Pt
Boathouses
South
LONGHORN ORDNANCE WORKS
LONGHORN ORDNANCE WORKS
Bayou
Saunders
Branch
Harrison
Bayou
Karnack
Hope No 2 Cem
Hope No 1 Cem
Haynes Cem
Radio Tower
Gravel Pit
Mill Pond
LOUISIANA
Carver High Sch
Substation

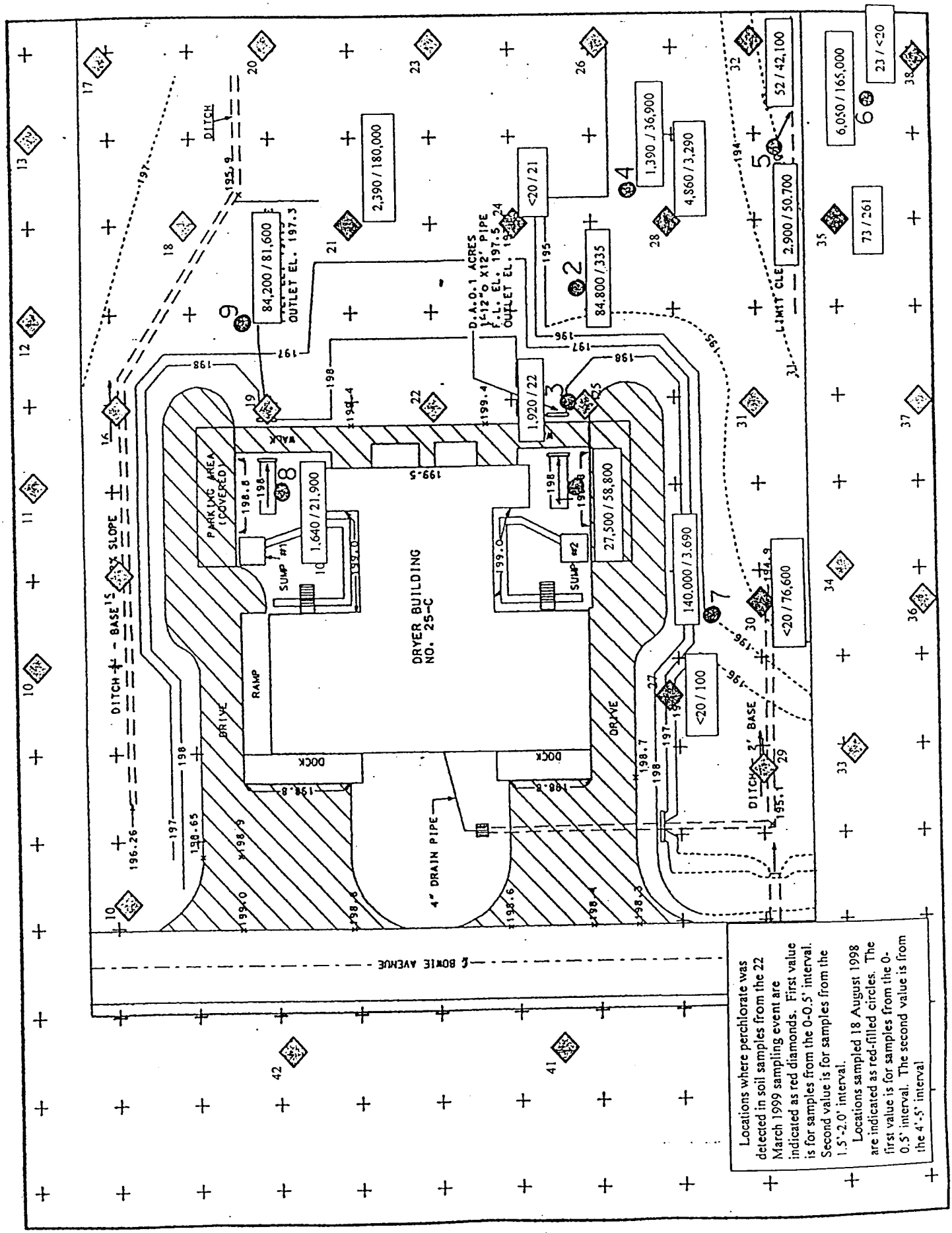
ONGHORN ARMY AMMUNITION PLANT

OSE PARAIRIE CREEK SAMPLING RESULTS (ppb)

	Sampling Point ID	GPW-1	GPW-2	GPW-4	GPW-5	GPW-6	GPW-9	GPW-10	GPW-12	GPW-15
	Sampling Date	10-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98
	SWD Report No.	16888-2	16888-2	16888-2	16888-2	16888-2	16888-2	16888-2	16888-2	
c	2,4,6-TNT	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	7.0	NT
e	2,4-DNT	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	NT
	2,6-DNT	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	1.3	NT
c	2-Am-DNT	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	7.5	NT
e	4-Am-DNT							<0.25	14.7	NT
	2-Nitrotoluene	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	NT
e	4-Nitrotoluene	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	NT
e	HMX	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	NT
e	RDX	NT	NT	NT	NT	NT	NT	NT	NT	NT
s	Diethylphthalate	<1	<1	<1	<1	<1	<1	<1	<1	NT
v01	1,2,4-Trichlorobenzene	<1	<1	<1	<1	<1	<1	<1	<1	NT
v02	4-Isopropyltoluene	<1	<1	<1	<1	<1	<1	2.4	<1	NT
v03	Bromodichloromethane	<1	2.6	1.3	1.0	<1	<1	4.6	<1	NT
v04	Chloroform	<1	1.1	<1	<1	<1	<1	<1	<1	NT
v05	cis-1,2-Dichloroethene	<1	<1	<1	<1	<1	<1	<1	<1	NT
v06	Dibromochloromethane	<1	<1	<1	<1	<1	<1	<1	<1	NT
v07	Methylene Chloride	<1	<1	<1	<1	<1	<1	<1	<1	NT
v08	Tetrachloroethene	<1	12.1	3.9	3.0	2.6	<1	<1	<1	NT
v09	Trichloroethene	<1	<1	<1	<1	<1	11	460	12	11,000
v10	Vinyl Chloride	6.8	190	180	200	210	<1	<1	<1	NT
	Perchlorate			<1	<1	<1				
	Toluene									

NT= Not tested.

GPC-1 On Goose Prairie Creek, immediately upstream from bridge on Crocket Ave
GPC-2 On Goose Prairie Creek, immediately upstream from bridge on Karnack Ave
GPC-3 On Goose Prairie Creek, approximately halfway between Karnack Ave and 59th Street.
GPC-4 On Goose Prairie Creek, downstream from 59th Street. Accessed from Marshall Ave.
GPC-5 On Goose Prairie Creek, accessed from trail extending northwest from magazine area.
GPC-6 On Goose Prairie Creek, accessed from trail extending northwest from magazine area.
GPC-7 On tributary of Goose Prairie Creek, immediately upstream of bridge on Ave "P".
GPC-8 On Goose Prairie Creek, immediately upstream from bridge on Ave "P".
GPC-9 On Goose Prairie Creek, at Plant boundary. Sampling point normally surrounded by water extending at least100' in all directions. Accessed from trail extending northwest from magazine area.
GPC-10 At outfall of water treatment plant (sewage).
GPC-11 East of Independence Ave. in ditch of intermittent tributary east of building 32-H at corner of 55th Street and Independence Ave.
GPC-12 On tributary upstream of sampling point no. 7 east of Ave "D".
GPC-13 Water sample taken from impounded area west of building 32-H.
GPC-14 Drainage point for water flowing from production area downstream from sampling point no. 11 immediately prior to flowing into Goose upstream from sampling point no. 2.
GPC-15 Surface runoff southeast of Building 25-C sampled during a heavy rain .

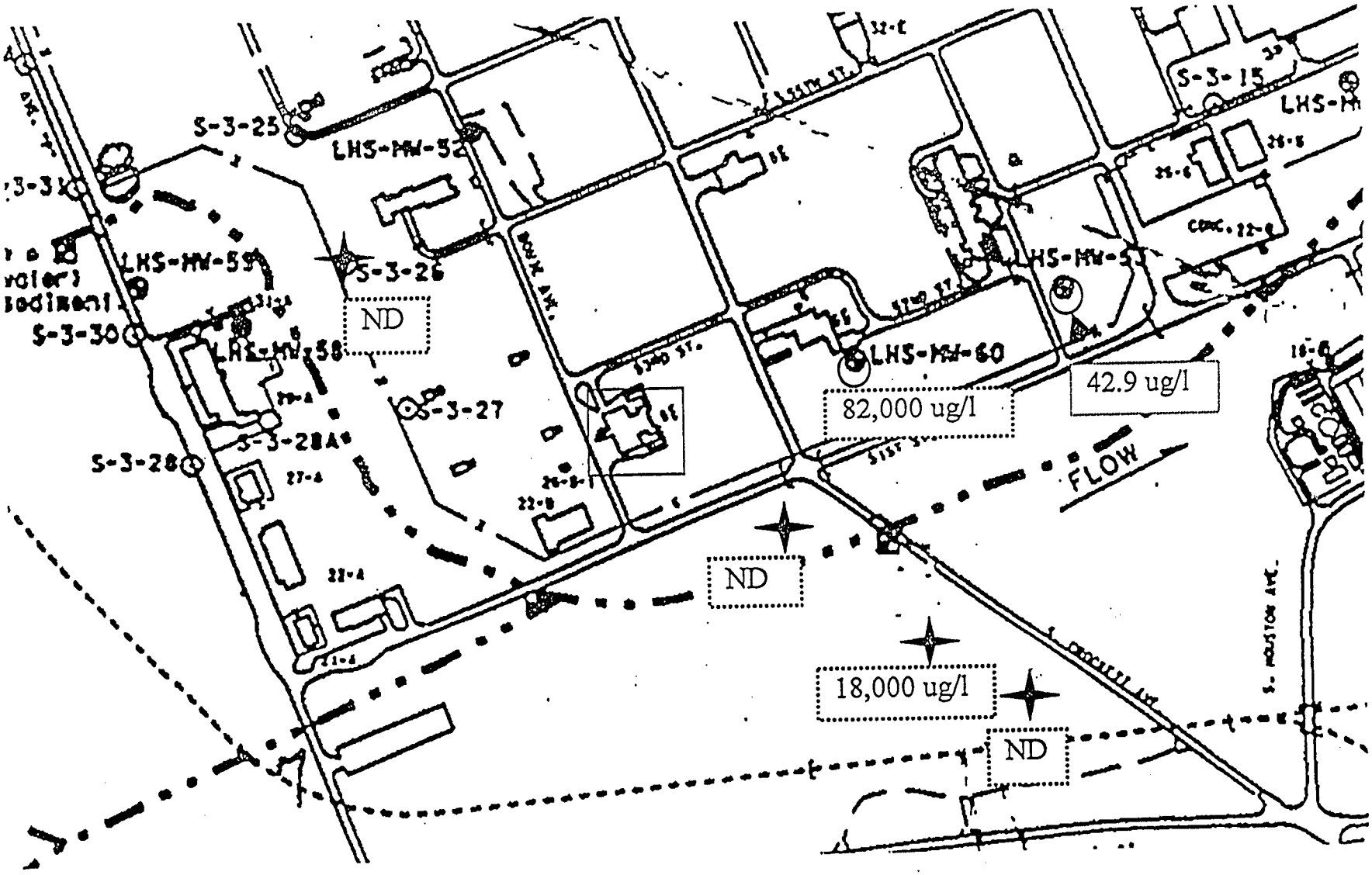

DRYER BUILDING NO. 25-C
PARKING AREA (COVERED)
RAMP
DRIVE
DOCK
SUMP #1
SUMP #2
4" DRAIN PIPE
DITCH - BASE
SLOPE
DITCH
BOWIE AVENUE
D.A.0.1 ACRES 12"o X12' PIPE F.L. EL. 197.5 OUTLET EL. 197.3
OUTLET EL. 197.3
LIMIT CLE
84,200 / 81,600
2,390 / 180,000
<20 / 21
1,390 / 36,900
4,860 / 3,290
84,800 / 335
52 / 42,100
6,050 / 165,000
23 / <20
2,900 / 50,700
73 / 261
1,920 / 22
1,640 / 21,900
27,500 / 58,800
140,000 / 3,690
<20 / 76,600
<20 / 100
Locations where perchlorate was detected in soil samples from the 22 March 1999 sampling event are indicated as red diamonds. First value is for samples from the 0-0.5' interval. Second value is for samples from the 1.5'-2.0' interval.
Locations sampled 18 August 1998 are indicated as red-filled circles. The first value is for samples from the 0-0.5' interval. The second value is from the 4'-5' interval

Longhorn Army Ammunition Plant
Building 25-C
Perchlorate Results (ug/kg)
Sampled 18 August 1998

		Sampling Location								
		25C1	25C2	25C3	25C4	25C5	25C6	25C7	25C8	25C9
Sampling Depths (ft)	0-0.5'	27,500	84,800	1,920	1,390	2,900	6,050/ 5,880 QC/ 11,000 QA	140,000	1,640	84,200
	4'-5'	58,800	335	22.1/ 23.1QC/ <40QA	36,900	50,700	165,000	3,690	21,900	81,600
	9'-10'	10,700	5,720	12,300	3,570	15,200	118,000	2,310	14,400	8,090

Sample Description

		Sampling Location								
		25C1	25C2	25C3	25C4	25C5	25C6	25C7	25C8	25C9
Sampling Depths (ft)	0-0.5'	Yellow Brown silty Sand	Tan silty Sand	Yellow Brown/ Gray silty Sand	Light Brown silty Sand	Brown Silty Sand	Yellow Brown silty Sand	Brown Sand	Mixed Sand/ Gravel	Yellow Brown silty Sand
	4'-5'	Gray-red stiff Clay	Gray clayey Sand	Gray clayey silty Sand (wet)	Gray silty Sand	Mottled Brown/ Gray clayey silty Sand	Gray silty Sand	Gray silty Sand w/dk brown woody type fiber mixed	Brown Gray silty Sand	Mottled Brown/ Gray silty Sand
	9'-10'	Gray clayey Sand (moist)	Yellow Brown clayey Sand (wet)	Brown Sand (wet)	Gray clayey Sand	Gray/Brown clayey Sand	Gray silty Sand	Brown silty Sand (wet)	Gray silty Sand	Gray silty Sand



Groundwater Perchlorate Sampling
October 22, 1998

Perchlorate Sampling Results
Groundwater/Surface Water
April/May 1999

On 1 April 1999, one water sample was collected from the effluent of the contaminated groundwater treatment plant at Burning Ground No. 3. That water sampling point was identified as LHGWTP-1. That water sample was taken from a faucet on the inlet side of the effluent holding tank. The analytical result is listed in the Table 1.

In response to the analytical result of the previously mentioned sample, groundwater and surface water samples were collected 28 April 1999 for perchlorate analysis. Groundwater samples were collected at three locations at the Burning Ground No. 3 contaminated groundwater treatment plant and at three locations on Harrison Bayou. The sampling results and locations are listed in the table below. Figure 1 shows illustrates the location of the Harrison Bayou sampling points.

At the contaminated groundwater treatment plant, field, quality control and quality assurance samples were collected at sampling location LHGWTP-1. Field and quality control samples were sent to APPL Inc for analysis. The quality assurance sample was submitted to CLS Laboratory for analysis.

From Harrison Bayou, duplicate samples were taken at each location. One set of samples was submitted to APPL Inc and the other sample was submitted CLS Laboratory. At location HBW5, a quality assurance sample was collected and submitted with the duplicate sample sent to CLS Laboratory. Radian International recorded the flow in Harrison Bayou on 28 April 1999 to be 3.40 cfs (1526.0 gpm) at the outfall location.

On 13 May 1999, groundwater was sampled from separate points along the extraction system to determine the variation in perchlorate influent concentrations and effluent concentrations. Groundwater samples were collected from each of the 28 sump wells along the interceptor collector trenches. Two samples were collected from the effluent stream of the groundwater treatment plant. One of those samples was collected at location LHGWTP-1. The second effluent sample was collected from the outfall stream on Harrison Bayou and identified as sampling location LHGWTP-4. The results of that sampling round have been included in the table below. The locations of the ICT sump wells are shown in Figure 2.

Table 1. Groundwater/Surface Water Perchlorate Sampling Results (ug/L). Results from the 5/13/99 sampling event are tentative pending verification from the laboratory.

	Laboratory (Sampling Date)				
Sample ID	APPL (4/1/99)	APPL (4/28/99)	CLS Labs (4/28/99)	APPL (5/13/99)	Sampling Location
LHGWTP-1	10,200	14,500 / 14,400	14,000	12,200	Sample port on inlet side of GWTP treated effluent storage tank
LHGWTP-2		1,760			Sample port at Storage Tank at Site 16
LHGWTP-3		2,890			Entrance spigot from BG3 to GWTP

Sample ID	Laboratory (Sampling Date)				Sampling Location
	APPL (4/1/99)	APPL (4/28/99)	CLS Labs (4/28/99)	APPL (5/13/99)	
LHGWTP-4				7,980	Discharge pipe from GWTP at Harrison Bayou
LHGWTP-Outfall		1,410	1,500		Harrison Bayou at discharge outfall from treated effluent storage tank
HBW5		21.4	75 / 29		Harrison Bayou at sampling point HBW-5
HBW9		97.3	38		Harrison Bayou at sampling point HBW-9
ICT-1				<1	Interceptor Collector Trench Sump
ICT-2				<1	Interceptor Collector Trench Sump
ICT-3				63,900	Interceptor Collector Trench Sump
ICT-4				213,000	Interceptor Collector Trench Sump
ICT-5				18	Interceptor Collector Trench Sump
ICT-6				6,850	Interceptor Collector Trench Sump
ICT-7				<1	Interceptor Collector Trench Sump
ICT-8				18,600	Interceptor Collector Trench Sump
ICT-9				26,800	Interceptor Collector Trench Sump
ICT-10				3	Interceptor Collector Trench Sump
ICT-11				1	Interceptor Collector Trench Sump
ICT-12A				7,490	Interceptor Collector Trench Sump
ICT-12B				169,000	Interceptor Collector Trench Sump
ICT-12C				21,500	Interceptor Collector Trench Sump
ICT-12D				33,500	Interceptor Collector Trench Sump
ICT-12E				<1	Interceptor Collector Trench Sump
ICT-13A				24,000	Interceptor Collector Trench Sump
ICT-13B				1,100	Interceptor Collector Trench Sump
ICT-13C				<1	Interceptor Collector Trench Sump
ICT-13D				<1	Interceptor Collector Trench Sump
ICT-13E				13	Interceptor Collector Trench Sump
ICT-13F				5	Interceptor Collector Trench Sump
ICT-13G				<1	Interceptor Collector Trench Sump
ICT-14A				26,800	Interceptor Collector Trench Sump
ICT-14B				8,420	Interceptor Collector Trench Sump
ICT-14C				74,800	Interceptor Collector Trench Sump
ICT-14D				24,500	Interceptor Collector Trench Sump
ICT-14E				98	Interceptor Collector Trench Sump

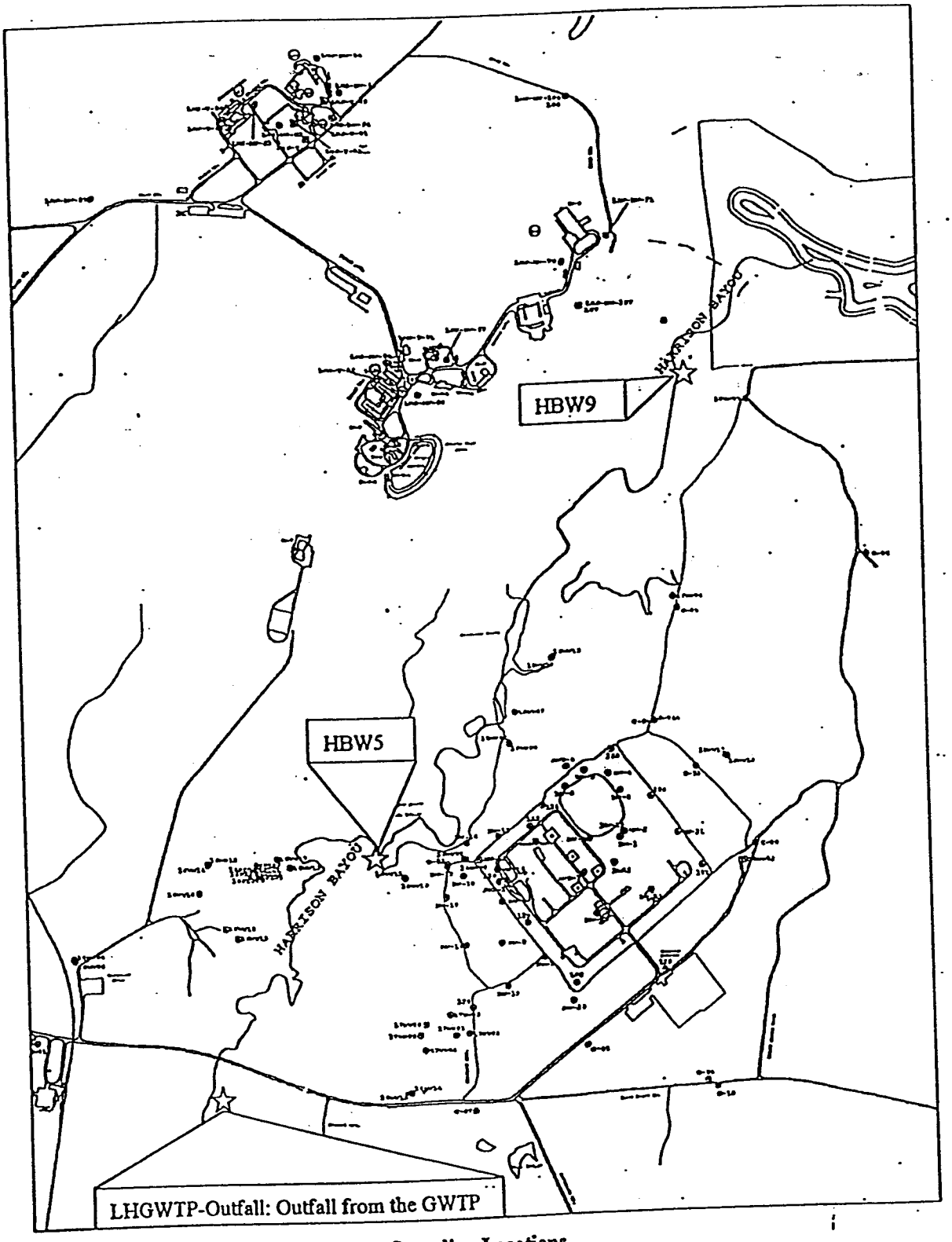


Figure 1. Harrison Bayou Perchlorate Sampling Locations

SIOLL-CR

12 July 1999

Mr. James Sher
TNRCC
Superfund Engineering Section-MC-144
P.O. Box 13087
Austin, TX 78711-3087

SUBJECT: Longhorn Army Ammunition Plant's Perchlorate Action Plan

Ref: LHAAP Request for Immediate Initial Assessment of Perchlorate in Caddo Lake, TNRCC, and July 9 1999

Dear Mr. Sher:

The Army has carefully considered and researched options regarding your 9 July 1999 request for an immediate initial assessment of perchlorate in Caddo Lake. Recent research has confirmed the earlier communication to TNRCC regarding Caddo Lake sampling outside the boundaries of Longhorn Army Ammunition Plant. A request supported by a legal requirement, for sampling off the LHAAP property must be submitted to the Department of Army for approval. Based on the EPA review of drinking water facilities close to the plant boundary (Blanchard, La.) indications are that there are no perchlorates present. Therefore, we are unable to establish the legal requirement necessary to obtain the Secretary of the Army's approval for off post sampling.

Since the inception of the Federal Facility Agreement (FFA) in 1991, the Army has teamed with the FFA members, as well as the public in recent years, to develop strategies and plans as well as extensive remediation systems for protecting human health and the environment. This very effective method of teaming, as set forth in the FFA, has provided an opportunity for all to work together to discover innovative solutions acceptable to all parties. We encourage the continued success of this system, and would like the opportunity to discuss this perchlorate issue with you in person during the Monthly Managers' Meeting scheduled for 20 July 1999 in your offices.

Sincerely,

James A. McPherson
Commander's Representative

Copy Furnished:
Peter Waterreus – TNRCC
Wade Stone - TNRCC
Chris Villerreal - EPA Region 6
Cyril Onewokae - AMSIO-IBE-R
Jeff Armstrong - AEC
Paul Bruckwicki - TNRCC Region 5
Jonna Polk - COE - Tulsa
Wilma Subra - Audubon TAG

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

July 13, 1999

VIA E-MAIL, FAX, AND MAIL
FAX #:318-459-5112

Mr. David Tolbert, Program Manager
Longhorn/Louisiana Army Ammunition Plant
Attn: SIOLH-CR
P.O. Box 658
Doyline, LA 71023-0658

Re: Longhorn Army Ammunition Plant (LHAAP)
July 12, 1999 Army response to the July 9, 1999 TNRCC Request For Immediate Initial Assessment of Perchlorate in Caddo Lake

Dear Mr. Tolbert:

The Texas Natural Resource Conservation Commission (TNRCC) offers the following comments regarding the Army's July 12, 1999 response to our request for an immediate initial assessment of perchlorate in Caddo Lake:

Concern 1: **The objective of the sampling request -- are you concerned about drinking water? Are you concerned about swimmers, boaters, and fisherman?**

Response: The objective of the sampling request is to determine whether perchlorate has migrated from the LHAAP into Caddo Lake. As stated in our July 9, 1999 letter, the results of water samples collected within the LHAAP property boundary suggest that perchlorate may have migrated off-site into Caddo Lake. Until the potential presence of perchlorate in Caddo Lake is assessed, the TNRCC is concerned about all potential human health pathways of exposure.

Concern 2: **What is the next step if perchlorates are found?**

Response: If perchlorate is detected in Caddo Lake, additional assessment may be needed depending on the concentration and locations in which perchlorate is found.

Concern 3: **We need to define and locate the "mouth" of each tributary.**

Response: Caddo Lake samples should be collected off-site (across the LHAAP property boundary). The TNRCC will be happy to work with the Army to determine the most appropriate sample locations.

Response: Caddo Lake samples should be collected off-site (across the LHAAP property boundary). The TNRCC will be happy to work with the Army to determine the most appropriate sample locations.

Concern 4: We do not understand some of the factors used in your calculations of the effluent limitations.

Response: The discharge criteria provided to the Army in our July 9, 1999 letter were established using standard formulas to calculate such criteria. If the Army will identify which factors used in the calculations are unclear, the TNRCC will provide whatever clarification is needed.

Concern 5: We do not know what impact your new interim action level for perchlorates will have on our groundwater treatment plant.

Response: The perchlorate discharge criteria may have a significant impact on the LHAAP groundwater treatment plant. The treated water from the treatment plant is required to meet the discharge criteria prior to discharge to Harrison Bayou.

With regard to Concerns 4 and 5, the TNRCC does not believe that resolution of these concerns is an appropriate prerequisite to sampling Caddo Lake.

Please provide your response regarding both requests from our July 9, 1999 letter by the close of business July 16, 1999. If the Army agrees to collect water samples from Caddo Lake, the TNRCC will be happy to meet with you to discuss your concerns in more detail. If you have any questions, please give me a call at (512) 239-2444.

Sincerely yours,

James S.H. Sher, P.E.
Project Manager
Superfund Cleanup Section
Remediation Division

JS/ls

Enclosure

cc: Chris Villarreal, EPA Region 6 (6SF-AP)
cc: James A. McPherson, LHAPP

DEPARTMENT OF HEALTH & HUMAN SERVICES
Public Health Service

Agency for Toxic Substances
and Disease Registry
Atlanta GA 30333

July 14, 1999

Longhorn Army Ammunition Plant/ Louisiana Army Ammunition Plant
Mr. James McPherson
P.O. Box 658
Doyline, LA 71023

RE: Longhorn Army Ammuniton Plant: Public Health Assessment

Dear Mr. McPherson:

The Agency for Toxic Substances and Disease Registry (ATSDR) is pleased to provide you with a copy of the Final Release version (July 9, 1999) of our public health assessment of the Longhorn Army Ammunition Plant. This health assessment was prepared by the Texas Department of Health, under a Cooperative Agreement with ATSDR and is our evaluation of any past, current, or future impacts on the health of people who work and live in the community from releases of environmental contaminants from the facility.

Also enclosed please find a Reader Evaluation form. This questionnaire is designed to help us improve our communications. We would like to know if we have presented our findings clearly. Reader's responses will help us improve our reports. Please fill out the form, add your own comments, fold the form and drop it in the nearest mailbox. No postage is necessary.

If you have any questions about the report or our public health activities at Longhorn Army Ammunition Plant, do not hesitate to contact the health assessor, Jeff Kellam, at (404) 639-6044. Thank you for your time and interest.

Sincerely yours,

for Max M. Howie, Jr.
Chief, Program Evaluation, Records, and Information Services Branch
Division of Health Assessment and Consultation
ATSDR, Mailstop E-56
1600 Clifton Road, NE
Atlanta, GA 30333

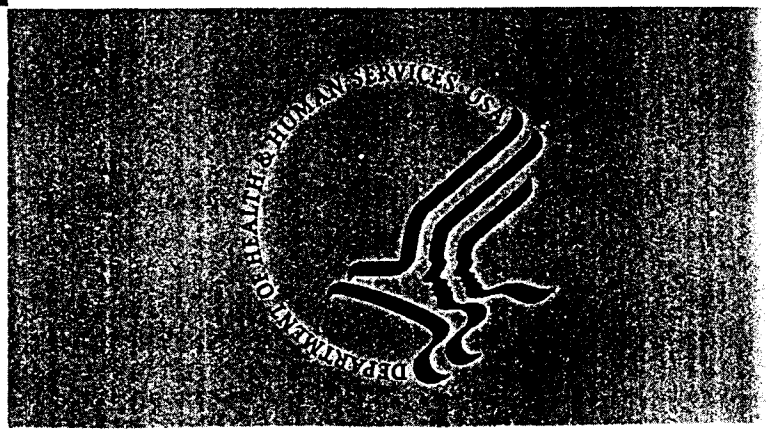
Enclosures

024507

Public Health Assessment for

LONGHORN ARMY AMMUNITION PLANT
KARNACK, HARRISON COUNTY, TEXAS
CERCLIS NO. TX6213820529
JULY 9, 1999

U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry



THE ATSDR PUBLIC HEALTH ASSESSMENT: A NOTE OF EXPLANATION

This public health assessment was prepared by ATSDR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) section 104 (i)(6) (42 U.S.C. 9604 (i)(6)), and in accordance with our implementing regulations (42 C.F.R. Part 90). In preparing this document, ATSDR has collected relevant health data, environmental data, and community health concerns from the Environmental Protection Agency (EPA), state and local health and environmental agencies, the community, and potentially responsible parties, where appropriate.

In addition, this document has previously been provided to EPA and the affected states in an initial release, as required by CERCLA section 104 (i)(6)(H), for their information and review. The revised document was released for a 30-day public comment period. Subsequent to the public comment period, ATSDR addressed all public comments and revised or appended the document as appropriate. The public health assessment has now been reissued. This concludes the public health assessment process for this site, unless additional information is obtained by ATSDR which, in the agency's opinion, indicates a need to revise or append the conclusions previously issued.

Use of trade names is for identification only and does not constitute endorsement by the Public Health Service or the U.S. Department of Health and Human Services.

Additional copies of this report are available from:
National Technical Information Service, Springfield, Virginia
(703) 487-4650

PUBLIC HEALTH ASSESSMENT

LONGHORN ARMY AMMUNITION PLANT

KARNACK, HARRISON COUNTY, TEXAS

CERCLIS NO. TX6213820529

Prepared by:

Texas Department of Health
Under Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

FOREWORD

The Agency for Toxic Substances and Disease Registry, ATSDR, was established by Congress in 1980 under the Comprehensive Environmental Response, Compensation, and Liability Act, also known as the *Superfund* law. This law set up a fund to identify and clean up our country's hazardous waste sites. The Environmental Protection Agency, EPA, and the individual states regulate the investigation and clean up of the sites.

Since 1986, ATSDR has been required by law to conduct a public health assessment at each of the sites on the EPA National Priorities List. The aim of these evaluations is to find out if people are being exposed to hazardous substances and, if so, whether that exposure is harmful and should be stopped or reduced. (The legal definition of a health assessment is included on the inside front cover.) If appropriate, ATSDR also conducts public health assessments when petitioned by concerned individuals. Public health assessments are carried out by environmental and health scientists from ATSDR and from the states with which ATSDR has cooperative agreements. The public health assessment program allows the scientists flexibility in the format or structure of their response to the public health issues at hazardous waste sites. For example, a public health assessment could be one document or it could be a compilation of several health consultations - the structure may vary from site to site. Nevertheless, the public health assessment process is not considered complete until the public health issues at the site are addressed.

Exposure: As the first step in the evaluation, ATSDR scientists review environmental data to see how much contamination is at a site, where it is, and how people might come into contact with it. Generally, ATSDR does not collect its own environmental sampling data but reviews information provided by EPA, other government agencies, businesses, and the public. When there is not enough environmental information available, the report will indicate what further sampling data is needed.

Health Effects: If the review of the environmental data shows that people have or could come into contact with hazardous substances, ATSDR scientists evaluate whether or not these contacts may result in harmful effects. ATSDR recognizes that children, because of their play activities and their growing bodies, may be more vulnerable to these effects. As a policy, unless data are available to suggest otherwise, ATSDR considers children to be more sensitive and vulnerable to hazardous substances. Thus, the health impact to the children is considered first when evaluating the health threat to a community. The health impacts to other high risk groups within the community (such as the elderly, chronically ill, and people engaging in high risk practices) also receive special attention during the evaluation.

ATSDR uses existing scientific information, which can include the results of medical, toxicologic and epidemiologic studies and the data collected in disease registries, to determine the health effects that may result from exposures. The science of environmental health is still developing, and sometimes scientific information on the health effects of certain substances is not available. When this is so, the report will suggest what further public health actions are needed.

Conclusions: The report presents conclusions about the public health threat, if any, posed by a site. When health threats have been determined for high risk groups (such as children, elderly, chronically ill, and people engaging in high risk practices), they will be summarized in the conclusion section of the report. Ways to stop or reduce exposure will then be recommended in the public health action plan.

ATSDR is primarily an advisory agency, so usually these reports identify what actions are appropriate to be undertaken by EPA, other responsible parties, or the research or education divisions of ATSDR. However, if there is an urgent health threat, ATSDR can issue a public health advisory warning people of the danger. ATSDR can also authorize health education or pilot studies of health effects, full-scale epidemiology studies, disease registries, surveillance studies or research on specific hazardous substances.

Interactive Process: The health assessment is an interactive process. ATSDR solicits and evaluates information from numerous city, state and federal agencies, the companies responsible for cleaning up the site, and the community. It then shares its conclusions with them. Agencies are asked to respond to an early version of the report to make sure that the data they have provided is accurate and current. When informed of ATSDR's conclusions and recommendations, sometimes the agencies will begin to act on them before the final release of the report.

Community: ATSDR also needs to learn what people in the area know about the site and what concerns they may have about its impact on their health. Consequently, throughout the evaluation process, ATSDR actively gathers information and comments from the people who live or work near a site, including residents of the area, civic leaders, health professionals and community groups. To ensure that the report responds to the community's health concerns, an early version is also distributed to the public for their comments. All the comments received from the public are responded to in the final version of the report.

Comments: If, after reading this report, you have questions or comments, we encourage you to send them to us.

Letters should be addressed as follows:

Attention: Chief, Program Evaluation, Records, and Information Services Branch, Agency for Toxic Substances and Disease Registry, 1600 Clifton Road (E-56), Atlanta, GA 30333.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

SUMMARY

Longhorn Army Ammunition Plant (Longhorn) is an 8,493 acre government-owned former industrial facility approximately 14 miles northeast of Marshall, Harrison County, Texas. The site is bounded by Caddo Lake to the north and northeast and the town of Karnack to the west. The town of Uncertain also is north of the site.

Longhorn has been intermittently in operation since 1942 when it was established to produce the explosive 2,4,6-trinitrotoluene (TNT). Pyrotechnic ammunition also was produced at Longhorn and Morton Thiokol Corporation produced a plastic explosive at the facility until August 1997. Wastes from production facilities were washed into ponds or buried in landfills. According to document records for the hazardous ranking system, releases of 1,3-dinitrobenzene, 1,3,5-trinitrobenzene, arsenic, barium, chromium, and lead occurred. These chemicals have been found in the groundwater. The site was placed on the National Priorities List (NPL) in August 1990. The remedial investigation and feasibility study are expected to be completed in December 1999 and the Records of Decision are expected in the year 2000.

The Agency for Toxic Substances and Disease Registry (ATSDR) reviewed available environmental information for the site and evaluated several potential exposure situations. These exposure situations include potential contact with site contaminants in surface water, sediment, surface soil, wasteline material, and groundwater. Although site-related contaminants have been found in these various environmental media, currently the contaminants are not accessible, on or off the site, at levels that would pose a public health threat. Based on available information, we have concluded that overall, the Longhorn Army Ammunition Plant poses no apparent public health hazard. In the future, the conclusion category for this site could change if additional data were to indicate that contaminants from the site were migrating towards the public water supply wells near the site. The conclusion category also could change if contaminants were migrating into Caddo Lake at concentrations that could affect public health. A brief review of the exposure situations that were considered is presented below.

NO APPARENT PUBLIC HEALTH HAZARD

ATSDR concluded that the following exposure situations pose no apparent public health hazard either because people are not likely to come into contact with site contaminants or because institutional controls are sufficient to protect human health.

Surface Water

Contaminants found in surface water on this site do not present a public health hazard. Although limited access hunting is allowed on the site, as are infrequent research activities, we do not consider exposure to site contaminants either by ingesting or contacting on-site surface water to be a significant source of exposure since: 1) surface water on the site is limited to small bodies of water such as puddles, drainage areas, and small non-navigable streams, 2) access to the site is

limited, 3) the probability of ingesting surface water is very low, 4) the frequency and duration of any contact with surface water would be very low, and 5) the surface area of skin that potentially could come into contact with contaminated water would be small.

We considered the potential health hazards associated with the possible transport of contaminants to Caddo Lake via surface water drainage from Goose Prairie Creek and Harrison Bayou. Although contaminants have been detected in water from these creeks, the available evidence indicates that contaminants are not migrating further downstream at levels that would be a public health concern with the exception of perchlorate. Based on available information and worst case exposure estimates, it is unlikely that contaminants will migrate to Caddo Lake at concentrations great enough to pose a health threat to people using the lake for recreation or drinking water. Remediation of the sources of perchlorate and continued quarterly sampling of surface water from Goose Prairie Creek and Harrison Bayou will help ensure that the likelihood of potential future exposures is removed.

Sediment

Contaminants found in sediment at this site do not present a public health hazard. Although limited access hunting is allowed on the site, and research activities are periodically conducted on the site, we do not consider exposure to site contaminants either by ingesting or contacting sediment to be a significant exposure pathway since: 1) access to the site is limited, 2) the probability of ingesting sediment is very low, 3) the frequency and duration of any contact with sediment is very low, and 4) the surface area of skin that potentially could come into contact with contaminated sediment would be small.

Surface Soil and Wasteline Material

Contaminants found in surface soil or wasteline material at this site do not present a public health hazard. Although limited access hunting was allowed on the site, and infrequent research activities and utility maintenance activities are conducted on site, we do not consider exposure to site contaminants either by ingesting or contacting soil or wasteline material to be a significant exposure pathway since: 1) access to the site is limited, 2) the probability of ingesting soil or wasteline material is very low, 3) the frequency and duration of any contact with soil or wasteline material would be very low, and 4) the surface area of skin that potentially could come into contact with contaminated soil or wasteline material would be small.

Groundwater

Currently, contaminated groundwater beneath Longhorn does not pose a public health hazard. 1.) Contaminants have been detected in shallow groundwater on the site but the on-site groundwater is not used for drinking or other purposes. 2.) Although low concentrations of site-related contaminants were reported in the on-site monitoring wells at the perimeter of Longhorn, these data may be the result of cross-contamination or other sampling and analytical problems. The mercury which has been measured in some of the perimeter wells seems to be related to

seasonal dry conditions. 3.) Area public water supply wells and domestic water wells are upgradient of Longhorn. 4.) Site contaminants have not been detected in public water supply wells. Although the public water supply wells have not been tested for every site contaminant on Longhorn (such as explosives), they have been tested for the same volatile organic compounds, minerals, and metals found in on-site groundwater. In the public water supply wells these constituents were either not detected or (in the case of minerals and metals) were not detected at levels above background or at levels of health concern. Therefore, since volatile organic compounds, minerals, and metals have not migrated from Longhorn into these public water supply wells, then it is unlikely that the explosive compounds from Longhorn have migrated into public water supply wells.

INTRODUCTION

In accordance with the Interagency Agreement between the U.S. Army and ATSDR and through a Cooperative Agreement between ATSDR and the Texas Department of Health (TDH), ATSDR and TDH have prepared this Public Health Assessment (PHA) for the Longhorn Army Ammunition Plant (Longhorn), a federal facilities National Priorities List (NPL) site.

This PHA presents conclusions about whether exposures are occurring, and whether a health threat is present. In some cases, it is possible to determine whether exposures occurred in the past. If it is found that a threat to public health exists, recommendations are made to stop or reduce the threat to public health.

In order to evaluate the threat to public health from contaminants at NPL sites, the PHA focuses on examining whether people have been ***exposed*** to (in contact with) the contaminants. Two of the most important tasks associated with the PHA are:

1. to determine whether people have been exposed to hazardous material from the NPL facility, and

2. to determine whether identified exposures are at levels that could pose a threat to public health.

In the PHA we will examine:

- **whether contamination exists** in the environment,
- **whether contamination is in places where people in the surrounding community might come into contact with the contaminants**, and
- if there is exposure, **whether there is enough contamination to affect the health of people** in the community.

To make the above determinations, each of the potential environmental media pathways will be examined. An environmental pathway can be described as the route contamination follows to get from its source to where people may come into contact with it. The environmental media that this PHA will examine are:

- **surface water**,
- **sediment**,
- **surface soil**,
- **wasteline material**, and
- **groundwater**.

Another important factor is the way that people might contact the contaminant. By this we mean whether the chemical is:

- **inhaled,**
- **ingested** (eaten or drunk), or
- **absorbed through the skin.**

Not all chemicals are a hazard for each of these methods of contact. For example, most metals are not harmful, particularly in very low amounts, if the only contact is by way of the skin. See the following box for a general portrayal of the exposure evaluation process we use in this PHA.

In preparing this Public Health Assessment, ATSDR has relied on the information provided in the referenced documents. Site number and site name designation were obtained from information provided in referenced documents. Site numbers are used as identifiers for locations on Longhorn and are not necessarily sequential. The Agency assumes that adequate quality assurance and quality control measures were followed with regard to chain-of-custody, laboratory procedures, and data reporting. The validity of the analyses and the conclusions drawn in this document are determined by the availability and reliability of the referenced information.

The majority of the environmental data presented in this public health assessment were collected for the United States Department of the Army by their contractor Sverdrup Environmental, Inc. during remedial investigations and by the United States Army Corps of Engineers (USACOE). Much of the environmental sampling data referenced in this report were collected between January 30, 1995 and April 1999 [1,2]. The U. S. Environmental Protection Agency (EPA) has approved quality assurance and quality control (QA/QC) criteria contained in the referenced site investigation documents. The EPA also has overseen all aspects of the remedial investigations to ensure that all QA/QC standards were met.

ATSDR Exposure Evaluation Process

WHAT **are the contaminants at Longhorn Army Ammunition Plant?**

WHICH **environmental media are contaminated ?**
(surface water, sediment, soil, groundwater)

and

HOW **much contamination is present in each?**

HOW **do contaminants travel to where people can come into contact with them?**

HOW **could people be exposed to the contaminants?**
(Breathe [inhale], eat [ingest], or touch [dermal contact])

ARE **people exposed to site contaminants?**

or

(*WERE* they exposed to site contaminants in the past?)

If exposure is occurring, or occurred in the past,
COULD **they be/have been exposed to contaminants in amounts that could affect health?**

Agency for Toxic Substances and Disease Registry
Public Health Conclusion Categories

CATEGORY A. URGENT PUBLIC HEALTH HAZARD	CATEGORY B. PUBLIC HEALTH HAZARD	CATEGORY C. INDETERMINATE PUBLIC HEALTH HAZARD	CATEGORY D. NO APPARENT PUBLIC HEALTH HAZARD	CATEGORY E. NO PUBLIC HEALTH HAZARD
This category is used for sites that pose an urgent public health hazard as the result of short-term exposures to hazardous substances. **Criteria:** Evidence exists that exposures have occurred, are occurring, or are likely to occur in the future; and the estimated exposures are to a substance or substances at concentrations in the environment that, upon short-term exposures (less than 1 year), can cause adverse health effects to any segment of the receptor population. The adverse health effect can be the result of either carcinogenic or noncarcinogenic toxicity from a chemical exposure. For a noncarcinogenic toxic effect, the exposure exceeds an acute or intermediate minimal risk level (MRL) established in the ATSDR Toxicological Profiles or other comparable value; and /or community-specific health outcome data indicate that the site has had an adverse impact on human health that requires rapid intervention; and /or physical hazards at the site pose an imminent risk of physical injury.	This category is used for sites that pose a public health hazard as the result of long-term exposures to hazardous substances. **Criteria:** Evidence exists that exposures have occurred, are occurring, or are likely to occur in the future; and the estimated exposures are to a substance or substances at concentrations in the environment that, upon long-term exposures (greater than 1 year), can cause adverse health effects to any segment of the receptor population. The adverse health effect can be the result of either carcinogenic or noncarcinogenic toxicity from a chemical exposure. For a noncarcinogenic toxic effect, the exposure exceeds a chronic MRL established in the ATSDR Toxicological Profiles or other comparable value; and/or community-specific health outcome data indicate that the site has had an adverse impact on human health that requires intervention.	This category is used for sites with incomplete information. **Criteria:** The limited available data do not indicate that humans are being or have been exposed to levels of contamination that would be expected to cause adverse health effects. However, data or information are not available for all environmental media to which humans may be exposed; and there are insufficient or no community-specific health outcome data to indicate that the site has had an adverse impact on human health.	This category is used for sites where human exposure to contaminated media is occurring or has occurred in the past, but the exposure is below a level of health hazard. **Criteria:** Exposures do not exceed an ATSDR chronic MRL or other comparable value; and data are available for all environmental media to which humans are being exposed; and there are no community-specific health outcome data to indicate that the site has had an adverse impact on human health.	This category is used for sites that do not pose a public health hazard. **Criteria:** There is no evidence of current or past human exposure to contaminated media; and future exposures to contaminated media are not likely to occur; and there are no community-specific health outcome data to indicate that the site has had an adverse impact on human health.

BACKGROUND

Site Description

Longhorn Army Ammunition Plant (Longhorn)[1] is a government-owned, former industrial facility situated on 8,493-acres east of State Highway 43 and south-southwest of Caddo Lake near Karnack, Harrison County, Texas [3]. Longhorn is approximately 14 miles northeast of Marshall, Texas (1990 Texas Census population of 23,682) and approximately 40 miles northwest of Shreveport, Louisiana (Figure 1). The nearest communities, Karnack (population 775) [4] and Uncertain (population 204 people) [5], are on the western and northern boundaries of the installation, respectively. Caddo Lake State Park is adjacent to the west northwest boundary of the site. The total population within one mile of the site boundaries is estimated to be 769 people (Figure 1). Harrison County has a total population of 57,483 people [6]. In 1991, approximately 2,000 people worked at Longhorn and in 1999, approximately 33 employees were working on the site.

Portions of the Longhorn property remain wet much of the year. Surface water on the site, which drains northeast toward Caddo Lake via four drainage systems (Figure 2), does not support fish of edible size and is not deep enough for boating, swimming and/or general recreational activities. However, each of these creeks drain contaminated areas on the Longhorn site. Approximately 11 percent of the surface water drains to Caddo Lake through Saunder's Branch of Martin Creek. Approximately 30 percent of the surface drainage is carried by Harrison Bayou on the southern edge of the site. Approximately 29 percent of the surface drainage from Longhorn is carried through Central Creek which is on the western edge of the installation and flows just south of the town of Karnack. Approximately 30 percent of Longhorn is drained via Goose Prairie Creek located near the northwest corner of the plant. Big Cypress Bayou joins Caddo Lake upgradient and northwest of Longhorn. Big Cypress Bayou is the surface water supply to the City of Marshall and former surface water supply to Longhorn. Caddo Lake is used for fishing, boating, swimming, and general recreation activities [3]. It is one of five East Texas Lakes that has a fish consumption advisory due to methylmercury concentrations in largemouth bass and freshwater drum. The mercury is believed to originate from the atmospheric deposition of non-point source emissions. This lake provides optimal conditions for the methylation of mercury and its subsequent biomagnification up the food chain into fish. Caddo Lake also serves as a surface water supply to public water systems in Louisiana (Blanchard, East Mooringsport, Mooringsport, Oil City, Shreveport, Vivian, and East Cove Utilities). There are no public water supply systems in Texas using surface water from Caddo Lake. Water from Caddo Lake flows east and joins the Red River at Shreveport, Louisiana. The Red River flows southeast across Louisiana and eventually joins the Mississippi River at Simmesport, Louisiana.

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[1] NOTE: acronyms, abbreviations, and definitions used in this document are defined in Appendix A and B

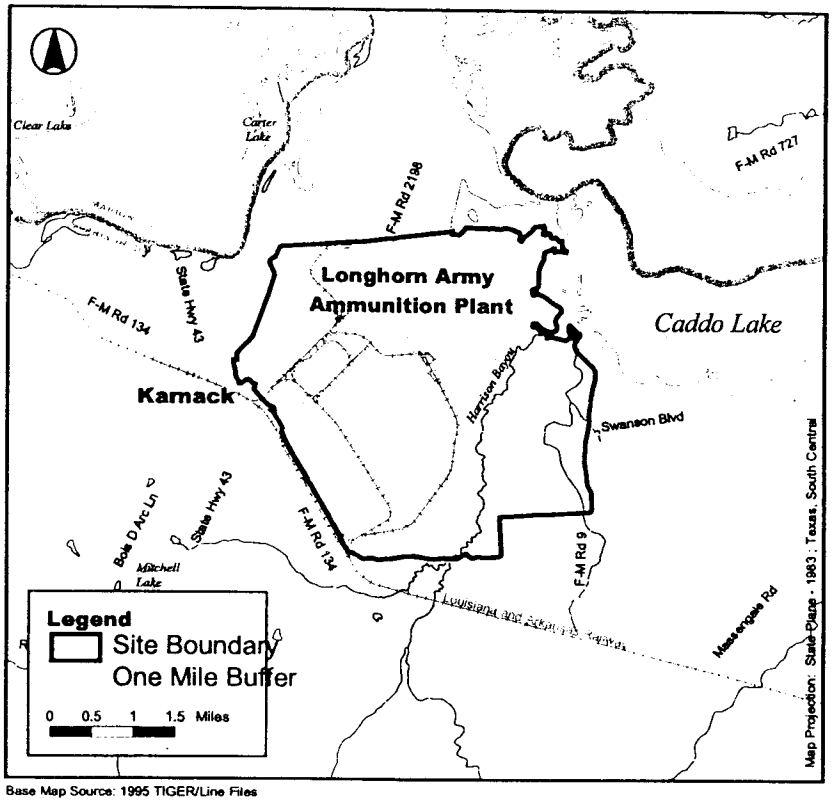
The Longhorn site is surrounded by pine and hardwood forests. An oil and natural gas field is east of Longhorn on the Louisiana border. The terrain at the site is characterized as gently rolling to hilly with slopes as steep as 12 percent grade common in the western and northwestern parts of the site. Groundwater beneath Longhorn predominantly moves in an east-northeast direction. Two groundwater wells drilled in 1997 and 1998 provide water for drinking and washing on the Longhorn site; in addition, there are several other public water supply wells near Longhorn that use groundwater from the Wilcox Carrizo Aquifer (Figure 3). There are other non-public water supply wells in the area that are used for livestock and domestic purposes. These wells typically are deep and hydraulically upgradient from Longhorn. Recharge of groundwater occurs primarily by precipitation infiltration from the surface. According to the 1996-1997 Texas Almanac, the average annual rainfall for Harrison County is 46.4 inches.

Parts of the installation, particularly those areas bordering Caddo Lake and surrounding Harrison Bayou, are relatively wild and support a variety of plant and animal life. The Caddo Lake area is included in the Northeast Piney Woods area and contains a significant amount of cypress swamps with wetland plants and animals that are unique to this environment [3]. Employees and their families are permitted to hunt deer on certain parts of the site. The Caddo Lake Institute leases Harrison Bayou basin for research activities. Periodically utility workers come on the Longhorn property to repair and/or check utility lines. There is currently interest to transfer this property to U. S. Fish and Wildlife for use as a National Park or wildlife area.

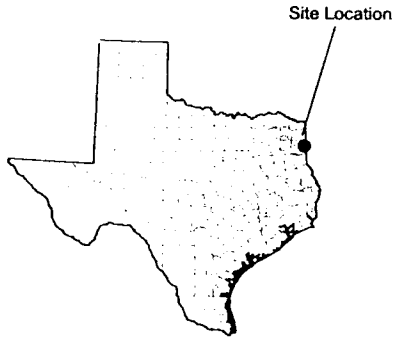
US Army Longhorn Army Ammunition Plant

Karnack, Texas

CERCLIS No. TX6213820529



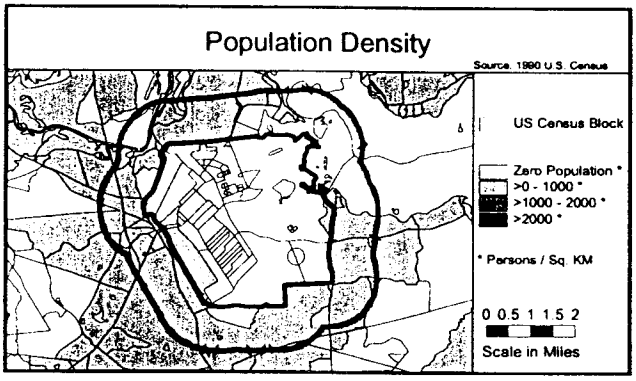
Base Map Source: 1995 TIGER/Line Files

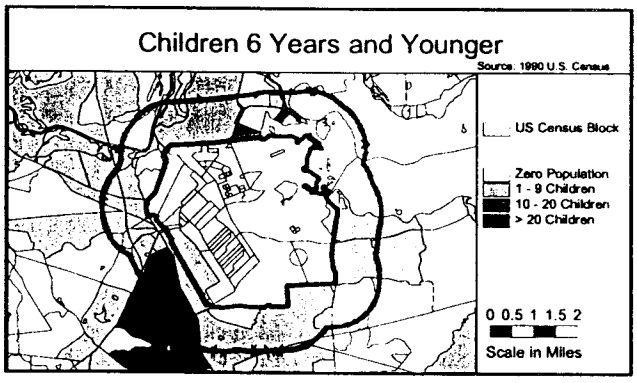


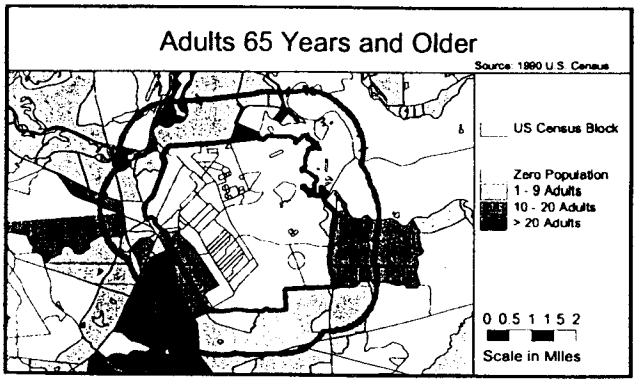
Harrison County, Texas

Demographic Statistics Within One Mile of Site*	
Total Population	769
White	502
Black	263
American Indian, Eskimo, Aleut	1
Asian or Pacific Islander	2
Other Race	2
Hispanic Origin	6
Children Aged 6 and Younger	67
Adults Aged 65 and Older	157
Females Aged 15 - 44	150
Total Housing Units	490

Demographics Statistics Source: 1990 U.S. Census
*Calculated using an area-proportion spatial analysis technique







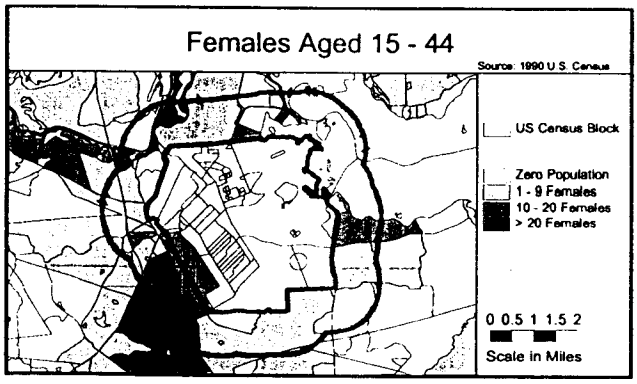


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Figure 2
Longhorn Army Ammunition Plant
Streams and Creeks at Longhorn

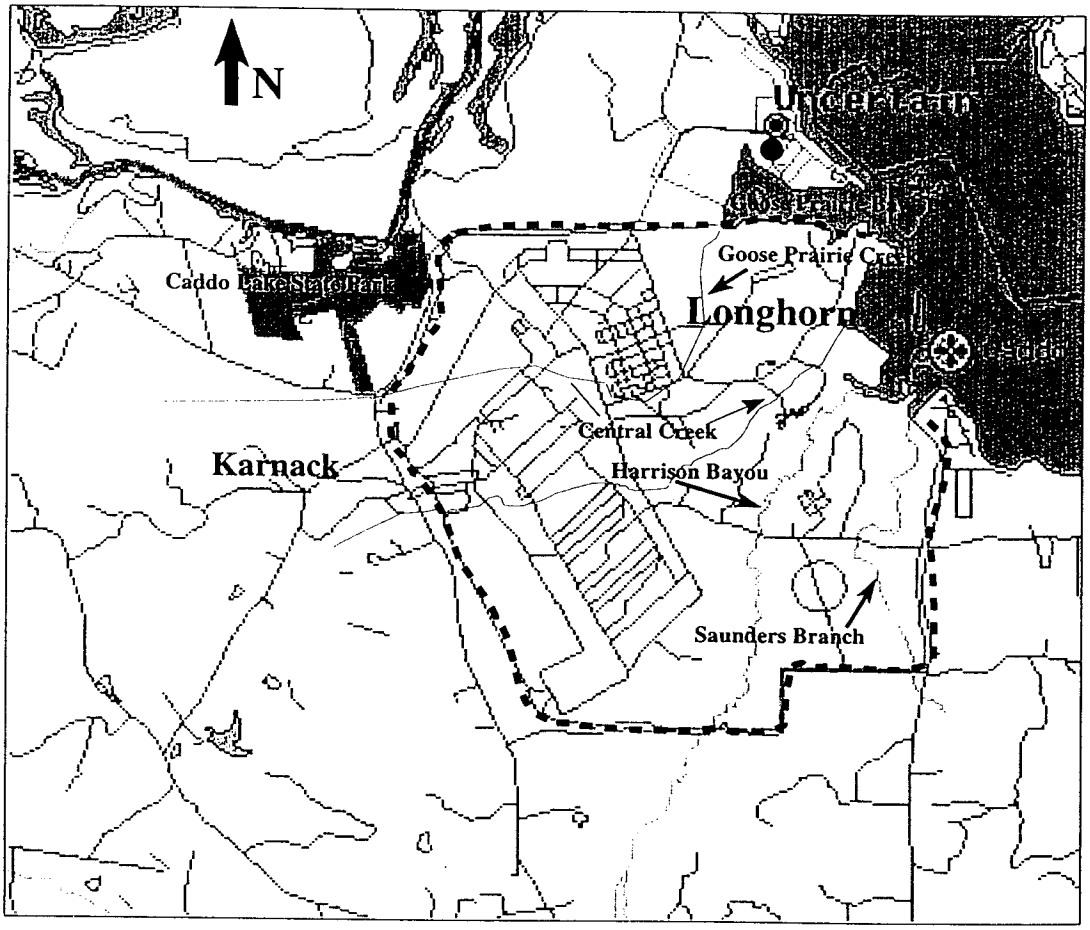
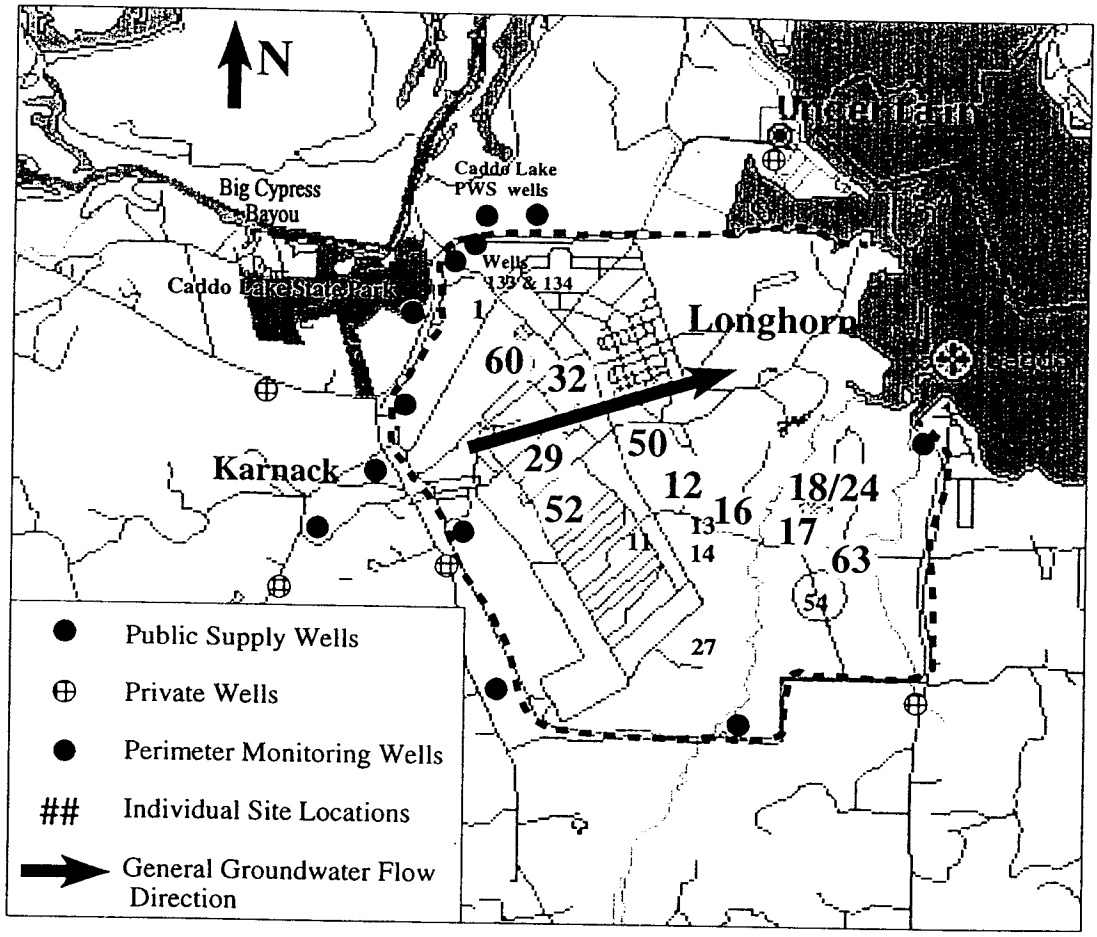


Figure 3
Longhorn Army Ammunition Plant
General Site Information



Site History

Longhorn, under the jurisdiction of the U.S. Army Armament, Munitions and Chemical Command (AMCCOM), was established in October 1942 to produce 2,4,6-trinitrotoluene (TNT). The facility was on standby status from August 1945 until February 1952. From 1952 until 1956 the facility produced such pyrotechnic ammunition as photo flash bombs and 40-millimeter tracers. In November 1955, the Morton Thiokol Corporation began operating a rocket motor production facility. This was the primary activity at Longhorn until 1965, when production of pyrotechnic ammunition was re-established. Morton Thiokol Corporation produced CL-20, a plastic explosive, on site until August 1997. Morton Thiokol Corporation is no longer operating at Longhorn. At present, production has ceased and demilitarization activities have started; the principal remaining activity on site is remedial investigation and environmental restoration [7,8].

Until about 1984, production wastes were washed into ponds or buried in landfills [9]. Under the Installation Restoration Program (IRP), a program through which the Department of Defense identifies, investigates, and cleans up contamination from hazardous materials, the Army initially identified several contaminated or potentially contaminated areas. No information was available to verify that any remediation was done at that time. These included Burning Ground No. 3 (Site 18) where flammable wastes had been burned since the early 1950s; the Unlined Evaporation Pond (Site 24) into which an estimated 16,000 gallons per day of waste containing arsenic, barium, chromium, lead, zinc, and organic nitrogen compounds were discharged during 1972-1984; the Old Landfill (Site 16) where TNT wastes were disposed of during 1942-1944; and the Former TNT Production Area (Site 29), the Ground Signal Test Area (Site 54), and South Test Area (Site 27), where various rocket motors and ammunition were tested.

According to EPA's NPL site narrative at listing, the 1984 IRP study reported barium, chromium, and lead in sediment from the Unlined Evaporation Pond; barium in soil from the Old Landfill; and arsenic, barium, chromium, lead, zinc, 1,3-dinitrobenzene, and 1,3,5-trinitrobenzene in groundwater from monitoring wells near Burning Ground No. 3. Dinitrobenzene, TNT, nitrobenzene, 2,4-dinitrobenzene, and 2,6-dinitrotoluene found in surface water were believed to have originated from the Old Landfill and the Former TNT Production Area. The EPA placed Longhorn on the NPL on August 30, 1990.

In 1991, the Army began a Remedial Investigation (RI) to better define the areas of known or suspected contamination. For some of the suspected areas, initial investigations indicated that "no further action" was necessary to ensure the continued protection of the public and the environment [3]. A list of these sites and their current status is included in Appendix C. The locations of these areas are shown in Figure 3. A brief description of the areas, the media sampled, and the types of chemicals tested for is in Appendices D and E. According to EPA, Records of Decision are scheduled for mid-2000.

Previous ATSDR Involvement

ATSDR completed an initial visit in 1991 to rank the facility according to its health/exposure priority among all other Department of Defense (DOD) NPL facilities [8]. The facility received a relatively low ranking meaning there did not appear to be exposure situations that might present a possible public health hazard.

In December of 1995, ATSDR received a request from the U.S. Army Center for Health Promotion and Preventative Medicine (USACHPPM), to evaluate whether trichloroethene (TCE) contamination found in on-site groundwater and surface water could adversely affect people. Specifically, ATSDR was asked to assess the risk to people using water from public water supply systems taking water from Caddo Lake. After visiting the site and reviewing available data, ATSDR found that concentrations of TCE were high in Landfill 16 groundwater and in one surface water sample collected from a seep area downgradient of Landfill 16 in Harrison Bayou. Additional sampling showed that TCE had not been detected further downstream in Harrison Bayou, or in any of the public water supplies using Caddo Lake water. ATSDR concluded that the presence of TCE in on-site groundwater and surface water did not represent a public health hazard to people drinking water from public water supply systems using Caddo Lake water. ATSDR recommended to USACHPPM that water from Harrison Bayou continue to be monitored for site contaminants to verify that TCE is not reaching Caddo Lake. ATSDR also recommended that, if contaminants were found at the confluence of Harrison Bayou and Caddo Lake, the public water supplies using Caddo Lake water be notified so that they can arrange to have their water tested for TCE contamination [8]. In response to ATSDR's consult recommendations, quarterly sampling was budgeted for and conducted in Harrison Bayou for fiscal year 1999 by the United States Army Corps of Engineers [7]. The results of this sampling are presented in the Environmental Contamination section of this report.

ENVIRONMENTAL CONTAMINATION / EXPOSURE PATHWAYS / PUBLIC HEALTH IMPLICATIONS

Introduction

Exposure to, or contact with chemical contaminants drive the ATSDR public health assessment process. The release or disposal of chemical contaminants into the environment does not always result in exposure or contact. Chemicals only have the potential to cause adverse health effects if people actually come into contact with them. People may be exposed to chemicals by breathing, eating, or drinking a substance containing the contaminant or by skin (dermal) contact with a substance containing the contaminant.

When people are exposed to chemicals, the exposure does not always result in adverse health effects. The type and severity of health effects that may occur in an individual from contact with contaminants depend on the toxicologic properties of the contaminants, how much of the contaminant to which the individual is exposed, how often and/or how long exposure is allowed to occur, the manner in which the contaminant enters or contacts the body (breathing, eating, drinking, or skin/eye contact), and the number of contaminants to which an individual is exposed (combinations of contaminants). Once exposure occurs, characteristics such as age, sex, nutritional status, genetics, life style, and health status of the exposed individual influence how the individual absorbs, distributes, metabolizes, and excretes the contaminant. These factors and characteristics influence whether exposure to a contaminant could or would result in adverse health effects.

To assess the potential health risks associated with contaminants at this site we compared contaminant concentrations to health assessment comparison (HAC) values. HAC values are media specific contaminant concentrations that are used to screen contaminants for further evaluation. Non-cancer HAC values are called environmental media evaluation guides (EMEGs) or reference dose media evaluation guides (RMEGs) and are respectively based on ATSDR's minimal risk levels (MRLs) or EPA's reference doses (RfDs). MRLs and RfDs are estimates of a daily human exposure to a contaminant that is unlikely to cause adverse non-cancer health effects. Cancer risk evaluation guides (CREGs) are based on EPA's chemical specific cancer slope factors and an estimated excess lifetime cancer risk of one-in-one-million persons exposed for a lifetime. We used standard assumptions to calculate appropriate HAC values [10]. Exceeding a HAC value does not imply that a contaminant represents a public health threat, but suggests that the contaminant warrants further consideration. In some instances, we compared contaminant concentrations in water to EPA's maximum contaminant levels (MCLs). MCLs are chemical specific maximum concentrations allowed in water delivered to the users of a public water system; they are considered protective of public health over a lifetime (70 years) of exposure at an ingestion rate of two liters per day. MCLs may be based on available technology and economic feasibility. Although MCLs only apply to public water supply systems, we often use them to help assess the public health implications of contaminants found in water from other sources.

Environmental Contamination

Table 1 lists the maximum detected concentration of each contaminant found in each of the areas investigated. Constituents included are those which were measured above health-based comparison values or above background. Contaminants are listed by the media in which they were found. Metals that were detected at concentrations similar to background levels are not listed in the table. ATSDR comparison values for each of the contaminants also are listed in the table. Contaminants whose concentrations were below ATSDR's comparison values were excluded from the pathways analysis. Inclusion of a contaminant in the table or the fact that a contaminant exceeds a comparison value does not imply that a contaminant represents a threat to public health but that it warrants further evaluation.

Environmental sampling data were collected for the United States Army Corps of Engineers by their contractor during the Phase II, Group 2 Sites Remedial Investigation [1, 3, 11, 12]. Where appropriate, data from previous investigations were reviewed by TDH. Previous investigations at this site include a Preliminary Assessment/Site Investigation (PA/SI) in 1980, 1982, and 1987, the Army's Installation Restoration Program (IRP) study in 1984, surface water and waste sampling in 1991, and a Phase I Remedial Investigation (RI) in 1993. During the Phase II RI (July 1996), groundwater, surface water, sediment, soil and wasteline samples were collected and analyzed for volatile organic compounds (VOCs), explosives, and metals. Quarterly monitoring data of perimeter groundwater wells were provided by the USACOE; samples were collected between June 1995 and August 1998. Quarterly surface water sampling data for Goose Prairie Creek and Harrison Bayou were provided by the U.S. Army Corps of Engineers, Tulsa District. Surface water and sediment sampling data collected in July and November 1998 for Harrison Bayou, Goose Prairie Creek, Harrison Bayou Bay, and Goose Prairie Bay were provided by a representative of the Clean Rivers Program [13]. Results of perchlorate sampling conducted in April 1999 were provided by the USACOE [14, 15]. During 1998, extensive sampling and analyzeswere performed at Group 2 and Group 4 sites under Phase III investigations to define the extent of contamination. These data were undergoing validation and were not yet publicly available for ATSDR/TDH to include in this report.

Exposure Pathways

In this section we evaluated the possible pathways for exposure to contamination at Longhorn Army Ammunition Plant. We examined these possible exposure pathways to determine whether people in the community can be exposed to (or come into contact with) contaminants from the site. Exposure pathways consist of five elements: 1) a source of contamination, 2) transport through an environmental medium, 3) a point of exposure, 4) a plausible manner (route) for the contaminant to get into the body, and 5) an identifiable exposed population. Exposure pathways can be completed, potential, or eliminated. For a person to be exposed to a contaminant, the exposure pathway must be completed. An exposure pathway is considered completed when all five elements in the pathway are present and exposure has occurred, is occurring, or will plausibly occur in the future. A potential pathway is missing at least one of the five elements but

possibly may be completed in the future as more data become available or site conditions change. Eliminated pathways are missing one or more of the five elements and will never be completed. Table 2 summarizes the exposure pathways considered in our evaluation of this site. Contaminants whose concentrations did not exceed ATSDR or other health-based comparison values were excluded from the pathways analysis.

Table 1. Contaminants Exceeding Comparison Values in Various Media* Longhorn Army Ammunition Plant [1,2,11,16]

Contaminated Media	Potential Contaminants of Concern	Maximum Detected Concentration	ATSDR Comparison Value
GROUP 2 SITES			
12 Active Landfill			
Surface Water	Methylene chloride	17 µg/L	5 µg/L MCL/CREG; 600 µg/L $EMEG_{child}$
Groundwater	1,2-Dichloroethene	122 µg/L	70 µg/L MCL(*cis*); 200 µg/L $RMEG_{child}$ (*trans*)
	Trichloroethene	495 µg/L	5 µg/L MCL; 3 µg/L CREG; 20 µg/L $_{int}EMEG_{child}$
	RDX	2.3 J µg/L	2 µg/L LTHA
16 Old Landfill			
Groundwater	1,1,2-Trichloroethane	12 µg/L	0.6 µg/L CREG; 5 µg/L MCL; 40 µg/L $RMEG_{child}$
	1,1-Dichloroethane	34 µg/L	None available
	1,1-Dichloroethene	603 µg/L	0.06 µg/L CREG; 7 µg/L MCL; 90 µg/L $EMEG_{child}$
	1,2-Dichloroethane	103 µg/L	0.4 µg/L CREG; 5 µg/L MCL
	Methylene chloride	73 µg/L	5 µg/L CREG/MCL; 600 µg/L EMEGchild
	1,2-Dichloroethene	275,000 µg/L	70 µg/L MCL(*cis*); 200 µg/L $RMEG_{child}$ (*trans*)
	Trichloroethene	20,900 µg/L	5 µg/L MCL; 3 µg/L CREG; 20 µg/L $_{int}EMEG_{child}$
	Vinyl chloride	7,980 J µg/L	0.2 µg/L $EMEG_{child}$; 2 µg/L MCL
	1,3,5-Trinitrobenzene	0.74 µg/L	0.5 µg/L $RMEG_{child}$
17 Burning Ground No. 2			
Sediment	Barium	20,500 mg/kg	4,000 $RMEG_{child}$; 50,000 $RMEG_{adult}$
Groundwater	1,1-Dichloroethane	8 µg/L	None available
	1,1-Dichloroethene	28 µg/L	0.06 µg/L CREG; 7 µg/L MCL; 90 µg/L $EMEG_{child}$
	1,2-Dichloroethane	62 µg/L	0.4 µg/L CREG; 5 µg/L MCL
	Trichloroethene	5,320 µg/L	5 µg/L MCL; 3 µg/L CREG; 20 µg/L $_{int}EMEG_{child}$
	1,3,5-Trinitrobenzene	2.3 µg/L	0.5 µg/L $RMEG_{child}$
18/24 Burning Ground No.3/Unlined Evaporation Pond			
Soil	Lead	1,290 mg/kg	400 mg/kg EPA action level
Groundwater	Bromodichloromethane	7 µg/L	0.6 µg/L CREG; 100 µg/L MCL
	Methylene Chloride	21 µg/L	5 µg/L CREG/MCL; 600 µg/L $EMEG_{child}$
	Chloroform	22 µg/L	6 µg/L CREG; 100 µg/L MCL
	Chromium	122 µg/L	100 µg/L MCL
	Perchlorate	10,200 µg/L	1-5 µg/L (child) / 4.5-17.5 (adult) EPA's provisional RfD

Table 1. Contaminants Exceeding Comparison Values in Various Media* Longhorn Army Ammunition Plant [1,2,11,16]

Contaminated Media	Potential Contaminants of Concern	Maximum Detected Concentration	ATSDR Comparison Value
29 Former TNT Production Area			
Wasteline Contents Liquids	4-Amino-2,6-DNT 2-Amino-4,6-DNT	21 J µg/L 26 J µg/L	None available None available
Wasteline Contents Solids	2,4,6-Trinitrotoluene Lead	1,720 mg/kg 628 J mg/kg	20 mg/kg CREG; 30 mg/kg $RMEG_{child}$ 500 mg/kg EPA action level
Wasteline Associated Soils	1,3,5-Trinitrobenzene	12 mg/kg	3 mg/kg $RMEG_{child}$
Groundwater	2-Nitrotoluene 1,3,5-Trinitrobenzene 1,3-Dinitrobenzene 2,4-Dinitrotoluene	4,600 J µg/L 8.0 J µg/L 0.4 J µg/L 165 J µg/L	None available 0.5 µg/L $RMEG_{child}$ 1.0 µg/L $RMEG_{child}$ 20 µg/L $EMEG_{child}$
32 Former TNT Waste Disposal Area			
Wasteline Contents Liquid	RDX 1,3-Dinitrobenzene 2,4,6-Trinitrotoluene	9.5 J µg/L 1.7 J µg/L 6.4 J µg/L	2 µg/L LTHA 1 µg/L $RMEG_{child}$ 1 µg/L CREG; 2 µg/L LTHA; 5 µg/L $RMEG_{child}$
GROUP 4 SITES			
35 Sumps			
Groundwater	1,1-Dichloroethene 1,2-Dichloroethene, Total Trichloroethene Tetrachloroethene Vinyl chloride Chromium Nickel Selenium Thallium	1,341 µg/L 1,840 µg/L 29,140 µg/L 4,884 µg/L 100 µg/L 3,630 µg/L 4,810 µg/L 65.8 µg/L 178 µg/L	7 µg/L MCL; 90/300 µg/L EMEG; 0.06 µg/L CREG 70 µg/L MCL 5 µg/L MCL; 20/70 µg/L intEMEG; 3 µg/L CREG 5 µg/L MCL; 100/400 µg/L RMEG; 0.7 µg/L CREG 2 µg/L MCL; 0.2/0.7 µg/L chronic EMEG 100 µg/L MCL; 100 µg/L LTHA 100 µg/L MCL 200/700 µg/L RMEG 50 µg/L MCL; 20/70 µg/L RMEG 2 µg/L MCL; 0.4 µg/L LTHA
50 Sump Water Storage Tank			
Surface Soil	Bis-2(ethylhexyl)phthalate	421 mg/kg	50 mg/kg CREG; 1000/10000 mg/kg $RMEG_{child/adult}$
Soil Boring	1,2,3 Trichlorobenzene n-Butylbenzene	0.004 mg/kg (0.004) mg/kg	None available None available
60 Former Storage Buildings (Bldg 411A, 411, and 714 and Shed TS-80)			
Surface Soil	Dieldrin	25.4 mg/kg	0.04 mg/kg CREG; 3/40 $_{chronic}EMEG_{child/adult}$
GROUP 5 SITES			
52 Magazine Area Wash-out			
Soil Boring	p-Isopropyltoluene	0.016 mg/kg	None available

Table 1. Contaminants Exceeding Comparison Values in Various Media* Longhorn Army Ammunition Plant [1,2,11,16]

Contaminated Media	Potential Contaminants of Concern	Maximum Detected Concentration	ATSDR Comparison Value
OTHER			
Goose Prairie Creek**			
Surface Water	RDX	12.1 µg/L	2.0 µg/L LTHA
	Bromodichloromethane	22.0 µg/L	0.6 µg/L CREG; 200 µg/L $EMEG_{child}$
	Chloroform	70.7 µg/L	6 µg/L CREG; 100 MCL; 100 $EMEG_{child}$
	Chlorodibromomethane	1.0 µg/L	0.4 µg/L CREG; 100 µg/L MCL
	Trichloroethene	23 µg/L	3 µg/L CREG; 5 µg/L MCL
	2,4,6-Trinitrotoluene	41.2 µg/L	1 µg/L CREG; 2 µg/L LTHA; 5 µg/L $RMEG_{child}$
	Vinyl chloride	0.7 µg/L	0.2 µg/L $EMEG_{child}$
	Perchlorate (near contam source)	11,000 µg/L	1-5 µg/L (child) / 4.5-17.5 (adult) EPA's provisional RfD
	Perchlorate (near Caddo Lake)	11 µg/L	1-5 µg/L (child) / 4.5-17.5 (adult) EPA's provisional RfD
Harrison Bayou**			
Surface Water	Trichloroethene	169 µg/L	3 µg/L CREG; 5 µg/L MCL
	1,1-Dichloroethene	0.66 µg/L	0.06 µg/L CREG; 7 µg/L MCL; 90 µg/L $EMEG_{child}$
	1,2-Dichloroethane	1.4 µg/L	0.4 µg/L CREG; 5 µg/L MCL
	Vinyl chloride	7.5 µg/L	0.2 µg/L $EMEG_{child}$
	Manganese	4,860 µg/L	50/200 µg/L $RMEG_{child/adult}$
	Perchlorate (near contam source)	1,500 µg/L	1-5 µg/L (child) / 4.5-17.5 (adult) EPA's provisional RfD
	Perchlorate (near Caddo Lake)	97.3 µg/L	1-5 µg/L (child) / 4.5-17.5 (adult) EPA's provisional RfD

Explanation of Comparison Values

MCL - The maximum permissible level of a contaminant in a public water system.

CREG - The Cancer Risk Evaluation Guide is an estimated contaminant concentration that would result in no more than one excess cancer in a million (10E-6) persons exposed over a lifetime. CREGs are calculated from EPA's cancer slope factors (CSFs).

EMEG - Environmental Media Evaluation Guides are based on ATSDR's minimal risk levels (MRLs). An MRL is an estimate of a daily human exposure to a chemical that is likely to be without an appreciable risk for noncarcinogenic effects over a specified duration of exposure (acute, intermediate, chronic).

RMEG - Similar to the EMEG but derived from EPA's reference dose. It is the concentration in a specific media at which daily human exposure is unlikely to result in adverse noncancerous effects.

LTHA - The Lifetime Health Advisory represents a contaminant concentration that EPA considers to be protective of noncarcinogenic health effects during a lifetime (70 years) of exposure.

$_{Child}$ - A subscript child adjacent to the EMEG or RMEG indicate that the comparison value was determined using a child exposure scenario. EMEGs and RMEGs are lower for children.

* Media shown in this table only include those in which constituents were measured above health-based comparison values or above background. Group 1 sites, Group 3 sites, and Site 63 site constituents measured were below health-based comparison values and/or metals concentrations were below background concentrations; therefore these sites were not included in Table 1.

**Goose Prairie Creek and Harrison Bayou sediment contaminant concentrations were below health-based comparison values and therefore were not included in Table 1.

Table 2
Exposure Pathways - Longhorn Army Ammunition Plant

PATHWAY NAME	CONTAMINANT(S)	EXPOSURE PATHWAYS ELEMENTS					TIME	COMMENTS
		SOURCE	MEDIA	POINT OF EXPOSURE	ROUTE OF EXPOSURE	EXPOSED POPULATION		
Surface Water	Methylene Chloride	Industrial Waste Active Landfill (Site 12)	Surface Water	Surface water at Active Landfill	Dermal Contact Incidental Ingestion	Hunters On-site workers	Past Present Future	Adverse health effects not likely to result from infrequent incidental ingestion or contact.
	RDX Bromodichloromethane Chloroform Chlorodibromomethane Trichloroethene 2,4,6-Trinitrotoluene Vinyl Chloride Perchlorate	Runoff from the now abandoned production areas	Surface Water	Surface Water in Goose Prairie Creek	Dermal Contact Incidental Ingestion	Hunters On-site workers	Past Present Future	Adverse health effects are not likely to result from infrequent incidental ingestion or contact with this water.
	Trichloroethene 1,1-Dichloroethene 1,2-Dichloroethane Vinyl chloride Manganese Perchlorate	Contaminants from Old Landfill (Site 16) and Burning Ground No. 3/ Unlined Evaporation Pond (Site 18/24)	Surface Water	Surface Water in Harrison Bayou	Dermal Contact Incidental Ingestion	Hunters On-site workers	Past Present Future	Adverse health effects are not likely to result from infrequent incidental ingestion or contact with this water.
	Perchlorate	Possible transport of contaminants from Goose Prairie Creek	Surface Water	Surface Water in Goose Prairie Bay (Caddo Lake)	Dermal Contact Incidental Ingestion	Missing Element	Future	Although Goose Prairie Creek empties into Goose Prairie Bay, it (Caddo Lake) is unlikely that contaminants would reach the Bay at concentrations sufficient to pose a public health threat.
	Perchlorate	Possible transport of contaminants from Harrison Bayou	Surface Water	Surface Water in Caddo lake	Dermal Contact Incidental Ingestion	Missing Element	Future	Although Harrison Bayou empties into Caddo Lake, it is unlikely that contaminants would reach the Lake at concentrations sufficient to pose a public health threat.
Sediment	Barium	Site Activities at Burning Ground No. 2 (Site 17)	Sediment	Onsite Sediment at Burning Ground No. 2	Dermal Contact Incidental Ingestion	Hunters On-site workers	Past Present Future	Adverse health effects not likely to result from infrequent incidental ingestion or contact.

Table 2
Exposure Pathways - Longhorn Army Ammunition Plant

PATHWAY NAME	CONTAMINANT(S)	EXPOSURE PATHWAYS ELEMENTS					TIME	COMMENTS
		SOURCE	MEDIA	POINT OF EXPOSURE	ROUTE OF EXPOSURE	EXPOSED POPULATION		
Soil	Lead	Burning of various industrial and hazardous wastes at Burning Ground No. 3 (Site 18/24)	Soil	Onsite soil at Burning Ground No. 3	Dermal Contact Incidental Ingestion	Hunters On-site workers	Past Present Future	Adverse health effects in adults are not likely to result from infrequent incidental ingestion.
Soil	Bis-2(ethylhexyl)phthalate	Sump Water Storage Tank (Site 50)	Surface soil	On-site soil at Sump Water Storage Tank area	Dermal Contact Incidental Ingestion	Hunters On-site workers	Past Present Future	Adverse health effects in adults are not likely to result from infrequent incidental ingestion.
	1,2,3-Trichlorobenzene n-Butylbenzene	Sump Water Storage Tank (Site 50)	Soil boring	On-site soil at Sump Water Storage Tank area	Dermal Contact Incidental Ingestion	Hunters On-site workers	Past Present Future	Adverse health effects in adults are not likely to result from infrequent incidental ingestion.
	p-Isopropyltoluene	Magazine Wash-out Area (Site 52)	Soil boring	On-site soil at Magazine Wash-out area	Dermal Contact Incidental Ingestion	Hunters On-site workers	Past Present Future	Adverse health effects in adults are not likely to result from infrequent incidental ingestion.
	Dieldrin	Former storage buildings 411A,411,714 and Shed TS-80	Surface soil	Former storage buildings 411A,411,714 and Shed TS-80	Dermal Contact Incidental Ingestion	Hunters On-site workers	Past Present Future	Adverse health effects in adults are not likely to result from infrequent incidental ingestion or dermal contact.
Wasteline at Former TNT Production Area (Site 29)	4-Amino-2,6-DNT 2-Amino-4,6-DNT 2,4,6-Trinitrotoluene 1,3,5-Trinitrobenzene Lead	Production of explosives at former TNT Production area (Site 29)	Wasteline Solids, Liquids, and Associated Soil at Former TNT Production area	Onsite soil and wasteline material at the former TNT production area	Dermal Contact Incidental Ingestion	On-site utility workers	Past Present Future	Adverse health effects are not likely to result from infrequent incidental contact with this material.
Wasteline at TNT Disposal area (Site 32)	RDX 1,3-Dinitrobenzene 2,4,6-Trinitrotoluene	Treatment and disposal of TNT manufacturing residues from TNT Disposal Plant	Wasteline Liquids at TNT Disposal Plant	Onsite wasteline material	Dermal Contact Incidental Ingestion	On-site utility workers	Past Present Future	Adverse health effects are not likely to result from infrequent incidental contact with this material.
Groundwater	1,2-Dichloroethene Trichloroethene RDX	Industrial Waste Active Landfill (Site 12)	Groundwater	Missing Elements Eliminated Pathway			Future?	Exposure to contaminants in groundwater unlikely. Public water supplies are not in pathway of plume.

Table 2
Exposure Pathways - Longhorn Army Ammunition Plant

PATHWAY NAME	CONTAMINANT(S)	EXPOSURE PATHWAYS ELEMENTS					TIME	COMMENTS
		SOURCE	MEDIA	POINT OF EXPOSURE	ROUTE OF EXPOSURE	EXPOSED POPULATION		
Groundwater	1,1,2-Trichloroethane 1,1-Dichloroethane 1,1-Dichloroethene 1,2-Dichloroethane Methylene chloride 1,2-Dichloroethene Trichloroethene Vinyl chloride 1,3,5-Trinitrobenzene	Industrial Waste, Oils and Paints at Old Landfill (Site 16)	Groundwater	Missing Elements Eliminated Pathway			Future?	Exposure to contaminants in groundwater unlikely. Public water supplies are not in pathway of plume.
	1,1-Dichloroethane 1,1-Dichloroethene 1,2-Dichloroethane Trichloroethene 1,3,5-Trinitrobenzene	Site Activities at Burning Ground No. 2 (Site 17)	Groundwater	Missing Elements Eliminated Pathway			Future?	Exposure to contaminants in groundwater unlikely. Public water supplies are not in pathway of plume.
	Bromodichloromethane Methylene chloride Chloroform Chromium (Perchlorate)	Burning of various industrial and hazardous wastes at Burning Ground No. 3/ Unlined Evaporation Pond (18/24)	Groundwater	Missing Elements Eliminated Pathway (Harrison Bayou)			Future? (Present)	Exposure to contaminants in groundwater unlikely. Public water supplies are not in pathway of plume. (Groundwater from Groundwater Treatment Plant at Burning Ground Number 3 contains perchlorate and is being discharged to Harrison Bayou)
	2-Nitrotoluene 1,3,5-Trinitrobenzene 1,3-Dinitrobenzene 2,4-Dinitrotoluene	Former TNT Production Area (Site 29)	Groundwater	Missing Elements Eliminated Pathway			Future?	Exposure to contaminants in groundwater unlikely. Public water supplies are not in pathway of plume.
	1,2-Dichloroethene 1,2-Dichloroethene, Ttl Trichloroethene Tetrachloroethene Vinyl chloride Chromium Nickel Selenium Thallium	Sumps associated with Production areas	Groundwater	Missing Elements Eliminated Pathway			Future?	Contaminated groundwater not used for potable purposes. Exposure to contaminants in groundwater is unlikely.

No Apparent Public Health Hazard Situations

As a result of our site visit observations, and a review of available data, we concluded that there are no plausible exposure situations that could pose a public health hazard at this time. Although chemical contaminants have been found on site in surface water, groundwater, sediment, soil, and wasteline material, the current or likely future potential for the public to be exposed to site contaminants at levels which would present a threat to public health is low.

Evaluation of Possible Surface Water Exposure Pathways

Based on available information, surface water at Longhorn does not present a public health hazard on or off site. Drainage from the sites at Longhorn flows into one or more of the four on-site creeks (Appendix D). Goose Prairie Creek and Harrison Bayou are more likely than Central Creek or Saunders Branch to receive contaminants from sites at Longhorn. Currently, access to the site is restricted and contact with surface water on the site, either through incidental ingestion or dermal contact, in amounts sufficient to be of health concern is highly unlikely. According to site representatives, employees have been allowed to hunt on the site by permit; however, any exposure that hunters would have had with surface water would have been limited and infrequent. Individuals conducting research in Harrison Bayou, Goose Prairie Creek, or other areas on Longhorn would receive infrequent dermal exposure to perchlorate or other site contaminants. This exposure would be limited in scope and infrequent (one time per month or less often). Utility workers may receive exposure to site contaminants but this exposure would be limited and infrequent. Although it would be unrealistic to suspect that people drink water from either Goose Prairie Creek or Harrison Bayou, both eventually empty into Caddo Lake which is a source of drinking water for public water supplies in Louisiana. Using EPA's cancer potency factors, ingesting two liters of water from Caddo Lake (with contaminant concentrations equal to the maximum concentrations found in the creeks) every day for 70 years would result in no apparent increased lifetime risk for cancer.

On Base - Area Specific Surface Water

During the Phase II RI, surface water samples were collected from creeks and puddles at six sites. A total of 70 samples were collected: 11 from the Active Landfill (Site 12), 20 from the Old Landfill (Site 16), nine from Burning Ground No. 2 (Site 17), 18 from Burning Ground No. 3 and the Unlined Evaporation Pit (Site 18/24), three from the Former TNT Production Area (Site 29), and nine from the Former TNT Waste Disposal Plant (Site 32). Samples from each of the sites were analyzed for explosives and metals. Samples from the landfills and burning grounds also were analyzed for volatile organic compounds. Methylene chloride (17 µg/L) was detected at a concentration three times greater than its MCL (5 µg/L) at the Active Landfill (Site 12) (Table 1). Currently, access to these areas is restricted and infrequent contact with surface water from these areas would not pose a public health threat.

Goose Prairie Creek

Goose Prairie Creek flows from the west to the northeast across Longhorn; it receives drainage from the abandoned production areas. The USACOE has periodically sampled surface water from 15 locations along Goose Prairie Creek since November of 1995. The most recent sampling was conducted in June of 1998. One of the 15 sampling locations is at the mouth of Goose Prairie Creek where it joins with Goose Prairie Bay (a part of Caddo Lake).

Contaminants have been detected in water from Goose Prairie Creek adjacent to the former production areas at maximum concentrations that exceed health based comparison values (Table 1). Maximum concentrations of RDX and trichloroethene exceeded federal drinking water standards. Maximum concentrations of bromodichloromethane, chloroform, dibromochloromethane, and trichloroethene each exceeded their respective carcinogenic risk evaluation guides. The maximum reported concentration of vinyl chloride exceeded the noncarcinogenic risk comparison value for children which has been established for this contaminant.

Surface water in Goose Prairie Creek also has been analyzed for perchlorate; this substance was found in ten of the eleven locations from which samples were collected, including the sampling location at the mouth of Goose Prairie Creek. The perchlorate measured at the mouth of Goose Prairie Creek, as well as at the other on-site locations, exceeded tentative health-based comparison values proposed by EPA (Table 1).

Available data suggest some degree of seasonal influence on the contaminant concentrations found in Goose Prairie Creek. The majority of the maximum detections occurred in August, a time when contaminant concentrations might be expected to be high due to limited flow conditions. The highest reported concentrations of bromodichloromethane and chlorodibromomethane were found adjacent to the former outfall of the waste water treatment plant which has since been plugged. The highest concentrations of 2,4,6-TNT were detected downstream of the Former TNT Production Area (Table 1). The highest concentrations of perchlorate measured in Goose Prairie Creek were near Building 25C.

Surface water samples also were collected by a representative of the Clean Rivers Program in July and November of 1998 [13]. Samples were collected near the mouth of Goose Prairie Creek and in Goose Prairie Bay. Samples were analyzed for volatile organic compounds and dissolved metals. Volatile organic compounds were all below detection. Metals concentrations measured in Goose Prairie Creek and Goose Prairie Bay were comparable to background metals concentrations.

Based on the available information, including samples collected at the mouth of Goose Prairie Creek by the USACOE, perchlorate has migrated to the mouth of Goose Prairie Creek towards Goose Prairie Bay in Caddo Lake in quantities sufficient to warrant a closer evaluation. Although high concentrations of perchlorate have been measured in Goose Prairie Creek near Building 25C (11,000 µg/L), the concentrations measured downstream near the mouth of Goose

Prairie Creek were 11 µg/L. Remediation of the source of perchlorate and continued quarterly sampling of surface water from Goose Prairie Creek and Harrison Bayou will help ensure that the likelihood of potential future exposures is reduced or removed. It would be prudent to continue monitoring surface water from Goose Prairie Creek for site contaminants.

Harrison Bayou

Harrison Bayou flows northeast across Longhorn past the Old Landfill (Site 16), Burning Ground No. 2 (Site 17), and the groundwater treatment system at Burning Ground No. 3/Unlined Evaporation Pond (Sites 18/24) to Caddo Lake. The USACOE has periodically sampled surface water at 10 locations along Harrison Bayou since October of 1995 through June of 1998. One of the ten locations is near the mouth of Harrison Bayou where it enters Caddo Lake. In April of 1999 the USACOE sampled Harrison Bayou for perchlorate.

In the past, volatile organic compounds, specifically trichloroethene, *cis*-1,2-dichloroethene, and vinyl chloride were found in water seeping into Harrison Bayou. The highest concentrations of these contaminants (trichloroethene, 1,020 µg/L; *cis*-1,2-dichloroethene, 609 µg/L; and vinyl chloride, 65 µg/L) associated with this seep were found in 1995 in the vicinity of the Landfill 16 and Burning Ground No. 3 from a hole dug out of the bank. The highest contaminant concentrations found in surface water from Harrison Bayou were obtained from an area adjacent to this 'Seep' area (Table 1).

In April 1999 the USACOE sampled the treated effluent stored at Burning Ground Number 3 and measured perchlorate at 10,200 µg/L. Due to this finding, the USACOE resampling this effluent as well as sampled the location on Harrison Bayou where the effluent is discharged. Two additional downstream locations also were tested for perchlorate. Resampling of the effluent storage tank verified that there are high concentrations of perchlorate in the stored effluent (14,500 µg/L). Where the effluent is discharged into Harrison Bayou, the concentration of perchlorate was 1,500 µg/L. At the two downstream locations on Harrison Bayou (HBW-5 and HBW-9) perchlorate concentrations were 21.4 µg/L and 97.3 µg/L respectively [15].

Surface water samples collected in Harrison Bayou exceeded health-based comparison values for trichloroethene, 1,1-dichloroethene, 1,2-dichloroethane, and vinyl chloride; however, samples collected at the sampling location near the mouth of Harrison Bayou did not contain these chemicals. Explosives were not detected above health-based comparison values at any of the Harrison Bayou sampling locations. Metals were not measured above health-based comparison values or were similar to concentrations in uncontaminated areas with the exception of manganese. Perchlorate exceeded proposed health comparison values both at the effluent discharge point into Harrison Bayou and at the mouth of Harrison Bayou where it enters Caddo Lake.

Additional surface water sampling data was collected in July and November of 1998 by a representative of the Clean Rivers Program [13]. Samples were collected near the mouth of Harrison Bayou and in Harrison Bayou Bay. Samples were analyzed for volatile organic

compounds and dissolved metals. Volatile organic compounds were all below detection. Metals concentrations measured in Harrison Bayou and Harrison Bayou Bay were comparable to background metals concentrations.

Based on available data, including sampling data collected at the mouth of Harrison Bayou, perchlorate is migrating towards Caddo Lake at concentrations which exceeded EPA's tentative proposed reference dose for perchlorate. However the number of other contaminants detected and the concentrations of those contaminants were significantly reduced downstream from the 'Seep' area. ATSDR's previous recommendation to monitor water from this creek for site contaminants is still valid.

Caddo Lake

Caddo Lake is east of Longhorn and receives water from Goose Prairie Creek, Harrison Bayou, Central Creek, and Saunders Creek. The nearest communities using water from Caddo Lake for drinking water are Oil City and Blanchard, Louisiana. The intake for Oil City is on Jean's Bayou which is over three miles downstream of Longhorn [3]. Although surface water from Caddo Lake has not been analyzed for site contaminants, sampling data from Goose Prairie Creek and Harrison Bayou, and their respective Bays, provide evidence that contaminants from Longhorn do not appear to be migrating towards Caddo Lake in quantities sufficient to pose a public health threat. Recent detection of perchlorate in Harrison Bayou prompted EPA to check Blanchard public water supply in Louisiana for the presence of perchlorate. Perchlorate was not found in Blanchard public water supply [17].

Evaluation of Possible Sediment Exposure Pathways

Based on available information, contaminants found in sediment at Longhorn do not present a public health threat. Currently, access to the site is restricted and contact with sediment, either through incidental ingestion or dermal contact, in amounts sufficient to be of public health concern is not likely. Although hunting has been allowed on the site and research activities are periodically conducted on the site, incidental ingestion of or dermal contact with sediment on the site by hunters or researchers would be limited and infrequent.

During the Phase II RI, a total of 69 sediment samples were collected from the six areas of concern; 11 from the Active Landfill (Site 12), 20 from the Old Landfill (Site 16), eight from Burning Ground No. 2 (Site 17), 18 from Burning Ground No. 3 (Site 18), three from the Former TNT Production Area (Site 29), and nine from the Former TNT Waste Disposal Plant (Site 32). Samples from each of the sites were analyzed for explosives and metals. Sediment samples from the landfills and the burning grounds also were analyzed for volatile organic compounds. Several of the metals were detected in the sediment at low levels; however, barium was found at a maximum concentration of 20,500 mg/kg at Burning Ground No.2 (Site 17). Exposure to this contaminant in amounts sufficient to be of public health concern is highly unlikely.

Goose Prairie Creek

The USACOE sampled sediments from nine locations along Goose Prairie Creek. Sediments were collected and analyzed in August of 1996 and February of 1997. One of the nine sampling locations was at the mouth of Goose Prairie Creek where it enters Goose Prairie Bay (a part of Caddo Lake). Sediment samples collected in Goose Prairie Creek were analyzed for volatile organic compounds and for explosives. Health-based comparison values were not exceeded at any of the sampling locations.

Additional sediment samples were collected in July and November of 1998 by a representative of the Clean Rivers Program. Sediment samples were collected near the mouth of Goose Prairie Creek and in Goose Prairie Bay. Sediment samples also were collected near the mouth of Harrison Bayou and in Harrison Bayou Bay [13]. Sediment samples were analyzed for volatile organic compounds and metals. Volatile organic compounds were all below detection. Metals concentrations measured in Goose Prairie Creek, Goose Prairie Bay, Harrison Bayou, and Harrison Bayou Bay were similar to metals concentrations in uncontaminated areas [10].

Harrison Bayou

The USACOE periodically sampled sediments from ten locations along Harrison Bayou. Sediments were collected and analyzed between June of 1996 and August of 1997. One of the ten sampling locations is near the mouth of Harrison Bayou where it enters Caddo Lake. Sediment samples collected in Harrison Bayou were analyzed for volatile organic compounds. Health-based comparison values were not exceeded at any of the sampling locations.

Caddo Lake

Although sediment from Caddo Lake has not been analyzed for site contaminants, sediment sampling data from Goose Prairie Creek and Harrison Bayou, and their respective Bays, do not provide evidence that contaminants from Longhorn are migrating towards Caddo Lake in quantities sufficient to pose a public health threat.

Evaluation of Possible Soil Exposure Pathways

Based on available information, contaminants found in soil at Longhorn do not present a public health threat. Currently, access to the site is restricted and contact with soil, either through incidental ingestion or dermal contact, in amounts sufficient to be of public health concern is not likely. Although hunting has been allowed on the site and infrequent research activities and utility maintenance activities are conducted on site, contact with soil, including incidental ingestion and dermal contact, on the site by hunters, researchers, or utility workers would be limited and infrequent.

During the Phase II RI (January through June 1995), a total of 64 surface soil samples were collected: 17 from Burning Ground No. 2 (Site 17), 25 from Burning Ground No. 3/Unlined

Evaporation Pond (Site 18/24), and 22 from the Former TNT Production Area (Site 29). Soil samples from Burning Ground No. 2 were analyzed for volatile organic compounds, explosives, and metals (Appendix D). Soil samples from Burning Ground No. 3 were analyzed for volatile organic compounds and metals. Soil samples from the Former TNT Production Area were analyzed for explosives and metals. Constituents measured in soil from Burning Ground No. 2, and the Former TNT Production Area were below levels of health concern. At Burning Ground No. 3, lead was found in the soil at a maximum concentration (1,290 mg/kg) above its comparison value (Table 1). Because site access is restricted and some remediation of soils in this area has occurred, exposure to this contaminant in amounts sufficient to be of public health concern is not likely.

During site investigation activities in October 1995, 15 surface soil samples and 27 subsurface soil samples were collected and analyzed for pesticides and herbicides around the former storage buildings 411 A, 411, 714 and shed TS-80 (Table 1 and Appendix D). Thirty-five surface soil samples (0-1 feet) were found to contain the pesticides 4,4'-DDE, 4,4'-DDT and dieldrin as well as the herbicide Silvex. The 4,4'-DDE was detected in 5 of the 15 surface soil samples. The 4,4'-DDT and the Silvex were detected in 3 of the 15 surface soil samples. Dieldrin was detected in one of the 15 surface soil samples collected. Only one of the 27 subsurface samples (1-3 feet, 3-5 feet, and 5-7 feet) contained aldrin, dieldrin, and endosulfan sulfate. Dieldrin was the only constituent measured at concentrations above its health assessment comparison value; however, because site access is currently restricted, exposure to this contaminant in amounts sufficient to be of public health concern is not likely.

Bis-2(ethylhexyl) phthalate was measured in surface soil around the Sump Water Storage Tank (Site 50) at a concentration above health-based comparison values (Table 1). Because site access is currently restricted, exposure to this contaminant in amounts sufficient to be of public health concern is not likely.

Soil contaminants also were detected in soil borings at the Sump Water Storage Tank (1,2,3-Trichlorobenzene, n-Butylbenzene) and Site 52 the Magazine Area Wash-out (p-Isopropyltoluene). No health-based comparison values were available for these compounds; however, the likelihood of exposure to these contaminants in amounts sufficient to be of public health concern is low.

Soil samples from the Former Burial Pit (Site 63) were similar to uncontaminated areas of Longhorn.

Evaluation of Possible Wasteline Material Exposure Pathways

Based on available information, contaminants found in the wasteline at Longhorn do not present a public health threat. Currently, access to the site is restricted and contact with wasteline material by hunters, researchers, or utility workers, either through incidental ingestion or dermal contact, in amounts sufficient to be of public health concern is not likely.

TNT wastewater, which was generated at the TNT Production facility (Site 29), was collected in a storage tank and then pumped through a 6 inch underground wooden pipeline to the TNT Waste Disposal Plant (Site 32). Liquid and solid wasteline content samples were collected from this wooden pipeline between the Former TNT Production Area and the Former TNT Waste Disposal Plant. All wasteline samples were analyzed for explosive compounds and metals. Low concentrations of explosive compounds were found in liquid waste material from both sites. Low concentrations of explosive compounds were detected in solid wasteline material from the Former TNT Production Area. Access to the site is restricted and frequent contact with wasteline material on the site is not likely to occur. Thus, exposure to the contaminants in amounts sufficient to be of public health concern is not likely.

Evaluation of Possible Groundwater Exposure Pathways

Currently, contaminated groundwater beneath Longhorn does not pose a public health hazard. 1) Contaminants have been detected in shallow groundwater on the site but the on-site shallow groundwater is not used for drinking or other purposes. The two on-site wells are deeper and limited sampling has not shown site contaminants. 2) Although low concentrations of site-related contaminants were infrequently reported in the deeper on-site monitoring wells at the perimeter of Longhorn, these data may be the result of cross-contamination or other sampling and analytical problems. Mercury concentrations in the shallow perimeter wells seem to be due to seasonal groundwater fluctuation. 3) Off-site area public water supply wells and domestic water wells are upgradient of Longhorn. 4) Site contaminants have not been detected in public water supply wells. Although the public water supply wells have not been tested for every site contaminant on Longhorn (such as explosives or perchlorates), they have been tested for the same volatile organic compounds, minerals, and metals found in on-site groundwater. In the off-site public water supply wells these constituents were not detected, were not detected at levels above background or were not detected at levels of potential health concern. Since volatile organic compounds, minerals, and metals apparently have not migrated from Longhorn into these public water supply wells, it is also reasonable to conclude that the explosive compounds from Longhorn have not migrated into these wells.

General Hydrogeology

According to the documentation records for the hazard ranking system, the geologic units that are the principle source of groundwater in Harrison County consist of the Wilcox Group and the Carrizo Sand. These units are hydraulically interconnected and are considered one aquifer, the Wilcox-Carrizo Aquifer (at one time this aquifer was referred to as the basal portion of the Cypress Aquifer). The Wilcox-Carrizo Aquifer is approximately 380 feet thick near Longhorn and consists primarily of lenses of sand, silt, and clay [3]. Groundwater at Longhorn generally occurs under unconfined to semi-confined conditions and can be encountered from within 1 to 30 feet below ground surface (BGS) [1]. Perched and locally confined conditions frequently occur in the Wilcox Group due to its highly variable stratigraphy with frequent clay lenses. Area public water supply wells, domestic wells, and on-site monitoring wells are screened in the Wilcox-Carrizo Aquifer.

Although the documentation records for the hazard ranking system indicate that the general direction of groundwater flow in the Wilcox-Carrizo Aquifer is estimated to be north to northwest [3], beneath Longhorn the hydraulic gradient is highest at the northwest corner of the facility (Figure 4). Groundwater elevations decrease radially from the hydraulic peak. Therefore deep and shallow groundwater at Longhorn flows radially from the peak groundwater elevations in the northwest corner eastward to Caddo Lake and away from the public water supplies.(Figure 4).

On-Site Monitoring Wells

On-site groundwater has been sampled and analyzed both from monitoring wells throughout the site and at the perimeter. Site contaminants have been detected at levels above health based screening values in shallow water beneath the site but this shallow groundwater is not being used for potable or other purposes.

A total of 75 monitoring wells were installed at five of the areas formerly used for the production and storage of TNT or the disposal of hazardous waste; 14 at the Active Landfill, 19 at the Old Landfill, seven at Burning Ground No. 2, 18 at Burning Ground No. 3, and 17 at the Former TNT Production Area [11,12]. Sixty-five wells are shallow (between 17 and 75 feet BGS) and nine are deep (between 86 and 307 feet BGS). The depth of one of these wells was not available. These wells were sampled between January and June 1995. In February 1996 additional on-site groundwater sampling was conducted. Samples were collected from 71 monitoring wells associated with the 125 underground sumps and 20 waste rack sumps located in the northern half of Longhorn in areas formerly known as the plant production area and the Y/Static Test Area. All of these wells are in the Wilcox-Carrizo Aquifer. Currently, there is a groundwater treatment unit at Burning Ground No. 3 that is being used to slow the movement of contaminated groundwater towards Harrison Bayou which ultimately empties into Caddo Lake.

Groundwater from these on-site monitoring wells was tested for volatile organic compounds, semivolatile organic compounds, explosives, and metals; however, not all constituents were tested at each area (Appendices D and E). All three classes of constituents were found in the groundwater; however, not all constituents were found in each area (Table 1). Volatile organic compounds and explosive compounds were found in shallow monitoring wells (less than 40 feet deep). The only volatile organic compound found in the deeper monitoring wells was methylene chloride. This constituent was found measured at 4 µg/L in a monitoring well (229 feet BGS) at the Old Landfill (Site 16). The reported value of 4.0 µg/L was qualified as an estimated value (actual value is greater than zero but less than the laboratory quantitation limit). In the deeper wells explosives were not identified above detection limits and the detection limits were below levels of health concern. Although metals were detected both in shallow and deep wells, the highest concentrations were found in the shallow wells. Of the deeper on-site wells (86-307 feet BGS) metals concentrations exceeding health-based screening values were only found at the Old Landfill (Site 16). These included arsenic (20 J µg/L), barium (6500 J µg/L), and lead (30 µg/L).

In addition to the 75 on-site monitoring wells and 71 monitoring wells associated with the sumps, six monitoring wells were installed to monitor water quality at the perimeter of Longhorn (Figure 3) [11,12]. Three of the wells (110, 111, and 112) are between 20-22 feet deep and are screened with 15 foot screens at the bottom of the wells. One well (Well-108) is 22 feet deep and screened from 5.5 to 20.5 feet. The two wells drilled at the northwest perimeter of Longhorn are deeper since groundwater occurs at a greater depth below ground surface in that area. Well-133 is 90 feet deep and is screened from 64.5 to 84.5 feet BGS. Well-134 is 151 feet deep and is screened from 89 to 109 feet BGS. Well-133 and Well-134 are downgradient from the hydraulic peak but upgradient from areas of known contamination on Longhorn (Figure 4).

The six perimeter wells are on a quarterly sampling schedule and are sampled for volatile organic compounds, semivolatile organic compounds, explosives, and metals. We reviewed quarterly sampling results collected over 3½ years (January 1995 to August 1998). RDX was detected in Well-133 in January 1995 (1.16 µg/L) and June 1995 (3.4 µg/L); however, quality assurance duplicate samples did not detect RDX and it has not been detected in any of the 10 subsequent samples (September 1995 through August 1998). In 1996, 3-nitrotoluene was detected in Well-134; however, the laboratory result was qualified as an estimated value that fell below the laboratory's reportable detection limit. This contaminant has not been detected in any of the nine subsequent sampling episodes. In June 1995, 1,3,5-trinitrobenzene was detected in four of the perimeter monitoring wells (Well-108, Well-110, Well-112, and Well-134). Reported concentrations ranged from 0.52 to 1.84 µg/L; however, these data are suspect since the equipment blank contained 1,3,5-trinitrobenzene at a concentration of 0.58 µg/L but it was not detected in quality control and quality assurance duplicate samples of Well-108. This contaminant has not been detected in any of the subsequent quarterly samples since June 1995.

In August 1996, 1,2,4-trichlorobenzene (TCB) was detected in Well-110 (1.4 µg/L) and Well-133 (0.94 µg/L) and tetrachloroethene (PCE) was detected in Well-134 (0.61 µg/L). The reported concentrations were at levels near the laboratory's achievable detection limit and below the MCLs established for these contaminants (MCL for TCB = 70 µg/L; MCL for PCE = 5.0 µg/L). Additionally, these contaminants have not been detected in any of the subsequent quarterly sampling events.

Between January 1995 and August 1998 thirteen samples have been collected and analyzed for metals from each of the six perimeter groundwater wells at Longhorn. Various metals were detected in groundwater from all of the perimeter wells; however, with the exception of mercury, the concentrations were not above health-based screening values and therefore would not be of health concern [18]. Of the seventy-eight (78) perimeter monitoring well samples analyzed for mercury, ten of these had detectible concentrations of mercury and of these ten, only one sample (Well 110) had a concentration of mercury (3.3 µg/L) above the health assessment comparison value for mercury (2 µg/L). During the same sampling event (August 1998), mercury also was measured at a concentration of 0.54 µg/L in Well 112 and at a concentration of 1.9 µg/L in Well 111. According to information obtained during the Longhorn Monthly Managers Meeting of November 10, 1998, these detections were considered to be related to the dry season; the other detections of mercury also had been measured during dry periods. Wells reportedly were

resampled the first week of November 1998 and mercury was not detected. Mercury was below detection in the remainder of the samples.

Although the low concentrations of site contaminants (3-nitrotoluene, 1,3,5-trinitrobenzene, tetrachloroethene, 1,2,4-trichlorobenzene, and RDX) were measured infrequently in the northwest perimeter monitoring wells, we were concerned because of the nearness of these perimeter wells to the public water supply wells. We examined the data and believe that reports of the contaminants in the perimeter monitoring wells may be the result of cross-contamination. The following facts have led us to suspect the validity of these data: 1) the contaminants were detected infrequently and at concentrations near the laboratory detection limits, 2) where quality control and/or quality assurance duplicate or split samples were obtained , the contaminants in question were not detected during the same sampling event, 3) in some instances the contaminants also were detected in the equipment blanks, 4) the contaminants in question have not been detected since the August 1996 sampling event, and 5) based on available hydrogeologic information, these wells are upgradient from any of the areas of known or suspected contamination.

Public Water Supply Wells

Although the off-site water supply wells are upgradient of the contaminated sites at Longhorn, to verify that public water supply wells were not contaminated, we obtained water quality data from the TNRCC Water Quality Division [19]. The off-site public water supply wells closest to Longhorn are north and northwest of the site; the closest off-site well is approximately 400 feet from Longhorn's northern boundary (Figure 4) [3]. It is one of two wells, operated by Caddo Lake Water Supply, which supply water to the town of Uncertain. These wells are 250 to 310 feet deep with screened intervals at least 170 feet below ground surface (BGS). Another active well near the northwest boundary of the facility is in Caddo Lake State Park (Figure 3 & 4). This well is 315 feet deep (the screening depth of this well or the wells mentioned in the remainder of this paragraph were not available) and is used by park employees and recreational users of the park. Other public water supply wells in the area include an active well approximately ½ mile northwest of Longhorn; this well supplies water to the town of Karnack. This well is 430 feet deep and the pump is set at a depth of 200 feet. The town of Karnack also has two inactive public water supply wells. One is a 265-foot deep standby well at Karnack High School. The other is a 105-foot deep standby well at Karnack Elementary (formerly George Washington Carver) School. Several domestic water wells were identified in the area; these are upgradient of Longhorn and are about 250 feet deep (Figure 3). Reportedly, there are no irrigations wells in the vicinity of Longhorn.

There are two public water supply wells on the Longhorn site. Well Number 1 is at the Fire Station on-site at Building 710. Well Number 2 is on Water Tower Hill. Well Number 1 is screened at approximately 140 feet below ground surface; Well Number 2 is screened between 176 and 190 feet below ground surface. Together these wells supply water for approximately 33 people who work on Longhorn. Well Number 1 was sampled April 12, 1998 and analyzed for volatile organic compounds, pesticides, PCBs, minerals, and metals. Well Number 2 was

sampled April 6, 1999. It was analyzed for minerals and metals. None of the constituents analyzed for were at levels that could result in health problems. However, only limited analyses were conducted on Well Number 2. It would be prudent to resample both wells for perchlorate and to sample Well Number 2 for volatile organic compounds, semivolatile organic compounds, pesticides and PCBs.

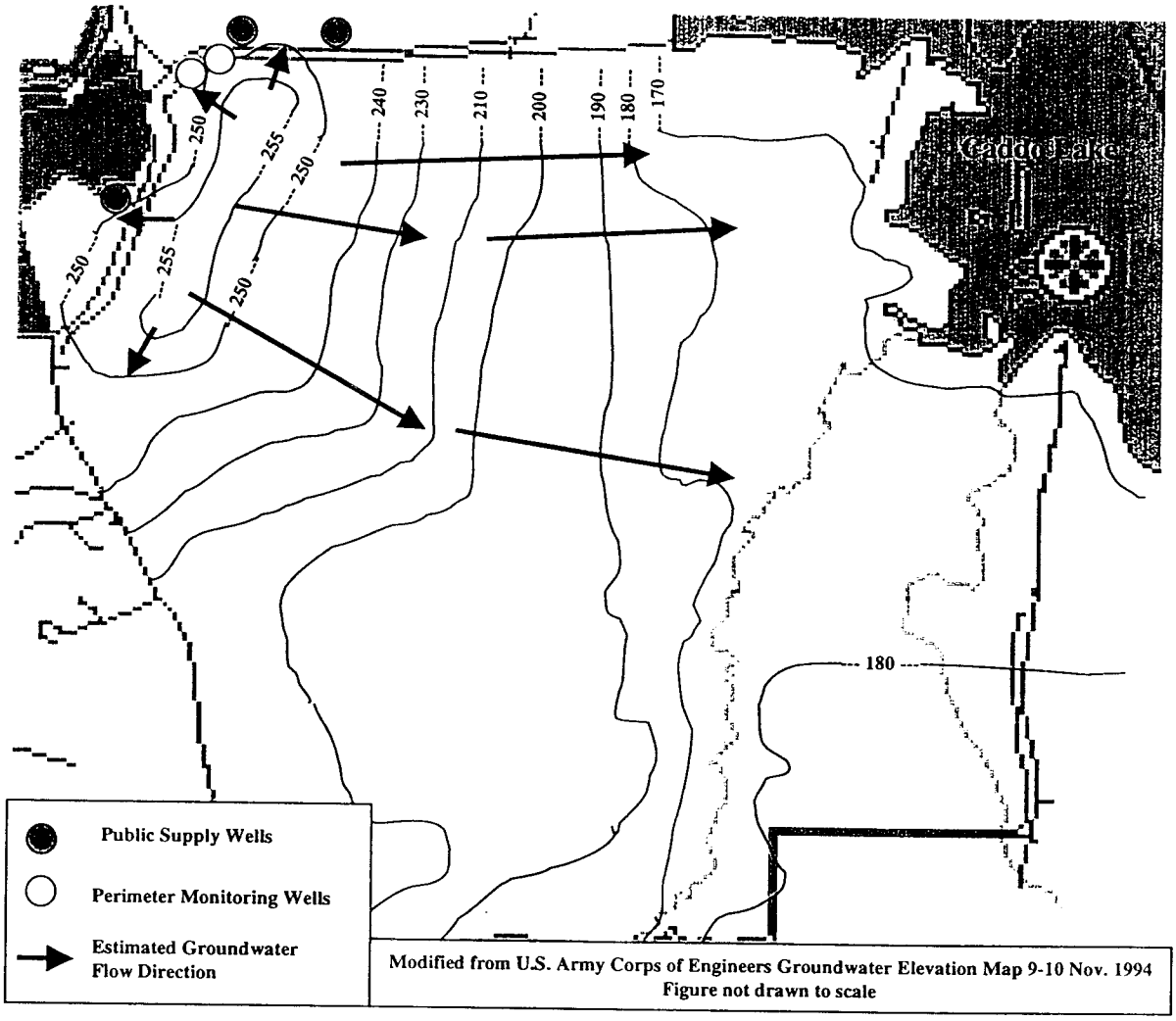
The Karnack Public Water Supply and the Caddo Lake Public Water Supply have been tested for volatile organic compounds and metals/minerals as required under the Safe Drinking Water Act. The Caddo Lake State Park Water Supply well has been tested for metals and minerals (Appendix F). According to data from a 1997 sampling episode, water from the Caddo Lake Public Water Supply contained low concentrations (below the MCL) of trihalomethanes (bromoform [7.2 µg/L], chloroform [1.1 µg/L], bromodichloromethane [3.2 µg/L], and chlorodibromomethane [8.1 µg/L]). Trihalomethanes (THMs) are common disinfection by-products found in chlorine-disinfected water. THMs also were reported in water from the Longhorn surface water supply; this water is currently not used for drinking. Volatile organic compounds and other constituents detected in the on-site groundwater wells either have not been detected in the closest public water supply wells or, in the case of minerals and metals, have not been detected at concentrations of health concern. Therefore, it is not likely that other site contaminants (such as explosives) are likely to be in privately owned or public water supply wells. This evidence, and the fact that these wells are upgradient of the contaminated areas on Longhorn, provide support that presently the contaminated groundwater beneath Longhorn does not pose a public health hazard.

Evaluation of Possible Exposure to Physical and Other Hazards

Much of the site is densely vegetated and it has both dirt and paved roads. During our site visit we saw physical hazards, such as abandoned and dilapidated buildings on the site. However, site access is restricted. ***Currently, physical hazards at this site do not pose a public health threat.***

Figure 4
Longhorn Army Ammunition Plant
Groundwater Elevation Map

*NGVD - National Geodetic Vertical Datum groundwater elevations measured February 1996



COMMUNITY HEALTH CONCERNS/ CHILD HEALTH INITIATIVE/HEALTH OUTCOME DATA

Community Health Concerns

To obtain community health concerns related to the Longhorn Army Ammunition Plant, we contacted several different agencies and individuals by telephone. The regional offices of both the Texas Department of Health (TDH Region 4) and the Texas Natural Resource Conservation Commission (TNRCC Region 5) were contacted in April of 1997. In addition to state agencies we contacted local health department staff, local citizens, former employees, the mayor from the town of Uncertain, the Uncertain Audubon Society, and the Caddo Lake Association Clean Rivers Program. We received the following health concerns.

1. Has TDH done studies on the health effects of past activities at the site?

   No. Such studies have not been considered for this site. Based on available information, we were not able to identify any exposure situations through which the public would have come into contact with site contaminants in sufficient amounts to be of public health concern. In the absence of an identifiable exposure pathway, a study on the health status of the community would not be useful in establishing cause and effect relationships between specific conditions and past site activities.

2. Foremen that worked at the plant died of cancer and were not really in the areas where workers handled chemicals. Could there have been something in the water at the plant?

   During the time that Longhorn was an actively operating facility, the public water supply was from Cypress Bayou and was treated at a surface water treatment plant on the Longhorn facility. Contaminants were not found in this public water supply. In examining the number of cancer deaths for Harrison County between 1987 and 1996, the number of cancer deaths was lower than or comparable to what was experienced in the State of Texas as a whole [20, 21].

3. People in town, including children, have breathing problems. Could this be due to Longhorn?

   There are many reasons why people may develop breathing problems (viral infections, allergies). Due to the lack of air sampling data collected at Longhorn during the time it was operating we could not evaluate this concern. However, because the facility is no longer operating, it is not likely to be contributing to breathing problems currently being experienced by people in town.

Child Health Initiative

ATSDR's Child Health Initiative recognizes that the unique vulnerabilities of infants and children demand special emphasis in communities faced with contamination of their water, soil, air, or food. Children are at greater risk than adults from certain kinds of exposures to hazardous substances emitted from waste sites and emergency events. They are more likely to be exposed because they play outdoors and they often bring food into contaminated areas. They are shorter than adults, which means they breathe dust, soil, and heavy vapors close to the ground. Children are also smaller, resulting in higher doses of chemical exposure per body weight. The developing body systems of children can sustain permanent damage if toxic exposures occur during critical growth stages. Most importantly, children depend completely on adults for risk identification and management decisions, housing decision, and access to medical care.

ATSDR evaluated the likelihood for children living in the vicinity of the Longhorn Army Ammunition Plant site to be exposed to site contaminants at levels of health concern. ATSDR did not identify situations in the past in which children were likely to have been exposed to site contaminants. Because site access is currently restricted, children are not likely to be exposed to contaminated surface water, soil, or sediments from the site. Children currently are not likely to be exposed to site contaminants in groundwater unless the extent of the contamination spreads to water wells which are being used by families with children.

Health Outcome Data

Health outcome data (HOD) record certain health conditions that occur in populations. These data can provide information on the general health of communities living near a hazardous waste site. They also can provide information on patterns of specified health conditions. Some examples of health outcome databases are tumor registries, birth defects registries, and vital statistics. Information from local hospitals and other health care providers also may be used to investigate patterns of disease in a specific population.

TDH and ATSDR look at health outcome data when there is a completed exposure pathway or community concern. Due to a lack of completed exposure pathways, a review of health outcome data is not warranted.

PUBLIC HEALTH ACTION PLAN

Conclusions

1. ATSDR concluded that the Longhorn site poses no apparent public health hazard, either because people are not likely to come into contact with site contaminants or because institutional controls are sufficient to protect human health. Although site-related contaminants have been detected on the site in various environmental media, currently the contaminants are not accessible on or off site at levels of public health concern. Based on available information, the Longhorn Army Ammunition Plant site does not pose a threat to public health at this time. If site access continues to be restricted, Longhorn is not likely to pose a threat to public health in the future. Due to the lack of appropriate environmental data during the time that Longhorn was in full operation, we are unable to assess the past public health significance of operations at Longhorn.

2. There are several public water supply wells, north and northwest of Longhorn, upgradient from areas of known contamination. In the past, low concentrations of contaminants were reported in water from on-site perimeter monitoring wells in this area; however, these data are suspect and likely are due to field or laboratory cross-contamination. Based on available information, it is unlikely that contaminants are migrating towards the public water supply wells.

3. ATSDR's previous recommendation to monitor water from the on-site creeks is still valid. Although surface water from Caddo Lake has not been analyzed for site contaminants, sampling data from Goose Prairie Creek and Harrison Bayou provide evidence that contaminants from Longhorn are not migrating towards Caddo Lake in quantities sufficient to pose a public health threat, with the possible exception of perchlorate. Remediation of the sources of perchlorate and continued quarterly sampling of surface water from Goose Prairie Creek and Harrison Bayou will help ensure that the likelihood of potential future exposures is removed.

Actions Planned

1. Continued investigation and remediation of on-site contaminants by the U. S. Army.

Actions Ongoing

1. The U.S. Army will maintain institutional controls to restrict possible access to contaminated areas on the site, particularly if other uses, such as the proposed wildlife management area, are considered for the Longhorn property in the future.

2. The U.S. Army will continue to sample water from Goose Prairie Creek and Harrison Bayou for appropriate site contaminants including perchlorate.

3. As the monitoring data from the Phase III investigation and perchlorate sampling become available, ATSDR/TDH will review those data to evaluate their impact on public health.

Actions Recommended

1. In order to minimize their exposure to site contaminants, hunters, Caddo Lake Institute Scholars and other researchers, utility workers and other visitors to Longhorn should be clearly informed by the Army, when they check in at the gate, which areas on the facility are contaminated and should be avoided (perhaps by map or diagram).

2. Although it is unlikely that contaminants from the site are migrating towards the public water supply wells, it would be prudent to periodically test water from these wells for site-related contaminants, including perchlorate. It would be prudent to resample both on-site public water supply wells for perchlorate, as well as to sample Well Number 2 for volatile organic compounds, semivolatile organic compounds, pesticides, and PCBs.

3. The effluent from the groundwater treatment system at Burning Ground Number 3 and the Unlined Evaporation Pond should be treated to remove perchlorates prior to being discharged to Harrison Bayou.

4. The U.S. Army should take measures to keep perchlorate from entering Goose Prairie Creek from the source area at Building 25C.

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CERTIFICATION

This Health Assessment was prepared by the Texas Department of Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the Health Assessment was initiated.

Technical Project Officer, DSB, FFAB, DHAC

The Division of Health Assessment and Consultation, ATSDR, has reviewed this Public Health Assessment and concurs with its findings.

Chief, DSB, FFAB, DHAC, ATSDR

REFERENCES

1. Sverdrup Environmental, Inc. Field Summary Report. Phase 2, Group 2 Sites. Remedial Investigation Longhorn Army Ammunition Plant, Karnack, Texas. July, 1996.

2. Sverdrup Environmental, Inc. Site Characterization Investigation Report. Phase 2, Group 5 Sites. Remedial Investigation Longhorn Army Ammunition Plant, Karnack, Texas. October, 1996.

3. Documentation Records for Hazard Ranking System (HRS). Longhorn Army Ammunition Plant, Karnack, Texas. Revised March 1, 1989.

4. Texas Almanac. Dallas Morning News. 1996-1997. Page 298.

5. U.S. Bureau of the Census. "Census of Population and Housing, Summary Tape File 3a. (Texas, City of Uncertain)." 1990.

6. U.S. Bureau of the Census, "Census of Population and Housing, 1990: Summary Tape File 1A (Texas)." 1991.

7. Longhorn Installation Restoration Program Status Summary December 11, 1997 and March 4, 1997. Received from USACOE Longhorn Project Manager: Yolane Hartsfield.

8. Agency for Toxic Substances and Disease Registry (ATSDR). Health Consultation for Longhorn Army Ammunition Plant, Karnack, Harrison County, Texas. Cerclis Number TX6213820529. April 26, 1996.

9 U.S. Environmental Protection Agency, NPL Site Narrative at Listing, Longhorn Army Ammunition Plant. August 30, 1990. www.epa.gov/oerrpage/superfnd/web/oerr/impm/products/npl/nar801.htm.

10. ATSDR Health Assessment Guidance Manual. U.S. Department of Health and Human Services, Public Health Service. Agency for Toxic Substances and Disease Registry: Atlanta, Georgia 1992.

11. Sverdrup Environmental, Inc. Sampling and Data Results Report. Phase 2, Group 2 Sites (12, 16, 17, 18/24, 29, and 32). Remedial Investigation Longhorn Army Ammunition Plant, Karnack, Texas. March, 1996.

12. Longhorn Army Ammunition Plant (LHAAP) Background Groundwater Report, Final, June 21, 1995.

13. Darville, Roy G., Ph.D., Clean Rivers Program--Cypress Creek Basin. Sediment and Surface Water Sampling Data. TDH Personal communication. December 15, 1998.

14. Texas Department of Health Record of Communication File for Longhorn. Telephone conversation between Chris Villarreal EPA Region 6 RPM for Longhorn and Susan Prosperie of Texas Department of Health Environmental Epidemiology and Toxicology Division. Regarding perchlorate sampling results from Harrison Bayou and proposed sampling of public water supply for perchlorate. May 7, 1999.

15. Texas Department of Health Record of Communication File for Longhorn. April 1999 perchlorate sampling of Harrison Bayou by the USACOE. Results and map received from Cliff Murray of the USACOE in Tulsa. May 10, 1999.

16. Environmental Protection Systems, Inc. Longhorn Army Ammunition Plant Contamination Survey. Prepared for Thiokol Corporation/Longhorn Division and Commander Longhorn Army Ammunition Plant. U.S. Army Toxic and Hazardous Materials Agency. June 1984.

17. Texas Department of Health Record of Communication File for Longhorn. From Chris Villarreal EPA Region 6 RPM for Longhorn to Susan Prosperie of Texas Department of Health Environmental Epidemiology and Toxicology Division. Perchlorate sampling results for Blanchard, Louisiana public water supply. May 14, 1999.

18. USACOE Perimeter Well Sampling Results for Longhorn Army Ammunition Plant. Received from Project Manager Yolane Hartsfield. April 17, 1997.

19. Texas Department of Health Miscellaneous File for LHAAP: Chemical analysis data received from the TNRCC for public water supplies in the vicinity of LHAAP (Caddo Lake PWS, Karnack WSC, and Caddo Lake State Park Water Supply).

20. Texas Department of Health. Letter from Barry Wilson of the Cancer Registry Division to a citizen regarding cancer occurrence in Harrison County during the period 1987-1996. November 3, 1997.

21. Texas Department of Health. Letter from Tim Rainbolt of the Cancer Registry Division to a citizen regarding cancer mortality in Marshall, Texas between 1981 to 1988. September 27, 1990.

22. U.S. Army Corps of Engineers, Department of the Army. RCRA Facility Investigation, Scope of Work Plan. 25 July 1990.

23. U.S. Army Corps of Engineers, Tulsa District Longhorn Army Ammunition Plant. Draft Final Remedial Investigation Report. Group 1 Sites. Prepared for Longhorn Army Ammunition Plant, Karnack, TX. April 1996.

24. Texas Department of Health Record of Communication File for Longhorn. Site visit notes from April 9, 1997 site visit to the Longhorn Army Ammunition Plant.

25. Agency for Toxic Substances and Disease Registry. Chemical Specific Consultation for Perchlorate. Prepared by Mike Allred, Ph.D. October 8, 1998.

APPENDICES

Appendix A
Acronyms and Abbreviations

AMCCOM	U.S. Army Armament, Munitions and Chemical Command
ATSDR	Agency for Toxic Substances and Disease Registry
BGS	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1990
DCA	dichloroethane
DCE	dichloroethene
DNB	dinitrobenzene
DNT	dinitrotoluene
DOD	Department of Defense
EPA	U.S. Environmental Protection Agency
GIS	geographic information system
HMX	high melting explosive
HOD	health outcome data
IRP	Installation Restoration Program
LHAAP	Longhorn Army Ammunition Plant
Longhorn	Longhorn Army Ammunition Plant
mg/kg	milligrams per kilogram
NPL	National Priorities List
PA/SI	preliminary assessment/site investigation
PHA	public health assessment
RDX	Royal Demolition Explosive
RI	remedial investigation
ROD	Record Of Decision
SARA	1986 Superfund Amendments and Reauthorization Act
TCE	trichloroethene
TDH	Texas Department of Health
TNB	trinitrobenzene
TNRCC	Texas Natural Resource Conservation Commission
TNT	2,4,6-trinitrotoluene
USACHPPM	U.S. Army Center for Health Promotion and Preventative Medicine
USATHMA	U.S. Army Toxic and Hazardous Materials Agency
µg/L	micrograms per liter
VOCs	volatile organic compounds
WSC	water supply corporation

Appendix B
Definitions

Aquifer	A layer of permeable rock containing water
Aquiclude	A body of relatively impermeable rock that is capable of absorbing water slowly but does not transmit it rapidly enough to supply a well or spring; confining bed
Dermal	Of or relating to the skin
Downgradient	On a lower level of an incline
Groundwater	Water beneath the ground surface
Hydrogeologic	Having to do with the occurrence and utilization of groundwater
Ingest	To take in; as in to eat
Inhalation	To breathe in
Lenses	Thin geologic layers of limited extent and enclosed by layers of different material
Migrate	To move from one place to another
Perched groundwater	Groundwater in a saturated zone separated from the main body of groundwater by unsaturated rock or clay
Potable	Drinkable water
Pyrotechnic	Fireworks, powders, and ammunition for display, military signaling or illumination
Stratum	Layer of sedimentary rock or earth
Stratigraphy	The branch of geology that deals with the origin, composition, distribution, and succession of strata
Surface water	Water that has not penetrated much below the surface of the ground.
Upgradient	On a higher level of an incline
Well Screen	The part of the well that allows groundwater to enter the well from the surrounding depth.
Sump	Drain

Appendix C

Status of Sites at Longhorn Army Ammunition Plant [16, 22, 23]

Site Number	Site Name	Site Status
GROUP 1 SITES		
1 11 27 54	Inert burning grounds Suspected TNT burial site South test area Ground signal test area	Sites closed - NO FURTHER ACTION*
GROUP 2 SITES		
12 16 17 18 24 29 32	Active landfill Old landfill Burning ground No. 2 Burning ground No. 3 Unlined evaporation pond Former TNT production area Former TNT waste disposal area	Interim remedial actions taken at sites 12 and 16 (capping) and Sites 18/24 (soil desorption and groundwater treatment) Final ROD scheduled for year 2000
GROUP 3 SITES		
13 14	Sub-site west of old landfill Sub-site west of old landfill	Sites closed - NO FURTHER ACTION**
GROUP 4 SITES		
35 50 60	Process wastewater sumps Sump water storage tank Former storage buildings 411A, 411, & 714 and shed TS-80	Currently re-scoping with Site 50, Phase III with Risk Assessment Currently re-scoping, Phase III with Risk Assessment Currently re-scoping, Phase III with Risk Assessment
GROUP 5 SITES		
52 63	Magazine area washout Former burial pits	Recommendation NO FURTHER ACTION; ROD not required Site Investigation concluded NO FURTHER ACTION required

*Extensive investigation of Group 1 Sites was conducted in 1993 and 1994 by the Tulsa District Army Corps of Engineers. The possibility of contamination at each of these sites was thoroughly investigated by sampling soil, groundwater, sediment and surface water and testing for volatile organic compounds, semivolatile organic compounds, explosives, and metals. No evidence was found to suggest that contamination from site activities exists. Since all of these sites were related to operations with TNT and no confirmed explosives were found, no further action was recommended for these sites [23].

**Sites 13 and 14 were investigated by the Tulsa District Army Corps of Engineers reported in the remedial investigation, June 1995.

Appendix D

Areas of Known or Suspected Contamination at Longhorn			
	Area Description	**Media Sampled**	**Parameters Analyzed**
GROUP 2 SITES			
12	**Active Landfill**		
	The Active Landfill is an approximately 7-acre landfill in the center of Longhorn that was started in 1963. It is approximately 1,700 feet east northeast of the intersection of Avenues P and Q. This area has been used intermittently by Longhorn for the disposal of industrial solid waste, and possibly hazardous wastes. From 1978, the landfill was used continuously for the disposal of non-hazardous industrial solid waste. The landfill was closed in April 1994 and temporary capping was completed in October of 1997. The Active Landfill area drains to Central Creek [3,16].	Surface Water Sediment Groundwater	VOCs, Explosives, Metals VOCs, Explosives, Metals VOCs, Explosives, Metals
16	**Old Landfill**		
	The Old Landfill is a 20-acre area landfill in the south central part of Longhorn, just north of Avenue Q. It was used for the disposal of industrial and solid waste from 1942 until the late 1980s. Between 1942 and 1945, ash from the incineration of TNT production wastewater was disposed of in this area. After 1945, burned-out rocket motor casings, off-specification 2,4,6-TNT, barrels of waste chemicals, oils and paints, and scrap iron and wood were reportedly disposed of in this area. A temporary cap was completed over the Old Landfill in October of 1998. This area drains to Harrison Bayou [3,16].	Surface Water Sediment Groundwater	VOCs, Explosives, Metals VOCs, Explosives, Metals VOCs, Explosives, Metals
17	**Burning Ground No 2**		
	Burning Ground No. 2 is an approximately 5.5-acre area which consists of two 185' X 305' cleared sections at the intersection of Long Point Road and Avenue Q. From 1952 until about 1956 this area was used for the bulk burning of TNT, photo flash powder, and off-specification materials. From 1959 until 1980, this area was used for flashing explosives to recover metals and to burn wastes in trenches on the western side of the site. These burn trenches were filled with ash and covered. Burning Ground No. 2 drains to Harrison Bayou [3,16].	Surface Water Sediment Soil Groundwater	VOCs, Explosives, Metals VOCs, Explosives, Metals VOCs, Explosives, Metals VOCs, Explosives, Metals
18/24	**Burning Ground No 3/ Unlined Evaporation Pond**		
	Burning Ground No. 3 is a 34.5-acre site in the southeast section of Longhorn. Since 1955, various industrial wastes and hazardous wastes were buried or burned at Site 18. Buried wastes include rocket motor washout residues, illuminating mixtures, oxidizing agents, solvents, oils and detergents. Burned wastes include solvents, oil, and red phosphorus. Site 24 was an unlined evaporation pond located within the boundaries of Site 18. This pond was constructed in 1963 as a holding pond for explosive wastes from rocket motor casing wash water containing solvent and metal residues. An estimated 16,000 gallons per day of wastewater, solvents, and solids from various sumps located throughout the facility were discharged into the evaporation pond. The use of this evaporation pond ceased in 1984. A temporary drum storage area and other miscellaneous wastes also are located within the boundary of Site 18. According to a status summary that TDH received from representatives of Longhorn during the site visit [24], the groundwater treatment plant was successfully tested in January of 1997. A "proof of performance test" to verify the effectiveness of the Low Temperature Thermal Desorber unit (for soil treatment) was completed in February of 1997 [7]. These areas drain to Harrison Bayou floodplain [3,16]. UEP capped in 1985. Contaminated groundwater being removed and treated to remove volatile organic compounds at groundwater treatment plant. Perchlorate discovered in this groundwater in April 1999.	Surface Water Sediment Soil Groundwater	VOCs, Explosives, Metals VOCs, Explosives, Metals VOCs, Metals VOCs, Metals, Perchlorate
29	**Former TNT Production Area**		
	The Former TNT Production Area is an 85-acre area in the western central portion of Longhorn. It is bounded by Avenue E on the southwest, 1st Street on the northwest, 18th Street on the Southeast, and Avenue D on the northeast. From 1943 to 1945, TNT plants on this site produced approximately 180 million kilograms of TNT. The plant remained inactive from 1945 until it was demolished in 1959. Demolition debris were burned or flashed at Site 17. When the site was active, wastewater from the production area was pumped through buried pipelines to a treatment/disposal plant at Site 32. Site 29 also includes an area that was used to store toluene in above ground tanks. The Former TNT Production Area drains to Central Creek [3,16].	Surface Water Sediment Wasteline (liquid) Wasteline (soil) Soil Groundwater	Explosives, Metals Explosives, Metals Explosives, Metals Explosives, Metals Explosives, Metals VOCs, Explosives, Metals

	APPENDIX D. (Continued) Areas of Known or Suspected Contamination at Longhorn		
	Area Description	**Media Sampled**	**Parameters Analyzed**
32	**Former TNT Waste Disposal Plant**		
	The Former TNT Waste Disposal Plant is a 9-acre area covered with trees and brush in the west central portion of Longhorn. The entrance to the area is on Avenue C, approximately 0.2 miles northwest of the 1st Street intersection. From 1943 to 1945, large quantities of wastewater containing TNT manufacturing residues were treated and disposed of in this area. The treatment process produced sludge that was incinerated on the site and the ash was disposed of at Site 16, the old landfill. The disposal plant was inactive from 1945 to 1959 when it was demolished. The demolition debris were burned at Site 17. Approximately 1,000 feet of buried pipeline, used to transport the wastewater to the treatment/disposal facilities, also are considered part of this site. The Former TNT Waste Disposal Plant area drains south of Goose Prairie Creek.	Surface Water Sediment Wasteline (liquid) Wasteline (soil) Soil	Explosives, Metals Explosives, Metals Explosives, Metals Explosives, Metals Explosives, Metals
GROUP 4 SITES			
35	**Process Wastewater Sumps**		
	On-site sumps associated with past plant operations. Majority of sumps are located in a large portion of the northern half of the facility in areas formerly known as the plant production area (1,180 acres) and the Y and Static Test areas (350 acres). Most of these areas are near Goose Prairie Creek and Central Creek.	Groundwater	VOCs,SVOCs,PCBs/Pesticides, Explosives,Metals
50	**Sump Water Storage Tank**		
	The Sump Water Storage Tank Area is approximately 75 feet south of the bridge on South Crockett Avenue. A 26-ft diameter concrete ring which is the suspected remains of the foundation for an above ground storage tank is overgrown with vegetation including one large tree inside the concrete ring. The site was identified from historical records as an above ground storage tank for industrial waste water collected from industrial production sumps located throughout Longhorn. The Sump Water Storage Tank area drains near Goose Prairie Creek.	Sediment Soil	VOCs, SVOCs, Explosives, Metals VOCs, SVOCs, Explosives, Metals
60	**Former Storage Buildings 411 A, 411, 714, and Shed TS-80**		
	This area consists of three buildings and a shed reportedly used for the storage of pesticides and herbicides. Two of the buildings and shed are located on the west side of Avenue T. The third building is located on 9th Street and currently is used to store drummed products and other materials. The buildings have concrete floors while the shed has an earthen floor.	Soil	Pesticides, Herbicides
GROUP 5 SITES			
52	**Magazine Area Washout**		
	The Magazine Area Washout is located at the northeast corner of the Avenue E and 19th Street intersection that was used as a washout area for transport vehicles. This area consists of a grassy area surrounding a water hydrant with an attached standpipe, and numerous magazines all of which were used to store TNT. The standpipe presumably was used as a water source for the washout of trucks used to transport TNT to and from the area.	Soil	VOCs, SVOCs, Explosives, Metals
63	**Former Burial Pits**		
	This area was identified as consisting of pits formerly used for the detonation and burial of reject materials of unknown composition, is located adjacent to Bobby Jones Road at the intersection of Long Point Road and extending north approximately 165 feet on both sides of the road.	Soil	VOCs, SVOCs, Explosives, Metals

Appendix E

Areas of Suspected Contamination at Longhorn Investigated and Determined to Require No Further Action by USATHMA			
	Area Description	**Media Sampled**	**Parameters Analyzed**
GROUP 1 SITES			
1	**Inert Burning Grounds**		
	This area is located northwest of the intersection of 32nd Street and Avenue P. Drainage from this area flows to Goose Prairie Creek. In the late 1940s and early 1950s this area was used to burn inert materials identified as trash, ashes, scrap lumber, and waste from burned TNT. Bulk TNT may also have been burned in this area. A stand of pine forest was growing on the site in the 1980s [3,16]	Soil Groundwater Surface Water Sediment	VOCs,Explosives,Metals VOCs,PCB/Pesticide,Explosives,Metals VOCs,Explosives,Metals VOCs,Explosives,Metals
11	**Suspected TNT Burial Site**		
	Although the exact location of this site was not readily apparent, based on available information this area was located near the intersection of Avenues P and Q and drains towards Central Creek. This area may have been used in the 1940s. The limited data from this area indicated some TNT contamination in 1980 [3,16].	Soil	Explosives
27	**South Test Area**		
	This area is just west of Harrison Bayou near the southern boundary of Longhorn. In 1954 the South Test Area was the site of the first test of the photo flash bomb. In the late 1950s pits dug at this site were used to demilitarize illuminating devices. Leaking production items were demilitarized here. This area has been inactive since the early 1960s. Test results for soils were consistent with results for soils at other uncontaminated areas of Longhorn. Groundwater was minimally affected. Sampling results indicated a very low potential for contaminant migrations and no corrective actions were recommended [3,16]	Soil Groundwater	VOCs,Explosives, Metals VOCs,PCB/PesticideExplosives, Metals
54	**Ground Signal Test Area**		
	This area is on the southeast corner of Longhorn on a ridge; Saunder's Branch is to the east and Harrison Bayou is to the west. Saunder's Branch receives approximately 70 percent of the drainage from this area; Harrison Bayou receives about 30 percent of area drainage. This area was first used in April 1963 for materials proofing and surveillance tests including testing red phosphorous smoke wedges, 4.2 illuminating shells, and ammunition ranging from 40 mm to 155 mm. Nike and Sargent rocket motors were tested there as were XM40EB button bombs. This area was still in use in the 1980s [3,16]. Sample results were similar to concentrations throughout uncontaminated areas of Longhorn.	Soil Groundwater	Explosives, Metals VOCs,Explosives, Metals
GROUP 3 SITES			
13	**Sub-site west of Old Landfill**		
	Suspected bulk TNT burial site between Old Landfill and Active Landfill/ Acid Dump. This site was 50 feet by 50 feet and located 600 feet west of Landfill 16 [22].		

	APPENDIX E. (Continued) **Areas of Suspected Contamination at Longhorn Investigated and Determined to Require No Further Action by USATHMA**		
	Area Description	**Media Samples**	**Parameters Analyzed**
14	**Sub-site west of Old Landfill**		
	This site was suspected to be Site 54 burial ground. The site was used in the 1940s and 1950s for the disposal of demolition debris, explosives and acids. Previous studies detected elevated chromium and 1,3,5 trinitrobenzene in downgradient wells. This area is currently paved and was used as a parking lot [22].		
AREA Y SITES			
	Static Test Area		
	Located in the northeast/central part of Longhorn on Tyler Avenue, the static test area was used primarily for testing Nike, Sargent, and Pershing rocket motors, illuminating candles, and red phosphorous smoke wedges. Two-thirds of the drainage from this area flows toward Harrison Bayou and approximately one-third of the drainage flows northwest to Central Creek. Chemical concentrations in soil and groundwater were consistent with natural background levels from uncontaminated area throughout Longhorn; therefore, no additional action was recommended for this site.	Soil Groundwater	VOCs, Explosives, Metals VOCs, Explosives, Metals

Appendix F

Public Water Supply Chemical Test Results
Constituents Exceeding Health-based Comparison Values (µg/L)

Contaminant	Off-site Public Water Supplies			Longhorn Public Water Supplies			HAC Values		
	Karnack Public Water Supply 430' deep	Caddo Lake Public Water Supply 250-300' deep screen around 170'	Caddo Lake State Park Water Supply 315' deep	Surface Water Supply (source from Cypress Bayou)	Well #1 at Fire Station: Bldg 710 ~140 feet (originally drilled to 460 feet) Drilled April 23-30, 1997	Well #2 at Elevated Tank Water Tower Hill: 503-C 176-190 feet deep gravel packed Drilled October 27, 1998	MCL	EMEG/RMEG	CREG
VOLATILE ORGANIC COMPOUNDS	None detected (11/19/96)	4/2/97 / 9/27/96	No data available	7/29/97 All bdl* except	None detected 8/12/98	Not analyzed			
Bromoform#	nd	7.2 / 4.0**					100	200/700 RMEG	4.0
Bromodichloromethane#	nd	3.2 / 55		47			100	200/700 RMEG	0.6
Chloroform#	nd	1.1 / 52		175			100	100/400 RMEG	6.0
Dibromochloromethane#	nd	8.1 / 41**		9.0			100	200/700 RMEG	0.4
o-Xylene	nd	0.6 / nd					10000(ttl)	2000/7000iEMEG	na
MIBK (methylisobutylketone)	nd	2.6 / nd					na	na	na
Sulfur Dioxide (TIC)	nd	630 TIC / 5600 TIC					na	na	na
Ethanethiol (TIC)	nd	nd / 4.1 TIC					na	na	na
METALS	None exceeded (2/24/97 and 3/20/97)	None exceeded (9/27/96)		None exceeded (1/26/98)		Only Manganese exceeded (4/6/99)			na
Manganese			73 (7/12/95)		220	70	50***	50/200 RMEG	
Nitrates	Did not exceed (2/24/97)	Did not exceed (9/27/96)	Did not exceed (5/11/95)	Did not exceed (7/29/97)	None detected	None detected	10,000		

*bdl-below detection limit
** Lab problem, data suspect
*** Secondary standard based on aesthetic considerations
# Not measured in perimeter groundwater monitoring wells for Longhorn; generally associated with disinfection by-products
nd-Not detected
na-None available
TIC - tentatively identified compound

APPENDIX G
PERCHLORATE FACT SHEET [25]

The Division of Toxicology of ATSDR has prepared this fact sheet to summarize the current state of toxicological knowledge pertaining to perchlorates.

Perchlorates are oxygen containing acids of chlorine that contain chlorine in its highest (+7) oxidation state. Although perchlorates in pure form are stable at room temperatures, they are potent oxidizers and are used in fireworks, matches, explosives, and jet and rocket fuels.

Health effects that may occur as a result of acute exposures include the following: upper respiratory tract irritation, sneezing, coughing, difficulty breathing and chest pain with inhalation exposures to perchlorate containing mists or particulates; skin, eye, and mucous membrane irritation with direct contact exposures to perchlorates in liquid form or in mists or particulates; nausea, vomiting diarrhea, abdominal pain, cyanosis (deficient oxygenation causing purplish skin and mucous membranes), absence of urine formation, confusion, and convulsions with ingestion exposure. Health effects seen with chronic exposures are similar to those seen with acute exposures but may also include loss of appetite and weight loss.

Perchlorates may cause hemolysis (breakdown of blood cells) which may lead to hemoglobinuria (presence of hemoglobin in the urine), disseminated intravascular coagulation (clotting of blood in small blood vessels), and nephrotoxicity (kidney toxicity). Disseminated intravascular coagulation and formation of methemoglobin (oxidized hemoglobin that is incapable of reversibly binding to oxygen) may lead to tissue hypoxia (deficiency of oxygen reaching tissues), and acute kidney failure which can lead to coma and death within a few hours.

The potassium and sodium salts of perchlorate have been used in the treatment of hyperthyroidism. Normal production and secretion of thyroid hormones (triiodothyronine or T3 and tetraiodothyronine or T4) are controlled by iodide levels in the thyroid and by a feedback mechanism involving the production of thyroid stimulating hormone (TSH) by the anterior pituitary. TSH causes the thyroid to initiate new thyroid hormone synthesis. TSH production by the pituitary gland responds to blood levels of thyroid hormones. When circulating levels of thyroid hormones decrease, the production of TSH in the pituitary increases. Conversely, increased levels of circulating thyroid hormones lead to decreased pituitary production of TSH. Hyperthyroidism or Grave's Disease is a condition where the thyroid synthesized and secretes excessive amounts of thyroid hormones. In the early 1950s, physicians began treating Grave's Disease patients with perchlorate when it was discovered that perchlorate would control excessive synthesis and release of thyroid hormones. The use of perchlorate to treat Grave's Disease has been associated with skin rashes, sore throat, and gastrointestinal irritation. Use of perchlorate to treat Grave's Disease was discontinued in the 1960s when aplastic anemia and other irreversible hematological side effects were observed in treated patients.

The toxicological data base for perchlorate is incomplete. Efforts to develop health guidance values that can be used to evaluate exposures have resulted in different values because of the use of different Lowest Observed Adverse Effect Levels (LOAELs) and No Observed Adverse Effect Levels (NOAELs) and different uncertainty and modifying factors. The range of Provisional Reference Doses (RfDs; a Reference Dose is an estimate, with uncertainty spanning perhaps an order of magnitude, of a daily exposure to the human population, including sensitive subgroups,

that is likely to be without an appreciable risk of deleterious effects during a lifetime) developed by various groups is 0.0001 to 1.2 mg/kg/day. The U.S. Environmental Protection Agency (EPA) has developed the most conservative reference dose range of 0.0001 to 0.0005 mg/kg/day which yields safe drinking water values for perchlorate of 0.001 to 0.005 mg/L for a 10 kg child ingesting one liter of water per day and 0.0045 to 0.0175 mg/L for a 70 kg adult ingesting two liters of water per day.

The EPA has evaluated the potassium and sodium salts of perchlorate for carcinogenicity and has assigned them both a weight-of-evidence classification of B2, probable human carcinogen. However, because of the inadequacies of the toxicological data base for perchlorate, EPA has not developed a quantitative estimate of perchlorate carcinogenicity.

Research is currently under way to fill the data gaps in the toxicological data base for perchlorate. Proposed research includes neurobehavioral, developmental, pharmacokinetic, genotoxic, reproductive, immunotoxic, and 90-day toxicological studies.

Although ATSDR has not developed a Toxicological Profile or Minimal Risk Level (MRL; a Minimal Risk Level is an estimate of daily human exposure to a dose of a chemical that is likely to be without an appreciable risk of adverse noncancerous effects over a specified duration of exposure) for it, perchlorate is currently under consideration.

Anyone having questions about perchlorate toxicity should call the Division of Toxicology of ATSDR at 404/639-6300.

024571

DEPARTMENT OF THE ARMY
LONGHORN/LOUISIANA ARMY AMMUNITION PLANTS
P.O. BOX 658
DOYLINE, LOUISIANA 71023-0658

REPLY TO
ATTENTION OF

SIOLL-CR

15 July 1999

Mr. James Sher
TNRCC
Superfund Engineering Section-MC-144
P.O. Box 13087
Austin, TX 78711-3087

SUBJECT: Longhorn Army Ammunition Plant's Perchlorate Action Plan

Ref: LHAAP Request for Immediate Initial Assessment of Perchlorate in Caddo Lake, TNRCC, July 9 1999

Dear Mr. Sher:

In response to the referenced letter, the Army will consider honoring your request to collect and analyze water samples from Caddo Lake. The Army has and always will be proactive in the protection of human health and the environment. We would also like to continue the "team approach" with our partners of the Federal Facility Agreement. Before we can go forward with the request to sample in Caddo Lake there are some concerns that we feel must be addressed. These concerns are:

1. The objective of the sampling request.
   - Are you concerned about drinking water?
   - Are you concerned about swimmers, boaters, and fisherman?
2. What is the next step if perchlorates are found?
3. We need to define and locate the "mouth" of each tributary.
4. We do not understand some of the factors used in your calculations of the effluent limitations.
5. We do not know what impact your new interim action level for perchlorates will have on our groundwater treatment plant.

We would like to discuss these concerns in more detail in a meeting with the involved parties at your earliest convenience. The point of contact for this action is David Tolbert at (318) 459-5109.

Sincerely,

James A. McPherson
Commander's Representative

Copy Furnished:
Peter Waterreus – TNRCC
Wade Stone - TNRCC
Chris Villerreal - EPA Region 6
Cyril Onewokae - AMSIO-IBE-R
Jeff Armstrong - AEC
Paul Bruckwicki - TNRCC Region 5
Jonna Polk - COE - Tulsa
Wilma Subra - Audubon TAG

Longhorn Army Ammunition Plant
Monthly Managers' Meeting
July 20, 1999

The following is a list of participants:

Ira Nathan, LAAP/LHAAP
Chris Villarreal, EPA
David Tolbert, LHAAP
Wilma Subra, UAS
James Sher, TNRCC
Steve Winton, Radian
Bill Corrigan, CES
Craig Giggleman, USFWS
Paul Bruckwicki, TNRCC
Dan Wall, USFWS
Wade Stone, TNRCC
Bob Castro, TNRCC
Ken May, TNRCC
Jeff Armstrong, USAEC
Bill Davis, USAEC
Jennifer Wilson, USGS
Peter VanMetre, USGS
Roger Lee, USGS
Scott Crouch, TNRCC
Jonna Polk, USACE

1. Jim Sher requested a copy of a plant map with monitoring wells designated.

2. Wilma Subra requested a schedule for submittal of the Site 16 RI Report to the LHAAP team..

3. The Group 2 and Group 4 RI Report schedules were discussed. A scoping meeting will be held to discuss the groundwater/surface water modeling suggested by the ITR held at LHAAP in July 98. The modeling will need to be scoped and scheduled to determine the impacts to the RI Report schedules. The modeling will need to be incorporated into the reports, so the schedules for the RI Reports will be delayed for this purpose. New schedules for the RI Reports will be established after scoping the modeling efforts. The Army explained that this delay will not impact the actual remediation schedule since funding for remedial activities will not be available until FY01. TNRCC requested that the Army investigate the cost of proceeding with the RI without the modeling information, and preparation of RI Addendums incorporating the modeling data. The Army will gather this information.

4. The USGS explained the sampling which they will complete at Caddo Lake for EPA. The objective is to determine whether there have been historical or ongoing releases from LHAAP which have deposited in Caddo Lake, and if so, have those releases caused an impact? USGS will visit LHAAP on 4-5 August for a site visit. Sediment cores will be dates with cesium relating to nuclear weapons testing. Samples will be analyzed for pH, PCBs, pesticides, metals, and possibly explosives and perchlorate. A phased approach will be taken with sediment samples in September and surficial samples in each of the tributaries. Samples will be collected in Big Cypress and James Bayou to provide references for impacts from the oil industry contaminants. EPA is doing this work as an initial study. They would expect the Army to step in and determine extent if something is detected. EPA would like Army comments and input to USGS Sampling Plan. EPA will send David Tolbert a list of visitors for the meeting. Tentatively, the follow-up sampling is scheduled for winter, possibly January 2000. The Army, AEC, will check to determine whether USGS can sample on the plant.

5. USFWS said that Cliff Murray sent the data they had requested to Dan Wall, and he will check to see if he needs additional data.

6. A discussion regarding perchlorates was held. Jim Sher presented a proposed plan for addressing perchlorates at LHAAP which included a discharge standard for perchlorate at the LHAAP groundwater treatment plant. The Army asked where the "point of compliance" is for the plant discharge standard. The Army will send TNRCC a request for clarification of the standard via E-mail, and they will respond. In a review of previous data, there are high concentrations of perchlorate surrounding Bldg. 25C. In October 98, groundwater samples were collected, and analytical results showed the presence of perchlorate. TNRCC presented their determined perchlorate discharge levels of 375 ppb (average daily) and 795 ppb (maximum daily) at discharge pipe. However, it was agreed that no technology has been identified which can achieve these concentrations. TNRCC recommended monthly sampling for perchlorate in Goose Prairie Creek. TNRCC withdrew their opinion that Building 25-C should not be demolished without their approval. The Army is having trouble with the demolition contract, and anticipates that demolition will not occur for another 6-12 months. The Army will provide information regarding other buildings where perchlorate may have been used, based on process knowledge. TNRCC stated that the Army needs to assess the groundwater to delineate the groundwater plume, and should include perchlorate as one of the Chemicals of Concern in the RI Report. It was agreed that the Group 2 and Group 4 RI reports will proceed as is. A perchlorate integration approach will be determined, possibly an addendum or supplemental RI. Wilma Subra asked if TNRCC has established a monitoring frequency for the discharge pipe for perchlorate at the treatment plant.

7. TNRCC will sample Caddo Lake in August and at another time (TBD) immediately following a rainfall event, using GPS to establish data points. Parameters will be VOCs, SVOCs, metals, dissolved metals, perchlorate, and possibly explosives. TNRCC offered to split samples with the Army.

8. A monthly meeting was scheduled for 18 August in Austin to discuss the data quality objectives regarding perchlorate sampling at LHAAP.

8/24 024576

SIOLL-CR

MEMORANDUM FOR RECORD

Ref: TNRCC, Request for Immediate Initial Assessment of Perchlorate in Caddo Lake, 9 July 1999

Subject: Information Paper Re: Groundwater Treatment Plant Effluent

1. The Army notified EPA and TNRCC during the May, 1999 Longhorn Installation Restoration Program Manager's meeting that the Army discovered perchlorate in the groundwater treatment plant effluent at 7,980 ppb. The treatment plant effluent is discharged into Harrison Bayou. The treatment plant, according to the terms of the Record of Decision (ROD) signed in 1995, is designed for the treatment and removal of volatile organics and heavy metals, so it has no apparent impact on perchlorate.

2. In the referenced letter from TNRCC, standards for the treatment plant effluent for perchlorate were established at levels of 375 ppb for the daily average discharge limit and 795 ppb for the daily maximum limit.

3. Because of drought conditions at this time, LHAAP is discharging treated water into the INF pond, as approved by TNRCC on 13 August 1999. The INF pond is to be used during low-flow conditions in Harrison bayou. However, it is estimated that the holding pond capacity is 29 days.

4. Assuming that flow in Harrison Bayou will allow us to discharge into the bayou in the near future, we will be in violation of the perchlorate effluent limitations. If we don't operate the treatment plant we will violate the agreement set forth in the ROD for extraction and treatment groundwater containing volatile organics and heavy metals.

James McPherson
Commander's Representative

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

August 25, 1999

VIA FAX AND US MAIL

Mr. James A. McPherson, Commander's Representative
Longhorn/Louisiana Army Ammunition Plant
Attn: SIOLH-CR
P.O. Box 658
Doyline, LA 71023

Re: Longhorn Army Ammunition Plant

Dear Mr. McPherson:

In accordance with Section IX.A.2. of the Federal Facility Agreement for the Longhorn Army Ammunition Plant, this letter is to notify you that, effective August 25, 1999, James Sher will be the Texas Natural Resource Conservation Commission's designated Project Manager.

Additionally, in accordance with Section XIV.C., the state's address for notification is changed as follows:

Mr. James Sher (MC-143)
Texas Natural Resource Conservation Commission
Superfund Cleanup Section
Remediation Division
P.O. Box 13087
Austin, TX 78711-3087

The physical address for overnight delivery service is:

Mr. James Sher (MC-143)
Texas Natural Resource Conservation Commission
Superfund Cleanup Section
Remediation Division
12100 Park 35 Circle, Bldg. D
Austin, TX 78753

If you have any questions or comments regarding this matter, please give me a call at (512) 239-2487.

Sincerely,

Wade Stone

Wade Stone (MC 143)
Superfund Cleanup Section
Remediation Division

WS/ls

cc: Mr. Chris Villarreal, EPA Region 6 (6SF-AP)
Ms. Jonna Polk, COE Tulsa District (CESWT-PP-EA)
Mr. Oscar Linebaugh, COE Eastern Area Office (CESWF-AD-E)

024579

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

August 27, 1999

Mr. James A. McPherson
Commander's Representative
Longhorn Army Ammunition Plant
P.O. Box 658
Doyline, LA 71023

Re: Routine Inspection at:
Longhorn AAP, FM 134 at Spur 449, Karnack (Harrison County), Texas
PWS ID No.: 1020025

Dear Mr. McPherson:

On July 28, 1999, Mr. William Gibson of the Texas Natural Resource Conservation Commission (TNRCC) Tyler Region Office conducted an inspection of the above-referenced system to evaluate compliance with applicable public water supply requirements. During the inspection, the inspector verbally notified you of some apparent instances of noncompliance. You have described to us measures you have taken to address these problems. These measures as described appear to address the problems documented during this investigation. No further response from you is necessary concerning this investigation.

The TNRCC appreciates your assistance in this matter and your compliance efforts to ensure protection of the State's environment. If you or members of your staff have any questions regarding these matters, please feel free to contact Mr. Gibson in the Tyler Region Office at (903)535-5169.

Sincerely,

C. Noel Luper, P.E.
Water Section Manager
Tyler Region Office

CNL/WDG

024580

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

August 31, 1999

James A. McPherson, Commander's Representative
Longhorn/Louisiana Army Ammunition Plants
Attn: SIOLH-CR
P.O. Box 658
Doyline, LA 71023

Re: Longhorn Army Ammunition Plant
Remedial Action Completion
Early Interim Remedial Action at Burning Ground No. 3 and
Early Interim Remedial Action at Landfills 12 and 16

Dear Mr. McPherson:

This letter is to document that the U.S. Environmental Protection Agency (EPA) finds that the Interim Remedial Actions at the Burning Ground No. 3 and Landfills 12 and 16 are complete. The EPA defines completion of an operable unit remedial action as: conclusion of construction activities, performance of a final inspection, determination that the remedy is operational and functional, and preparation of an operable unit Remedial Action Report.

In regards to the Early Interim Remedial Action at Burning Ground No. 3, major components of the selected remedy included:

- Excavation and treatment of source material using low temperature thermal desorption and catalytic oxidation for the off-gas, and
- Extraction and treatment of contaminated shallow ground water using organic air stripping and off-gas treatment and metals precipitation.

The full-scale source treatment operation occurred from February through December 1997. The *Cost and Performance Report Low Temperature Thermal Desorption at Longhorn Army Ammunition Plant, Burning Ground No. 3* (U.S. Army Corps of Engineers, January 1999), which included all the elements required in a Remedial Action Report, has been reviewed and was approved by EPA on April 19, 1999. The ground water treatment plant has been operational since January 1997 and is continuing to operate.

In regards to the Early Interim Remedial Action at Landfills 12 and 16, the selected remedy consisted of the construction of multilayer caps which included the following components:

- Foundation soil layer,
- Sodium bentonite geocomposite liner,
- Geosynthetic membrane liner,
- Final soil cover, and
- Perimeter berms and drainage swales.

The landfill caps and the final inspections were completed in November 1998. Documentation of the landfill cap construction activities is provided in the *Final Construction Completion Report Interim Remedial Action Landfills 12 and 16 Cap Construction* (OHM Remediation Services Corporation, December 1998).

If you have any questions, feel free to contact Mr. Chris G. Villarreal of my staff at (214) 665-6758.

Sincerely,

William K. Honker
Chief, AR/OK/ TX Branch
Superfund Division

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

September 3, 1999

VIA E-MAIL, FAX AND MAIL

James A. McPherson, Commander's Representative
Longhorn/Louisiana Army Ammunition Plant
Attn: SIOLH-CR
P.O. Box 658
Doyline, LA 71023-0658

Re: Longhorn Army Ammunition Plant (LHAAP)
Funding Regarding Immediate and Specific Actions for Perchlorate

Dear Mr. McPherson:

Based on your August 31, 1999 telephone conversation with Mr. Wade Stone of my staff, it is our understanding that the Army will immediately pursue funding for the following corrective actions to address the perchlorate contamination at LHAAP:

- Existing Groundwater Treatment Plant
  1. The current sampling frequency for the treated groundwater from the groundwater treatment plant is once every other week. The Army must add perchlorate to the existing analytical parameters for treated groundwater at the current sampling frequency.
  2. As an interim measure, the Army must immediately reduce the perchlorate concentration in the treated groundwater by decreasing the pumping rate from groundwater recovery wells with high perchlorate concentrations while maintaining hydraulic control of the groundwater contamination plume.
  3. The Army must collect adequate data to fully characterize the influent stream and complete a pilot perchlorate treatability study of the system no later than August 31, 2000. The effluent water from the groundwater treatment plant should meet the discharge criteria set by the State of Texas no later than February 29, 2001.

- Perchlorate Contaminated Storm Water
  1. The Army must collect and analyze storm water samples for perchlorate and conduct monthly sampling for perchlorate in Goose Prairie Creek, Harrison Bayou and Caddo Lake. The Army also must conduct monthly sampling for perchlorate in all public drinking water system intakes down stream from the site.
  2. As an interim measure, the Army must install storm water runoff controls to stop the discharge of perchlorates via storm water in areas other than Building 25-C no later than February 29, 2000.
  3. As an interim measure, the Army must complete disassembly of Building 25-C and cover the surrounding areas no later than October 15, 1999.

- Monitor Well Sampling
  1. The Army did not analyze for perchlorate in the perimeter monitoring wells in July 1999. The Army must re-sample those wells for perchlorate and report the results to Texas Natural Resource conservation Commission (TNRCC) by October 15, 1999.
  2. The Army must include perchlorate analysis in their routine quarterly monitoring well sampling events.

- Data Reporting
  The Army must release all analytical data to TNRCC within 30 days of sample collection.

- Delineation of Perchlorate Contamination
  1. The Army must fully delineate the extent and degree of perchlorate in soil by February 29, 2000.
  2. The Army must fully delineate the extent and degree of perchlorate contamination in groundwater by May 31, 2000.

The TNRCC requests that you provide written confirmation of your intent to pursue funding for the corrective actions referenced above no later than September 10, 1999. The TNRCC considers perchlorate contamination at LHAAP to be an urgent issue. Please be advised that the TNRCC will initiate dispute resolution pursuant to Section XV.B. of the Federal Facility Agreement (FFA) dated December 30, 1991, if the Army is unwilling/unable to secure the necessary funding by October 5, 1999, or if the referenced corrective actions are not completed in a timely manner.

Your prompt response to this matter will be greatly appreciated. If you have any questions, please call Mr. James Sher at (512) 239-2444.

Sincerely,

Scott T. Crouch

Scott T. Crouch, Section Manager
Superfund Cleanup Section

JS/STC/mmw

cc: Chris Villarreal, EPA Region 6 (6SF-AP)

DEPARTMENT OF THE ARMY
LONGHORN/LOUISIANA ARMY AMMUNITION PLANTS
P.O. BOX 658
DOYLINE, LOUISIANA 71023-0658

REPLY TO
ATTENTION OF

SIOLL-CR

7 September, 1999

MEMORANDUM FOR Commander, U.S. Industrial Operations Command ATTN: AMSIO-IBE-R (Mr. Cyril Onewokae), Rock Island, Illinois 61299-6000

Subject: TNRCC Letter Pertaining to Specific Funding for Perchlorate

1. Attached is TNRCC's letter requesting Longhorn Army Ammunition Plant (LHAAP) to pursue funding for immediate and specific actions for perchlorate. I have agreed to pursue funding in order to resolve this matter prior to the state initiating dispute resolution. The letter implies that I have agreed with all actions addressed in the letter. Although we do agree that some of the actions should be done, we feel that others are unnecessary and unwarranted at this time. The following is suggested comments and estimated costs for each action:

- Existing Groundwater Treatment Plant - $1,579,000 (includes $1.5M for treatablity study. The cost of treatment was not estimated.)
  1. We agree that perchlorate should be added to the sampling parameters.
  2. We agree to reduce the pumping of sumps with high perchlorates but do not think that a reduction in the perchlorate can not be achieved unless blending occurs from another source. TNRCC has refused to allow blending of any kind.
  3. We agree that the influent stream should be characterized and a treatability study completed. However, we do not want to commit to the imposed date of August 2000. Also, we do not think it is feasible to expect a treatment system to be operable by 29 February 2001.

- Perchlorate Contaminated Storm Water - $163,000 (item #2 not included)
  1. We agree that perchlorate should be added to our **normal** quarterly sampling events. The state has sampled in the Caddo Lake and EPA has sampled the closest public drinking water system. Perchlorate was non-detect in all samples. Therefore, we do not see the need to sample off plant.

2. The Army intends to address each area that has a perchlorate concern. We can not request funds to install storm water runoff until the areas (if any) are established.
3. We have agreed to cover the area surrounding 25-C. We can not achieve this task until the demolition of the building is complete. The cover is presently scheduled to be installed in mid- November.

- Monitoring Well Sampling – $4,800
  1. We intend to sample the perimeter wells at the end of this month as part of our quarterly sampling. We feel that there is no value added in sampling prior to this.
  2. We agree that perchlorate should be included in the routine quarterly sampling.

- Data Reporting
  We agree to release the data after validation (within 45 days after sampling).

- Delineation of Perchlorate Contamination - $1,600,000
  1. We agree that the Army must fully delineate the extent and degree of perchlorate contamination in the soil. We do not think this can be achieved by 29 February, 2000.
  2. We agree that the Army must fully delineate the extent and degree of perchlorate contamination in the groundwater. We do not think this can be achieved by 31 May 2000.

2. I am requesting that Headquarters address this letter and respond back to TNRCC. My staff and I are willing to assist you in any way possible.

3. The POC for this action is David Tolbert, SIOLL-OR, DSN 637-5109.

Sincerely,

James McPherson
Commander's Representative
Louisiana/Longhorn AAP

CF: Jeff Armstrong, AEC

DEPARTMENT OF THE ARMY
HEADQUARTERS, U.S. ARMY INDUSTRIAL OPERATIONS COMMAND
ROCK ISLAND, ILLINOIS 61299-6000

REPLY TO ATTENTION OF

09 SEP 1999

AMSIO-IBE-R (200-1a

MEMORANDUM FOR Commander, U.S. Army Materiel Command,
ATTN: AMCEN-A, 5001 Eisenhower Avenue,
Alexandria, VA 22333-0001

SUBJECT: Texas Natural Resource Conservation Commission (TNRCC) Letter Pertaining to Specific Funding for Perchlorate

1. Reference memorandum, Longhorn/Louisiana AAP, SIOLL-CR, 7 Sep 99, SAB and enclosure thereto (encl).

2. Request AMC/DA provide guidance on how to address TNRCC's request delineated in the enclosure to referenced memorandum. This office does not concur with all the requests from TNRCC because there are no regulatory standards for perchlorate. However, we are working with LHAAP on an interim measure to cap building 25-C site in order to prevent further perchlorate runoff from this site.

3. The POC for this action is Mr. Cyril Onewokae, AMSIO-IBE-R, DSN 793-1350, E-mail onewokaec@ioc.army.mil.

B. G. MURPHY
Chief, Environmental Management
and Restoration Team

Encl

OPTIONAL FORM 99 (7-90)

FAX TRANSMITTAL # of pages ▸ 1

To Ira Nathan	From Henry Cruse
Dept./Agency	Phone # DSN 793-1434
Fax # 637-5112	Fax #

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

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024587

AMCEN-A (AMSIO-IBE-R/09 Sep 99) (200-1a) 1st End Mr. Onewokae/
slm/DSN 767-5064
SUBJECT: Texas Natural Resource Conservation Commission (TNRCC)
Letter Pertaining to Specific Funding for Perchlorate

Commander, U.S. Army Materiel Command, 5001 Eisenhower Avenue,
Alexandria, VA 22333-0001 13 SEP 1999

FOR Assistant Chief of Staff for Installation Management,
ATTN: DAIM-ED (COL Richard L. Freeman), 600 Army Pentagon,
Washington, DC 20310-0600

1. References:

a. Letter, TNRCC, July 9, 1999, subject: Longhorn Army Ammunition Plant (LHAAP) Request for Immediate Initial Assessment of Perchlorate in Caddo Lake.

b. Letter, TNRCC, September 3, 1999, subject: Longhorn Army Ammunition Plant (LHAAP) Funding Regarding Immediate and Specific Actions for Perchlorate.

c. Memorandum, LHAAP, SIOLL-CR, 7 Sep 99, SAB.

d. Memorandum, HQ IOC, AMSIO-IBI-R, 9 Sep 99, SAB.

2. We request your office provide the Army's position on groundwater sampling and interim remedial actions for perchlorate, not only at LHAAP as requested by TNRCC and discussed in reference 1a through 1d, but by other state regulatory agencies.

3. The point of contact is Mr. Cyril Onewokae, DSN 767-5064, or commercial (703) 617-5064, E-mail: amcenal@hqamc.army.mil.

4. AMC -- Your Readiness Command . . . Serving Soldiers Proudly!

FOR THE COMMANDER:

Encls
as

P.S. MORRIS
Colonel, GS
Deputy Chief of Staff for
Engineering, Housing, Environment
and Installation Logistics

Longhorn Army Ammunition Plant
TRC Meeting
September 14, 1999

The following is a list of participants:

James McPherson, LAAP/LHAAP
Ira Nathan, LAAP/LHAAP
Chris Villarreal, EPA
David Tolbert, LHAAP
Dave Bockelmann, Sverdrup
Jay Spence, Ensafe
Bud Jones, TAPP
Ruth Culver, UAS
Cliff Murray, COE
Gaynor Dawson, PPC
Kevin Kutola, PPC
Dudley Beene, COE
Bart Ives, USAEC
Judy VanDeventer, CLWS
Paul Fortune, Longhorn Neighbor
'len Toots, TIEHH
.hris Theodorakis, TIEHH
Ken Dixon, TIEHH
Roy Darville, CLI
Robert Bradley, TIEHH
Jody Wireman, TIEHH
Wilma Subra, UAS
James Sher, TNRCC
Steve Winton, Radian
Bill Corrigan, CES
Craig Giggleman, USFWS
Jeff Armstrong, USAEC
Jonna Polk, USACE

1. The Groundwater Treatment Plant has experienced some problems with the catox blower, and lightning striking in June. Repairs have been made, and the system is back on line. The cost for treatment is $0.06/gal. In August the system operated 22 days. In June, the system operated 10-12 days. Radian is building a spare parts inventory and installing lightning suppressors. They have also changed the polymer to a solution. To reduce the perchlorate concentrations, sumps 12B and 4 are running only when other sumps with low concentrations are running.

2. The 7 September letter from TNRCC was forwarded to IOC, and a request for the response time to extend to 20 September has been made.

3. Demolition will begin at Building 25C on 16 September.

4. TNRCC requested that dates on GWTP graphs be changed from 99 to 00. Radian is checking on Y2K compliance per EPA request. Radian will be updating the software within the next month to ensure Y2K compliance, and they will provide written confirmation to LHAAP regarding the Y2K software update. Radian will add information in their monthly reports identifying the number and specific days when discharging to Harrison Bayou. Sludge from the GWTP is run through a filter press and sent to a hazardous waste landfill. The sludge meets the land disposal restrictions for F001 waste under RCRA. Wilma Subra suggested testing the sludge for perchlorate. Radian is working with the Lawrence Livermore lab to improve processes.

5. Bud Jones is working under the Technical Assistance for Public Participation Grant from DOD, and serving as the public liaison. His working to construct a surface water model for runoff. The purpose is to trace contaminants in groundwater entering surface water to determine is there is a problem from LHAAP for Caddo Lake. He is using existing COE data for the model, and should have results within the next month. He is using the WES SMS model. Perchlorate was not an issue when he started the model, and so it does not take that contaminant into account. He does not have enough information to include this contaminant. The model is mainly looking at TCE. He will be using the TRC as a mechanism to provide information to the public, unless otherwise requested. AEC stated that they want to ensure that the TAPP work does not duplicate other efforts.

6. Winter grass will be planted by the end of October by Bill Corrigan. Ruth Culver requested that a local subcontractor be used for the landfill seeding.

7. TNRCC explained that TNRCC issued an interim drinking water standard for perchlorate of 22 ppb on 28 June 99. Adequate information does not exist for eco risk standard, but estimate for eco risk is 500 ppb at this time. TNRCC issued discharge standards on 9 July for the GWTP for perchlorate. TNRCC sampled three wells at Caddo Lake, Karnack, and Caddo Lake State Park on 24-25 August, and results were all non-detect, less than 2 ppb. Also sampled were the intake at Big Cypress, mouths of Goose Prairie, Central Creek, and Harrison Bayou, and a point in Louisiana. All results were non-detect for perchlorate. TNRCC is also planning a storm water sampling event. TNRCC is also pursuing a groundwater supply well survey for private wells. TNRCC agreed to an extension for the Army response to their 7 September letter until 20 September. If no response by 20 September, the State will pursue Dispute Resolution. Two known sources of perchlorate exist at LHAAP – Building 25-C and the GWTP. Eighteen potential source areas have been identified. James McPherson explained that with non-detects resulting from the lake and Blanchard water system sampling, the Army intends to continue to run the GWTP as designed and agreed in the ROD, but is making every effort to reduce the perchlorate concentration from the GWTP. TNRCC explained that during the recent sampling

events they also tested for VOCs, metals, and explosives. There is a 30 day turnaround on the parameters, so the data is not yet available. TNRCC sample results from wells will be formally submitted to communities responsible for wells. Funds have been requested by LHAAP for perchlorate sampling at the GWTP. TNRCC explained that perchlorate has acute effects for fetuses and children under 4 years of age.

8. Results were presented for the 7 July Harrison Bayou and Goose Prairie Creek quarterly sampling events.

9. The Army is making contact with GSA for local government use of LHAAP land, beyond the discussions with USFWS. USFWS is continuing to express interest. Caddo Lake Institute has a new lease for office space at LHAAP.

10. The IAP meeting is scheduled for 18-20 October in San Antonio, TX.

LONGHORN AAP
TRC
14 Sept. 1999

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Jay Spence	EnSafe	972-701-3222	jspence@ensafe.com
CHRIS VILLARREAL	EPA	214-665-6758	villarreal.chris@epa.gov
H.L. "Bud" Jones	DoD-TAPP	903-839-3690	hljones@Tyler.net
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~~DHO~~			
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JONNA POLK	COE	918/669-7482	

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

VIA FACSIMILE AND REGULAR MAIL

September 24, 1999

James A. McPherson, Commander's Representative
Longhorn/Louisiana Army Ammunition Plants
Attn: SIOLH-CR
P.O. Box 658
Doyline. LA 71023

Re: Longhorn Army Ammunition Plant (LHAAP)
Capping at Bldg. 25-C

Dear Mr. McPherson:

This letter is in response to your September 16. 1999, letter regarding the capping of perchlorate contaminated soils near Building 25-C. Specifically, your letter stated that following demolition of Building 25-C, the soils identified in your attached drawing would be graded, then covered with approximately 18,000 square feet of 20 mil HDPE liner. The liner will be covered with three to six inches of soil or gravel, and if the area is covered with soil, seeded for vegetative growth to prevent erosion. This action is being taken to reduce future migration of perchlorate present in the soils. It is my understand that:

- the18,000 square feet of 20 mil HDPE liner is excess material from the capping activities at Landfills 12 and 16 and that the liner cover material (soil or gravel) will be obtained from sources on LHAAP; and
- this action is not considered to be the final action to address perchlorate contaminated soils near Building 25-C.

Additional actions may be required in the future to address the perchlorate contaminated soils near Building 25-C. These additional actions will be based upon information generated as part of the CERCLA process.

If you have any questions, feel free to contact me at (214) 665-6758.

Sincerely,

Chris G. Villarreal

Chris G. Villarreal
Remedial Project Manager

cc: Jonna Polk
Core of Engineers, Tulsa District

Oscar Linebaugh, Jr.
Core of Engineers, Fort Worth District

James S. H. Sher, P.E.
Texas Natural Resource Conservation Commission

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

September 27, 1999

VIA E-MAIL, FAX AND CERTIFIED MAIL

Mr. James A. McPherson, Commander's Representative
Longhorn/Louisiana Army Ammunition Plant
Attn: SIOLH-CR
P.O. Box 658
Doyline, LA 71023-0658

Re: Longhorn Army Ammunition Plant (LHAAP)
Notification of Dispute Regarding Immediate and Specific Actions for Perchlorate

Dear Mr. McPherson:

On July 9, 1999, the Texas Natural Resource Conservation Commission (TNRCC) provided the Army with a perchlorate action level of 22 parts per billion (ppb) for groundwater as well as daily maximum (795 ppb) and daily average (375 ppb) perchlorate discharge limits for the groundwater treatment plant (see enclosed letter dated July 9, 1999.) In the same letter, the TNRCC requested the Army to sample Caddo Lake and minimize perchlorate migration via the surface water runoff by covering the building 25-C area with a liner as a temporary remedial action. The Army turned down our request for sampling Caddo Lake on July 14, 1999 due to their interpretation of the Army's regulations regarding off-site sampling.

The TNRCC met with the Army and the United States Environment Protection Agency (EPA) on July 20, 1999 as part of its reasonable efforts to resolve differences of opinion TNRCC has with the Army concerning corrective actions to address the perchlorate contamination at LHAAP. Our differences of opinion were not resolved during the meeting basically because the Army did not consider perchlorate a chemical of concern.

The TNRCC, the Army, and the EPA met again on August 18 and 19, 1999 to work out the differences. During the August 18, 1999 meeting, Dr. Michael Honeycutt, the TNRCC's toxicologist and a member of the Inter-Agency Perchlorate Steering Committee (IPSC), briefed the Army regarding the human health risk associated with perchlorate. Dr. Honeycutt stated that perchlorate competitively inhibits the uptake of iodine by the thyroid gland, which results in hypothyroidism, a decrease in the thyroid hormone. Hypothyroidism can seriously impact developing fetuses and children. Short-term (one day) hypothyroidism at critical times in development leads to permanent

adverse effects, including deaf-mutism, mental retardation, decreased intelligence quotient, impaired fine motor skills, gait (walking) disturbances, and/or speech impairments. In fact, the EPA's December, 1998 preliminary draft reference dose (RfD) of 0.0009 mg/kg-day for perchlorate is based on neurodevelopmental effects in laboratory animals. Accordingly, the TNRCC has adopted a Risk Reduction Rule Standard 2 (30 TAC § 335.568 Appendix II) Medium Specific Concentration of 22 ppb for perchlorate by using this RfD, which would be protective of these effects. During the August 19, 1999 meeting, Mr. Steve Ligon of the TNRCC Wastewater Permit Section discussed the calculations used to establish perchlorate discharge limits for the onsite groundwater treatment plant. During these meetings, the TNRCC stated that it considers the perchlorate contamination at LHAAP to be an urgent issue. However, the Army maintained its position that perchlorate is not a concern, there are no proven technologies to treat perchlorate, and there is no budget to deal with perchlorate in the current or next fiscal year.

By letter dated September 3, 1999 (see enclosure), the TNRCC requested the Army to provide written confirmation by September 10, 1999 of its intent to immediately pursue funding to take the following corrective actions to address the perchlorate contamination at LHAAP:

- Existing Groundwater Treatment Plant
  1. The current sampling frequency for the treated groundwater from the groundwater treatment plant is once every other week. The Army must add perchlorate to the existing analytical parameters for treated groundwater if the current sampling frequency is used.
  2. As an interim measure, the Army must immediately reduce the perchlorate concentration in the treated groundwater by decreasing the pumping rate from groundwater recovery wells with high perchlorate concentrations while maintaining hydraulic control of the groundwater contamination plume.
  3. The Army must collect adequate data to fully characterize the influent stream and complete a pilot perchlorate treatability study of the system no later than August 31, 2000. The effluent water from the groundwater treatment plant should meet the discharge criteria set by the State of Texas no later than February 28, 2001.

- Perchlorate Contaminated Storm Water
  1. The Army must collect and analyze storm water samples for perchlorate and conduct monthly sampling for perchlorate in Goose Prairie Creek, Harrison Bayou and Caddo Lake. The Army also must conduct monthly sampling for perchlorate in all public drinking water system intakes down stream from the site.
  2. As an interim measure, the Army must install storm water runoff controls to stop the discharge of perchlorates via storm water in areas other than Building 25-C no later than February 29, 2000.
  3. As an interim measure, the Army must complete disassembly of Building 25-C and cover the surrounding areas no later than October 15, 1999.

- Monitor Well Sampling
  1. The Army did not analyze for perchlorate in the perimeter monitoring wells in July, 1999. The Army must re-sample those wells for perchlorate and report the results to the TNRCC by October 15, 1999.
  2. The Army must include perchlorate analysis in their routine quarterly monitoring well sampling events.

- Data Reporting
  The Army must submit all analytical data to the TNRCC within 30 days of sample collection.

- Delineation of Perchlorate Contamination
  1. The Army must fully delineate the extent and degree of perchlorate in the soil by February 29, 2000.
  2. The Army must fully delineate the extent and degree of perchlorate contamination in the groundwater by May 31, 2000.

On September 13, 1999, the Army requested and received an extension of the deadline until September 20, 1999. On September 21, 1999, the Army notified the TNRCC that the necessary funding had not been obtained. To date, the only corrective actions agreed to by the Army are addition of perchlorate analysis to their routine quarterly perimeter monitoring well sampling events and dismantling of building 25-C followed by placement of a liner to cover the surrounding area.

Analytical data collected at LHAAP indicates the presence of high concentrations of perchlorate in soil, groundwater, treated groundwater, surface water and storm water runoff. As referenced in our July 9, 1999 correspondence, all known perchlorate contaminated water flows to Caddo Lake, which is a drinking water source for several Louisiana Public Water Supply Systems. The TNRCC believes that expeditious actions to assess the potential presence of perchlorate contamination in Caddo Lake water, groundwater, storm water runoff, treated groundwater and soil are warranted. The failure of the TNRCC and the Army to come to an agreement concerning appropriate perchlorate corrective actions at the project manager and/or immediate supervisor level from July through September constitutes an action that has led to or generated a dispute pursuant to Section XV.B. of the Federal Facility Agreement (FFA), dated December 30, 1991.

This letter shall serve as TNRCC's written statement of dispute to the Dispute Resolution Committee in accordance with Section XV of the FFA. Obviously, the nature of the dispute is establishment of an appropriate corrective action plan for perchlorate at LHAAP. The TNRCC asserts that the work affected by this dispute (itemized above) must be performed for the protection of public health, welfare and the environment.

The technical basis for TNRCC's position in this dispute is provided to the Army under cover of TNRCC's July 9, 1999, letter, presented to the Army in the July and August meetings, and is

referenced above in this letter. At a minimum, TNRCC asserts the Army is legally required to address the perchlorate issue because perchlorate is a pollutant under the Texas Risk Reduction Rules, and it is a pollutant under the Comprehensive Environmental Response, Compensation and Liability Act because the FFA itself requires the Army to address contaminants and pollutants at LHAAP, and because the above-described past and imminent future releases of perchlorate above action levels violates Section 26.121 of the Texas Water Code.

The parties designated in the FFA should meet no later than October 18, 1999 to resolve unanimously the dispute and issue a written decision signed by all parties in accordance with Section XV. D and E of the FFA.

Your prompt response to this matter will be greatly appreciated. If you have any questions, please call Mr. James Sher at (512) 239-2444.

Sincerely yours,

Jacqueline S. Hardee

Jacqueline S. Hardee, P.E., Director
Remediation Division

JSH/JS/ls

Enclosure

cc: Mr. Myron O Knudson, EPA Region 6 (6SF)
Mr. Bill Honker, EPA Region 6 (6SF)

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

July 9, 1999

VIA E-MAIL, FAX AND MAIL

James A. McPherson, Commander's Representative
Longhorn/Louisiana Army Ammunition Plant
Attn: SIOLH-CR
P.O. Box 658
Doyline, LA 71023-0658

Re: Longhorn Army Ammunition Plant (LHAPP)
Request For Immediate Initial Assessment of Perchlorate in Caddo Lake

Dear Mr. McPherson:

The Texas Natural Resource Conservation Commission (TNRCC) recently established 22 parts per billion (ppb) as the interim action level for perchlorate in drinking water (See enclosed TNRCC memorandum dated June 28, 1999). Based on the 22 ppb perchlorate action level, the TNRCC has calculated the daily average discharge limit for the LHAPP groundwater treatment plant at 375 ppb with 795 ppb for the daily maximum limitation. (See enclosed effluent limitations calculation)

On April 28, 1999, perchlorate concentrations of 14,500 ppb and 97.3 ppb were detected in Harrison Bayou at the discharge point from the groundwater treatment plant and 200 feet upstream from Caddo Lake, respectively (See enclosed report titled Perchlorate Sampling Results Groundwater/Surface Water April/May 1999). The analytical results of the February 10, 1998 sampling in Goose Prairie Creek showed perchlorate at 11 ppb, 210 ppb, and 11,000 ppb from the plant boundary adjacent to Caddo Lake, several hundred feet upstream from Caddo Lake, and surface runoff southeast of Building 25-C during a heavy rain, respectively (See enclosed Goose Prairie Creek Sampling Results).

Based on the analytical results and the potential for impact to Caddo Lake which is a drinking water source for six public drinking water systems, the TNRCC believes that an expeditious survey to assess the potential presence of perchlorate contamination in the lake water adjacent to LHAPP is warranted. The TNRCC considers this an urgent issue and hereby requests the Army to take the following immediate actions:

- Minimize perchlorate migration via the surface water runoff by covering the building 25-C area with a liner as temporary remedial action. More frequent sampling of runoff from the Building 25-C area and Goose Prairie Creek should also be conducted until the perchlorate source(s) has been remediated.

- Assess the potential presence of perchlorate in Caddo Lake by collecting and analyzing water samples from the following locations:
  1. The mouth of Goose Prairie Creek.
  2. The mouth of Central Creek located between Goose Prairie Creek and Harrison Bayou.
  3. The mouth of Harrison Bayou.
  4. Any other areas of Caddo Lake that the Army suspects may have detectable levels of perchlorate.

Please provide your response regarding both requests by the close of business July 16, 1999. If the Army agrees to cover the building 25-C area with a liner, the Army should provide a schedule to complete the task within a reasonable time frame. If the Army agrees to collect water samples from Caddo Lake, the Army should provide a sampling and analysis plan which includes proposed sample locations and a schedule which ensures completion of all field work no later than July 31, 1999. If the Army cannot comply with the TNRCC's request, the TNRCC will use state funding to take necessary actions to protect human health and environment and may seek cost recovery under the Tex. Health & Safety Code.

The TNRCC will provide comments regarding your June 24, 1999 Perchlorate Action Plan under separate cover. Your prompt response to this matter will be greatly appreciated. If you have any questions, please give me a call at (512) 239-2444.

Sincerely yours,

James S.H. Sher, P.E.
Project Manager
Superfund Cleanup Section
Remediation Division

Enclosure

cc: Chris Villarreal, EPA Region 6 (6SF-AP)

bcc:

Paul Bruckwicki, OCE/FO/ Region 5/Tyler

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

September 3, 1999

VIA E-MAIL, FAX AND MAIL

James A. McPherson, Commander's Representative
Longhorn/Louisiana Army Ammunition Plant
Attn: SIOLH-CR
P.O. Box 658
Doyline, LA 71023-0658

Re: Longhorn Army Ammunition Plant (LHAAP)
Funding Regarding Immediate and Specific Actions for Perchlorate

Dear Mr. McPherson:

Based on your August 31, 1999 telephone conversation with Mr. Wade Stone of my staff, it is our understanding that the Army will immediately pursue funding for the following corrective actions to address the perchlorate contamination at LHAAP:

- Existing Groundwater Treatment Plant
  1. The current sampling frequency for the treated groundwater from the groundwater treatment plant is once every other week. The Army must add perchlorate to the existing analytical parameters for treated groundwater at the current sampling frequency.
  2. As an interim measure, the Army must immediately reduce the perchlorate concentration in the treated groundwater by decreasing the pumping rate from groundwater recovery wells with high perchlorate concentrations while maintaining hydraulic control of the groundwater contamination plume.
  3. The Army must collect adequate data to fully characterize the influent stream and complete a pilot perchlorate treatability study of the system no later than August 31, 2000. The effluent water from the groundwater treatment plant should meet the discharge criteria set by the State of Texas no later than February 29, 2001.

- Perchlorate Contaminated Storm Water
  1. The Army must collect and analyze storm water samples for perchlorate and conduct monthly sampling for perchlorate in Goose Prairie Creek, Harrison Bayou and Caddo Lake. The Army also must conduct monthly sampling for perchlorate in all public drinking water system intakes down stream from the site.
  2. As an interim measure, the Army must install storm water runoff controls to stop the discharge of perchlorates via storm water in areas other than Building 25-C no later than February 29, 2000.
  3. As an interim measure, the Army must complete disassembly of Building 25-C and cover the surrounding areas no later than October 15, 1999.

- Monitor Well Sampling
  1. The Army did not analyze for perchlorate in the perimeter monitoring wells in July 1999. The Army must re-sample those wells for perchlorate and report the results to Texas Natural Resource conservation Commission (TNRCC) by October 15, 1999.
  2. The Army must include perchlorate analysis in their routine quarterly monitoring well sampling events.

- Data Reporting
  The Army must release all analytical data to TNRCC within 30 days of sample collection.

- Delineation of Perchlorate Contamination
  1. The Army must fully delineate the extent and degree of perchlorate in soil by February 29, 2000.
  2. The Army must fully delineate the extent and degree of perchlorate contamination in groundwater by May 31, 2000.

The TNRCC requests that you provide written confirmation of your intent to pursue funding for the corrective actions referenced above no later than September 10, 1999. The TNRCC considers perchlorate contamination at LHAAP to be an urgent issue. Please be advised that the TNRCC will initiate dispute resolution pursuant to Section XV.B. of the Federal Facility Agreement (FFA) dated December 30, 1991, if the Army is unwilling/unable to secure the necessary funding by October 5, 1999, or if the referenced corrective actions are not completed in a timely manner.

Your prompt response to this matter will be greatly appreciated. If you have any questions, please call Mr. James Sher at (512) 239-2444.

Sincerely,

Scott T. Crouch

Scott T. Crouch, Section Manager
Superfund Cleanup Section

JS/STC/mmw

cc: Chris Villarreal, EPA Region 6 (6SF-AP)

Texas Natural Resource Conservation Commission

INTEROFFICE MEMORANDUM

To: Distribution **Date:** June 28, 1999

Thru: JoAnn Wiersema, Manager
Toxicology & Risk Assessment
Chief Engineer's Office

From: Michael Honeycutt, Ph.D.
Toxicology & Risk Assessment
Chief Engineer's Office

Subject: Interim Action Level for Perchlorate

Concern about perchlorate contamination at two sites in Texas has prompted staff from the Office of Waste and the Office of Water to request that the Toxicology & Risk Assessment Section develop an action level for perchlorate in drinking water. Currently, there is neither an USEPA- promulgated Maximum Contaminant Level nor Advisory Level. After consulting with USEPA Regions 6 and 9, the Agency for Toxic Substances and Disease Registry, the Texas Department of Health, and several states that also have perchlorate contamination, we have developed an interim action level of 22 μg/L (ppb) for perchlorate.

The interim action level of 22 μg/L was derived using the interim provisional reference dose (RfD) of 0.0009 mg/kg·day published on December 31, 1998 by USEPA's National Center for Environmental Assessment. USEPA cautions that this RfD is in an interim status and that a range of older provisional RfDs (0.0001 mg/kg·day to 0.0005 mg/kg·day) should be used until the interim provisional RfD is finalized. However, in reviewing the interim provisional RfD, I have found it to be based on the best scientific information available to date and therefore more scientifically-defensible than the older provisional RfDs. Numerous toxicologists from other agencies I have consulted on the matter concur. Please note that we fully expect that the interim provisional RfD published by USEPA will change once the final review currently ongoing is complete (tentatively at the end of this year). In any event, the general concensus is that the interim provisional RfD is conservative and is not expected to change drastically in either direction. Given the interim status of the RfD, the action level we are deriving should also be considered interim and subject to change when more data become available.

Please note that, based on perchlorate's mechanism of toxicity, we would expect children to be the most susceptible subpopulation. Therefore, we are using child exposure factors (0.64 L/day ingestion rate, 15 kg body weight) rather than adult exposure factors (2 L/day ingestion rate, 70 kg body weight) to calculate the interim action level for perchlorate.

Also note that in developing the interim action level for perchlorate, we considered other perchlorate action levels that are being used in other states. One such value being used in California, 18 μg/L, is based on the older provisional RfD of 0.0005 mg/kg·day and uses adult

exposure factors. Another value used in Nevada, 32 μg/L, is based on the interim provisional RfD of 0.0009 mg/kg·day and also uses adult exposure factors. Again, we are confident that the interim action level of 22 μg/L which was developed using the interim provisional RfD and child exposure factors is the most appropriate and scientifically-defensible.

If you have any questions, please call me at extension 1793.

Distribution:

Ken Peterson, Water Administration, MC-145
Leigh Ing, Waste Administration, MC-122
Sally Gutierrez, Water Administration, MC-150
Mike Cowan, Water Administration, MC-145
James Davenport, Standards and Assessment, MC-150
Dan Wittliff, Chief Engineer, MC-110
Ata ur Rahman, Corrective Action, MC-127
James Sher, Remediation, MC-143
Wade Stone, Remediation, MC-143
Barbara Daywood, Remediation, MC-225
Paul Bruckwicki, Region 5, MC-R5
Ken May, Public Drinking Water, MC-155
Michael Pfeil, Standards and Assessment, MC-150
Vickie Reat, Remediation Technical Support, MC-225
Scott Crouch, Remediation Technical Support, MC-221
Allison Woodall, Clean Rivers Program, MC-150
Patricia Wise, Clean Rivers Program, MC-150
Mark Arthur, Corrective Action, MC-127

FACT SHEET FOR DEVELOPMENT OF EFFLUENT LIMITATIONS
LHAAP - Perchlorate

General

Discharge Route - to Harrison Bayou (intermittent stream with perennial pools) thence to Caddo Lake, Stream Segment No. 0401 of the Cypress Creek Basin.

Segment 0401 uses - Contact Recreation, High Aquatic Life Use, and Public Water Supply.

Mixing Zone - There is no mixing zone established for this discharge to an intermittent stream. Acute toxic criteria apply at the point of discharge. Human health criteria are, however, applied at the point where the discharge reaches Caddo Lake. A mixing zone of 200 feet, and an effluent concentration of 8 % at the edge of that mixing zone, are utilized in calculation of human health-based effluent limitations.

Human Health Criteria - 0.22 parts per billion perchlorate, 100% availability

Aquatic Life Protection - Review of biomonitoring tests indicate that there will be no adverse effect to aquatic life in the receiving waters if effluent is treated to levels established for the protection of human health.

Calculation of Effluent Limitations *

22 ppb ÷ [(1) (.08)] = 275 as a WLA **

LTA*** = (0.93) (WLA)
LTA = (0.93) (275) = 255.7

Daily Average Effluent Limitation = (255.7) (1.47) = 375 parts per billion
Daily Maximum Effluent Limitation = (255.7) (3.11) = 795 parts per billion

* For a detailed description of the procedure for calculation of effluent limitations refer to "Implementation of the Texas Natural Resource Conservation Commission Standards Via Permitting," August 23, 1995.

** Waste Load Allocation

*** Long Term Average

Perchlorate Sampling Results
Groundwater/Surface Water
April/May 1999

On 1 April 1999, one water sample was collected from the effluent of the contaminated groundwater treatment plant at Burning Ground No. 3. That water sampling point was identified as LHGWTP-1. That water sample was taken from a faucet on the inlet side of the effluent holding tank. The analytical result is listed in the Table 1.

In response to the analytical result of the previously mentioned sample, groundwater and surface water samples were collected 28 April 1999 for perchlorate analysis. Groundwater samples were collected at three locations at the Burning Ground No. 3 contaminated groundwater treatment plant and at three locations on Harrison Bayou. The sampling results and locations are listed in the table below. Figure 1 shows illustrates the location of the Harrison Bayou sampling points.

At the contaminated groundwater treatment plant, field, quality control and quality assurance samples were collected at sampling location LHGWTP-1. Field and quality control samples were sent to APPL Inc for analysis. The quality assurance sample was submitted to CLS Laboratory for analysis.

From Harrison Bayou, duplicate samples were taken at each location. One set of samples was submitted to APPL Inc and the other sample was submitted CLS Laboratory. At location HBW5, a quality assurance sample was collected and submitted with the duplicate sample sent to CLS Laboratory. Radian International recorded the flow in Harrison Bayou on 28 April 1999 to be 3.40 cfs (1526.0 gpm) at the outfall location.

On 13 May 1999, groundwater was sampled from separate points along the extraction system to determine the variation in perchlorate influent concentrations and effluent concentrations. Groundwater samples were collected from each of the 28 sump wells along the interceptor collector trenches. Two samples were collected from the effluent stream of the groundwater treatment plant. One of those samples was collected at location LHGWTP-1. The second effluent sample was collected from the outfall stream on Harrison Bayou and identified as sampling location LHGWTP-4. The results of that sampling round have been included in the table below. The locations of the ICT sump wells are shown in Figure 2.

Table 1. Groundwater/Surface Water Perchlorate Sampling Results (ug/L). Results from the 5/13/99 sampling event are tentative pending verification from the laboratory.

	Laboratory (Sampling Date)				
Sample ID	**APPL (4/1/99)**	**APPL (4/28/99)**	**CLS Labs (4/28/99)**	**APPL (5/13/99)**	**Sampling Location**
LHGWTP-1	10,200	14,500 / 14,400	14,000	12,200	Sample port on inlet side of GWTP treated effluent storage tank
LHGWTP-2		1,760			Sample port at Storage Tank at Site 16
LHGWTP-3		2,890			Entrance spigot from BG3 to GWTP

Sample ID	Laboratory (Sampling Date)				Sampling Location
	APPL (4/1/99)	APPL (4/28/99)	CLS Labs (4/28/99)	APPL (5/13/99)	
LHGWTP-4				7,980	Discharge pipe from GWTP at Harrison Bayou
LHGWTP-Outfall		1,410	1,500		Harrison Bayou at discharge outfall from treated effluent storage tank
HBW5		21.4	75 / 29		Harrison Bayou at sampling point HBW-5
HBW9		97.3	38		Harrison Bayou at sampling point HBW-9
ICT-1				<1	Interceptor Collector Trench Sump
ICT-2				<1	Interceptor Collector Trench Sump
ICT-3				63,900	Interceptor Collector Trench Sump
ICT-4				213,000	Interceptor Collector Trench Sump
ICT-5				18	Interceptor Collector Trench Sump
ICT-6				6,850	Interceptor Collector Trench Sump
ICT-7				<1	Interceptor Collector Trench Sump
ICT-8				18,600	Interceptor Collector Trench Sump
ICT-9				26,800	Interceptor Collector Trench Sump
ICT-10				3	Interceptor Collector Trench Sump
ICT-11				1	Interceptor Collector Trench Sump
ICT-12A				7,490	Interceptor Collector Trench Sump
ICT-12B				169,000	Interceptor Collector Trench Sump
ICT-12C				21,500	Interceptor Collector Trench Sump
ICT-12D				33,500	Interceptor Collector Trench Sump
ICT-12E				<1	Interceptor Collector Trench Sump
ICT-13A				24,000	Interceptor Collector Trench Sump
ICT-13B				1,100	Interceptor Collector Trench Sump
ICT-13C				<1	Interceptor Collector Trench Sump
ICT-13D				<1	Interceptor Collector Trench Sump
ICT-13E				13	Interceptor Collector Trench Sump
ICT-13F				5	Interceptor Collector Trench Sump
ICT-13G				<1	Interceptor Collector Trench Sump
ICT-14A				26,800	Interceptor Collector Trench Sump
ICT-14B				8,420	Interceptor Collector Trench Sump
ICT-14C				74,800	Interceptor Collector Trench Sump
ICT-14D				24,500	Interceptor Collector Trench Sump
ICT-14E				98	Interceptor Collector Trench Sump

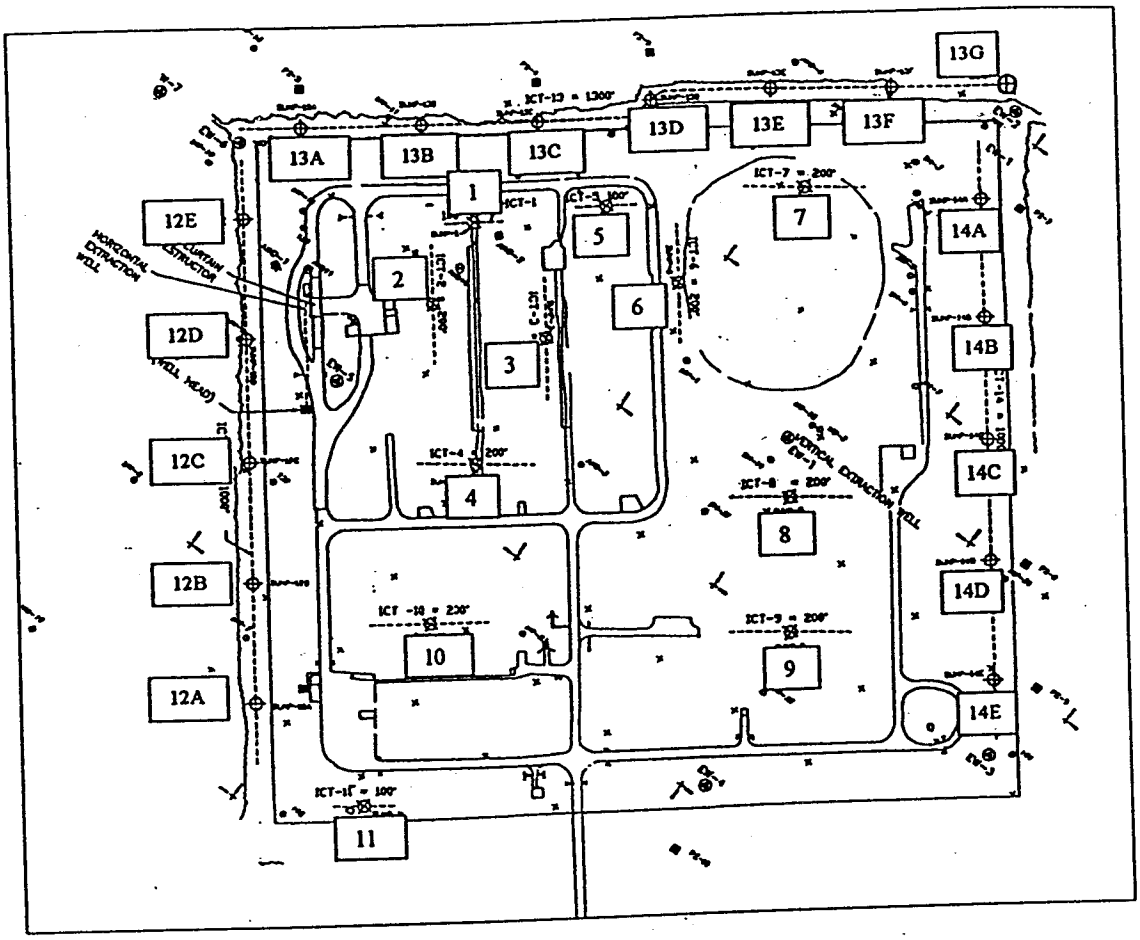

Figure 2. Burning Ground No. 3 ICT Sump Locations

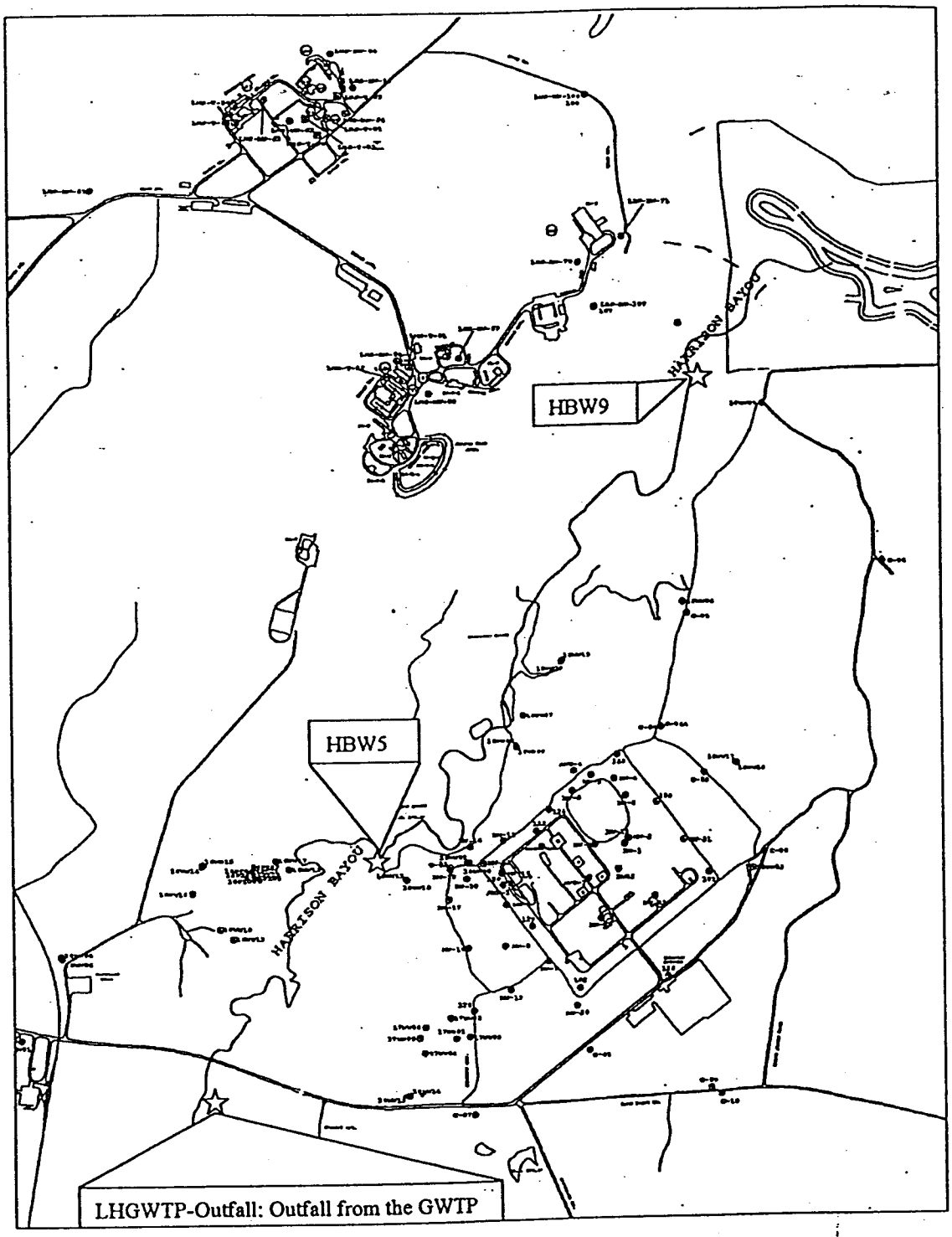

Figure 1. Harrison Bayou Perchlorate Sampling Locations

LONGHORN ARMY AMMUNITION PLANT

GOOSE PARAIRIE CREEK SAMPLING RESULTS (ppb)

	Sampling Point ID	GPW-1	GPW-2	GPW-4	GPW-5	GPW-6	GPW-9	GPW-10	GPW-12	GPW-15
	Sampling Date	10-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98
	SWD Report No.	16888-2	16888-2	16888-2	16888-2	16888-2	16888-2	16888-2	16888-2	
e	2,4,6-TNT	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	7.0	NT
e	2,4-DNT	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	NT
	2,6-DNT	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	1.3	NT
e	2-Am-DNT	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	7.5	NT
e	4-Am-DNT	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	14.7	NT
	2-Nitrotoluene							<0.25		NT
e	4-Nitrotoluene	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	NT
e	HMX	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	NT
e	RDX	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	NT
s	Diethylphthalate	NT	NT	NT	NT	NT	NT	NT	NT	NT
v01	1,2,4-Trichlorobenzene	<1	<1	<1	<1	<1	<1	<1	<1	NT
v02	4-Isopropyltoluene	<1	<1	<1	<1	<1	<1	<1	<1	NT
v03	Bromodichloromethane	<1	<1	<1	<1	<1	<1	2.4	<1	NT
v04	Chloroform	<1	2.6	1.3	1.0	<1	<1	4.6	<1	NT
v05	cis-1,2-Dichloroethene	<1	1.1	<1	<1	<1	<1	<1	<1	NT
v06	Dibromochloromethane	<1	<1	<1	<1	<1	<1	<1	<1	NT
v07	Methylene Chloride	<1	<1	<1	<1	<1	<1	<1	<1	NT
v08	Tetrachloroethene	<1	<1	<1	<1	<1	<1	<1	<1	NT
v09	Trichloroethene	<1	12.1	3.9	3.0	2.6	<1	<1	<1	NT
v10	Vinyl Chloride	<1	<1	<1	<1	<1	<1	<1	<1	NT
	Perchlorate	6.8	190	180	200	210	11	460	12	11,000
	Toluene			<1	<1	<1	<1	<1	<1	NT

NT= Not tested.

GPC-1 On Goose Prairie Creek, immediately upstream from bridge on Crocket Ave
GPC-2 On Goose Prairie Creek, immediately upstream from bridge on Karnack Ave
GPC-3 On Goose Prairie Creek, approximately halfway between Karnack Ave and 59th Street.
GPC-4 On Goose Prairie Creek, downstream from 59th Street. Accessed from Marshall Ave.
GPC-5 On Goose Prairie Creek, accessed from trail extending northwest from magazine area.
GPC-6 On Goose Prairie Creek, accessed from trail extending northwest from magazine area.
GPC-7 On tributary of Goose Prairie Creek, immediately upstream of bridge on Ave "P".
GPC-8 On Goose Prairie Creek, immediately upstream from bridge on Ave "P".
GPC-9 On Goose Prairie Creek, at Plant boundary. Sampling point normally surrounded by water extending at least100' in all directions. Accessed from trail extending northwest from magazine area.
GPC-10 At outfall of water treatment plant (sewage).
GPC-11 East of Independence Ave. in ditch of intermittent tributary east of building 32-H at corner of 55th Street and Independence Ave.
GPC-12 On tributary upstream of sampling point no. 7 east of Ave "D".
GPC-13 Water sample taken from impounded area west of building 32-H.
GPC-14 Drainage point for water flowing from production area downstream from sampling point no. 11 immediately prior to flowing into Goose upstream from sampling point no. 2.
GPC-15 Surface runoff southeast of Building 25-C sampled during a heavy rain .

024611

DEPARTMENT OF THE ARMY
ASSISTANT CHIEF OF STAFF FOR INSTALLATION MANAGEMENT
600 ARMY PENTAGON
WASHINGTON DC 20310-0600

REPLY TO ATTENTION OF

30 SEP 1999

DAIM-ED (200)

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Perchlorate Sampling Interim Guidance

1. The Federal Environmental Protection Agency (EPA) placed Perchlorate on a Contaminant Candidate List (CCL) as a substance requiring more scientific research to determine if Perchlorate requires regulation. States, such as California, Texas, and Nevada have set provisional action levels (which are not promulgated) and requested that DoD installations sample groundwater.

2. The enclosed guidance provides Army installations identified as users of Perchlorate and that may have caused groundwater exposure as a result of their usage of Perchlorate, the authority to engage in voluntary sampling. ER,A and BRAC funds are an appropriate source of funds, when sampling supports Army programs as stated in the enclosed guidance (see enclosed).

3. The point of contact in this office is Mr. Jewel A. Simmons (703) 693-0679, facsimile (703) 697-0338 or email simmoja@hqda.army.mil.

FOR THE ASSISTANT CHIEF OF STAFF FOR INSTALLATION MANAGEMENT:

Richard L. Freeman

RICHARD L. FREEMAN
Colonel, GS
Director, Environmental Programs

Encl

CF:
DASA(ESOH)
SFIM-AEC-R
DAJA-EL
SAGC
BRACO
AEC-OC

OPTIONAL FORM 99 (7-90) 10-6-99
FAX TRANSMITTAL # of pages ▸ 3

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Billy Murphy	Cyril Onewokse
Dept./Agency	Phone #
Fax #	Fax #

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024612

DAIM-ED (200)
SUBJECT: Perchlorate Sampling Interim Guidance

DISTRIBUTION:
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U.S. ARMY, PACIFIC, ATTN: APEN-EV, FORT SHAFTER, HI 96858-5100
U.S. ARMY CORPS OF ENGINEERS, ATTN: CEMP-R, 20 MASSACHUSETTS AVENUE, NW., WASHINGTON, DC 20314-1000
U.S. ARMY ENVIRONMENTAL CENTER, ATTN: SFIM-AEC-ER, ABERDEEN PROVING GROUND, MD 21010-5401
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U.S. ARMY MILITARY DISTRICT OF WASHINGTON, ATTN: ANEN-ES, BLDG. 42, FORT LESLEY J. MCNAIR, WASHINGTON, DC 20319-5050
U.S. ARMY TRAINING AND DOCTRINE COMMAND, ATTN: ATBO-SE, FORT MONROE, VA 23651-5000
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U.S. ARMY CRIMINAL INVESTIGATION COMMAND, 5611 COLUMBIA PIKE, FALLS CHURCH, VA 22041-5015
U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE ATTN: MCHB-ME-A, ABERDEEN PROVING GROUND, MD 21010-5422
U.S. ARMY RESERVE COMMAND, ATTN: AFRC-ENS-ER, 3800 NORTH CAMP CREEK PARKWAY, SW., ATLANTA, GA 30331-5099

DEPUTY COMMANDER, U.S. ARMY SPACE AND STRATEGIC DEFENSE COMMAND, ATTN: CSSD-EN-V, P.O. BOX 1500, HUNTSVILLE, AL 35807-3801
DIRECTOR, U.S. ARMY CENTER FOR PUBLIC WORKS, ATTN: CECPW-FU-S 7701 TELEGRAPH ROAD, ALEXANDRIA, VA 22310-3862

CHIEF, NATIONAL GUARD BUREAU, ATTN: NGB-ARE-ER, 111 S. GEORGE MASON DRIVE, ARLINGTON, VA 22204-1382

SUPERINTENDENT, U.S. MILITARY ACADEMY, ATTN: MAEN-EV, WEST POINT, NY 10966-1592

024613

Perchlorate Sampling Interim Guidance

1. **Purpose:** This interim guidance alerts installations that EPA and/or State regulators may request sampling of the chemical substance, Perchlorate. Presently, there is no promulgated standard for Perchlorate. Interim standards or action levels have been proposed, but these are not consistent. DoD is working with the EPA, State officials and health scientists to determine whether standards for Perchlorate are warranted.

2. **Guidance:** Army installations with a history of perchlorate use or operations may engage in voluntary sampling. Environmental restoration ER,A, BRAC and FUDS funds are an appropriate source of funds for Perchlorate sampling, if sampling occurs at ER,A, BRAC or FUDS eligible sites and data collected is relevant to the Army's environmental restoration program. Consequently, if an installation or Army agency is asked to sample for Perchlorate, it should first contact its MACOM, or equivalent authorities, to ensure a sensible, consistent response. The US Army Environmental Center (USAEC), Environmental Restoration Division will serve as the Army technical point of contact to assist MACOMs and Army installations.

Army installations engaging in sampling under this guidance should work closely with state regulators to determine which provisional standards are legally enforceable to protect human health and the environment until a national or state standard has been promulgated.

This guidance will remain in effect until final national or state perchlorate standards are promulgated.

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

October 7, 1999

Jacqueline S. Hardee, P.E.
Director
Remediation Division
Texas Natural Resource Conservation Commission
12100 Park 35 Circle
Bldg. D.
Austin, Texas 78753

Re: Longhorn Army Ammunition Plant
Notice of Dispute Regarding Immediate and Specific Actions for Perchlorate

Dear Ms. Hardee:

We are in receipt of your letter dated September 27, 1999, in which the Texas Natural Resource Conservation Commission (TNRCC) invoked the dispute resolution provisions of the Federal Facility Agreement (FFA) between the Environmental Protection Agency (EPA), the Department of the Army (Army), and the State of Texas relating to the Longhorn Army Ammunition Plant (Site). The letter raises a number of issues that EPA believes must be clarified before elevation of the dispute to the Dispute Resolution Committee (DRC).

The first issues that need clarification regard the application of the provisions of the FFA to this dispute. Under the terms of the FFA, the investigation of the Site, the selection of response actions for the Site, and the implementation of response actions at the Site are carried out pursuant to a series of documents referred in the FFA as "reports" which are prepared by the Army and approved by EPA and TNRCC. Among these reports, for example, are the Remedial Investigation/Feasibility Study Work Plan, the Risk Assessment, the Record of Decision, and the Remedial Action Work Plan (Section VIII. CONSULTATION WITH EPA AND TWC, Subsection C. Primary Reports). Generally, if a party seeks work not provided for in the reports, the FFA provides for that party to seek modification of a report (Section VIII. CONSULTATION WITH EPA AND TWC, Subsection J. Subsequent Modification of Final Reports) or the preparation of supplemental reports (Section XX. ASSESSMENT AND SELECTION OF SUPPLEMENTAL RESPONSE ACTIONS). TNRCC's letter does not specify whether TNRCC is seeking the modification of an existing report or the preparation of supplemental reports. It appears that the actions being sought by TNRCC may fall into both categories. We request that TNRCC identify what provision of the FFA it is relying on in seeking the proposed work and, if it is seeking modifications to existing reports, the identification of the reports to be modified and the modification to be made.

The second set of issues that need clarification regard the legal theories TNRCC is relying on to support its position that the work it is seeking should be done. For example, it is unclear if TNRCC is asserting that applicable or relevant and appropriate requirements apply or if some other legal basis exists for requiring the work. We request that TNRCC provide a more detailed explanation of its legal theory, including citations to the specific regulatory or statutory provisions it believes provide the bases for requiring the work TNRCC is seeking.

It is EPA's position that until the information requested above has been provided, this dispute is not ripe for consideration by the DRC and that the time period for DRC action has not begun to run. As a practical matter, because of the complexity of the issues raised in TNRCC's letter and the rapid schedule for elevation of the dispute set forth in the FFA, we believe strongly that the record on which this dispute will turn should be developed more completely and that the issues should be defined more clearly at the Project Manager level prior to elevation of the dispute to the DRC. To that end, EPA is committed to making its Project Manager and his first line supervisor, as well as EPA's attorney in this matter available for an intensive effort to resolve this matter or, if necessary, distill the issues and develop the record for elevation to the DRC. If this effort is to be successful, of course, it will require a similar commitment from the Army, as well as EPA and the TNRCC.

If you have any questions, please call me at (214) 665-6701.

Sincerely yours,

Myron O. Knudson, P.E.
Director
Superfund Division

cc: Mr. James A. McPherson
Commander's Representative
Longhorn/Louisiana Army Ammunition Plant

CDRXO-Longhorn-Louisiana AAP

From: CDRXO-Longhorn-Louisiana AAP
Sent: Thursday, October 07, 1999 8:42 AM
To: Woodhouse, Paul H
Subject: Environmental Issue

The superfund clean-up section of TNRCC advised that our offer would probably be accepted. However, their Water and Toxicology sections convinced the Director of Remediation to reject our offer. TNRCC wants to see us concentrate on complying with their Perchlorate standard at BG-3. They want us to present them a firm schedule as to when we will come into compliance.

They seem to be caught between the devil and deep blue sea. Currently our treatment facility at BG-3 is in compliance, with the exception of Perchlorate. The State cannot afford to force us to shut down the plant due to the other contaminants; but, they don't want to allow us to continue to discharge perchlorate. Therefore, they want a "fix" on line as quickly as possible.

I feel the problem is coming down to risk. The five public water systems using groundwater closest to the plant has been checked with no findings. Caddo Lake has been checked with no findings. The closest public water system drawing from the lake has been tested with no finding. Our funding program depends on risks and I think TNRCC is probably reacting to politics. In other words, if they lose the dispute they can point fingers and keep the Caddo Lake environmentalist off their case.

James McPherson

DEPARTMENT OF THE ARMY
HEADQUARTERS, U.S. ARMY INDUSTRIAL OPERATIONS COMMAND
ROCK ISLAND, ILLINOIS 61299-6000

October 14, 1999

REPLY TO
ATTENTION OF
Environmental/Safety Law

SUBJECT: Longhorn Army Ammunition Plant (LHAAP)
Notification of Dispute Regarding Immediate and Specific Actions for Perchlorate

Ms. Jacqueline S. Hardee, P.E.
Texas Natural Resource Conservation Commission
Director, Remediation Division
P.O. Box 13087
Austin, Texas 78711-3087

Dear Ms. Hardee:

I regret that the tentative agreement that LHAAP, the Industrial Operations Command (IOC) and TNRCC had reached concerning perchlorate sampling at LHAAP was not acceptable to the TNRCC. It was our opinion that the tentative agreement was a fair and cost effective initial response that would allow both the IOC and the TNRCC to gather data in a systematic way so that further evaluation of the data could be performed jointly. It is still the IOC's hope that it can partner with the TNRCC to resolve this matter in a mutually satisfactory manner.

In the meantime, this letter confirms the IOC's belief that there is a stay of the dispute resolution provisions previously invoked in your October 7, 1999 letter. It is our understanding that your agency and EPA are attempting to reschedule discussions of the issues involved and that there is some disagreement about the some of the procedural aspects of the dispute process. Therefore, members of LHAAP and the IOC do not plan to meet formally at this time with EPA and the TNRCC as part of the dispute resolution process.

However, the IOC remains committed to resolution of the substantive issues involved regardless of the procedural issues involved. Perhaps it would be possible to discuss some of these issues informally at the meeting

with the LHAAP stakeholders October 18-20, 1999, in San Antonio, TX. The IOC and LHAAP are willing to meet with members of your agency at any time to discuss these matters.

Sincerely,

DENNIS L. BATES
Chief, Environmental/Safety
Law

CF:
Cdr, LHAAP, ATTN: SIOLL-CR (Mr. James McPherson)
AMSIO-MAI-I (Mr. Paul Woodhouse)
AMSIO-MAI-E (Mr. Henry Crain)

024619

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

November 4, 1999

VIA E-MAIL, FAX AND MAIL

James A. McPherson, Commander's Representative
Longhorn/Louisiana Army Ammunition Plant
Attn: SIOLH-CR
P.O. Box 658
Doyline, LA 71023-0658

Re: Longhorn Army Ammunition Plant (LHAAP)
Data and Document Availability

Dear Mr. McPherson:

Upon review of our records for the LHAAP site the Texas Natural Resource Conservation Commission (TNRCC) has identified the following project data and documents pertaining to perchlorate, which are enclosed with this letter:

- Enclosure A: Groundwater/Surface water from groundwater treatment plant/Harrison Bayou for 4/1/99, 4/28/99, and 5/13/99.
- Enclosure B: Soil Sampling around building 25-C on 8/19/98 and 3/22/99
- Enclosure C: Groundwater data for LHS-MW-60, and LHS-MW-53 on 10/22/98
- Enclosure D: Storm Water Runoff and Surface Water from Goose Prairie Creek for 2/10/98 and 7/8/99.
- Enclosure E: List of areas where perchlorate has historically been handled.

The TNRCC requests LHAAP provide all additional data or documents pertaining to perchlorate at LHAAP which are not listed above. If any data or documents are withheld please identify them and provide the basis for withholding them. The TNRCC makes this request in accordance with the Federal Facility Agreement Section XII Part A, dated December 30, 1991. Please provide a response by November 19th, 1999.

024620

Your prompt response to this matter will be greatly appreciated.

Sincerely,

James S.H. Sher, P.E., Project Manager
Superfund Cleanup Section

RC/JS/mmw

Enclosure

cc: Chris Villarreal, EPA Region 6 (6SF-AP)

bcc: David Cooney

ENCLOSURE A

Perchlorate Sampling Results
Groundwater/Surface Water
April/May 1999

On **1 April 1999**, one water sample was collected from the effluent of the contaminated groundwater treatment plant at Burning Ground No. 3. That water sampling point was identified as LHGWTP-1. That water sample was taken from a faucet on the inlet side of the effluent holding tank. The analytical result is listed in the Table 1.

In response to the analytical result of the previously mentioned sample, groundwater and surface water samples were collected **28 April 1999** for perchlorate analysis. Groundwater samples were collected at three locations at the Burning Ground No. 3 contaminated groundwater treatment plant and at three locations on Harrison Bayou. The sampling results and locations are listed in the table below. Figure 1 shows illustrates the location of the Harrison Bayou sampling points.

At the contaminated groundwater treatment plant, field, quality control and quality assurance samples were collected at sampling location LHGWTP-1. Field and quality control samples were sent to APPL Inc for analysis. The quality assurance sample was submitted to CLS Laboratory for analysis.

From Harrison Bayou, duplicate samples were taken at each location. One set of samples was submitted to APPL Inc and the other sample was submitted CLS Laboratory. At location HBW5, a quality assurance sample was collected and submitted with the duplicate sample sent to CLS Laboratory. Radian International recorded the flow in Harrison Bayou on 28 April 1999 to be 3.40 cfs (1526.0 gpm) at the outfall location.

On **13 May 1999**, groundwater was sampled from separate points along the extraction system to determine the variation in perchlorate influent concentrations and effluent concentrations. Groundwater samples were collected from each of the 28 sump wells along the interceptor collector trenches. Two samples were collected from the effluent stream of the groundwater treatment plant. One of those samples was collected at location LHGWTP-1. The second effluent sample was collected from the outfall stream on Harrison Bayou and identified as sampling location LHGWTP-4. The results of that sampling round have been included in the table below. The locations of the ICT sump wells are shown in Figure 2.

Table 1. Groundwater/Surface Water Perchlorate Sampling Results (ug/L). Results from the 5/13/99 sampling event are tentative pending verification from the laboratory.

	Laboratory (Sampling Date)				
Sample ID	**APPL (4/1/99)**	**APPL (4/28/99)**	**CLS Labs (4/28/99)**	**APPL (5/13/99)**	**Sampling Location**
LHGWTP-1	10,200	14,500 / 14,400	14,000	12,200	Sample port on inlet side of GWTP treated effluent storage tank
LHGWTP-2		1,760			Sample port at Storage Tank at Site 16
LHGWTP-3		2,890			Entrance spigot from BG3 to GWTP

024624

Sample ID	Laboratory (Sampling Date)				Sampling Location
	APPL (4/1/99)	APPL (4/28/99)	CLS Labs (4/28/99)	APPL (5/13/99)	
LHGWTP-4				7,980	Discharge pipe from GWTP at Harrison Bayou
LHGWTP-Outfall		1,410	1,500		Harrison Bayou at discharge outfall from treated effluent storage tank
HBW5		21.4	75 / 29		Harrison Bayou at sampling point HBW-5
HBW9		97.3	38		Harrison Bayou at sampling point HBW-9
ICT-1				<1	Interceptor Collector Trench Sump
ICT-2				<1	Interceptor Collector Trench Sump
ICT-3				63,900	Interceptor Collector Trench Sump
ICT-4				213,000	Interceptor Collector Trench Sump
ICT-5				18	Interceptor Collector Trench Sump
ICT-6				6,850	Interceptor Collector Trench Sump
ICT-7				<1	Interceptor Collector Trench Sump
ICT-8				18,600	Interceptor Collector Trench Sump
ICT-9				26,800	Interceptor Collector Trench Sump
ICT-10				3	Interceptor Collector Trench Sump
ICT-11				1	Interceptor Collector Trench Sump
ICT-12A				7,490	Interceptor Collector Trench Sump
ICT-12B				169,000	Interceptor Collector Trench Sump
ICT-12C				21,500	Interceptor Collector Trench Sump
ICT-12D				33,500	Interceptor Collector Trench Sump
ICT-12E				<1	Interceptor Collector Trench Sump
ICT-13A				24,000	Interceptor Collector Trench Sump
ICT-13B				1,100	Interceptor Collector Trench Sump
ICT-13C				<1	Interceptor Collector Trench Sump
ICT-13D				<1	Interceptor Collector Trench Sump
ICT-13E				13	Interceptor Collector Trench Sump
ICT-13F				5	Interceptor Collector Trench Sump
ICT-13G				<1	Interceptor Collector Trench Sump
ICT-14A				26,800	Interceptor Collector Trench Sump
ICT-14B				8,420	Interceptor Collector Trench Sump
ICT-14C				74,800	Interceptor Collector Trench Sump
ICT-14D				24,500	Interceptor Collector Trench Sump
ICT-14E				98	Interceptor Collector Trench Sump

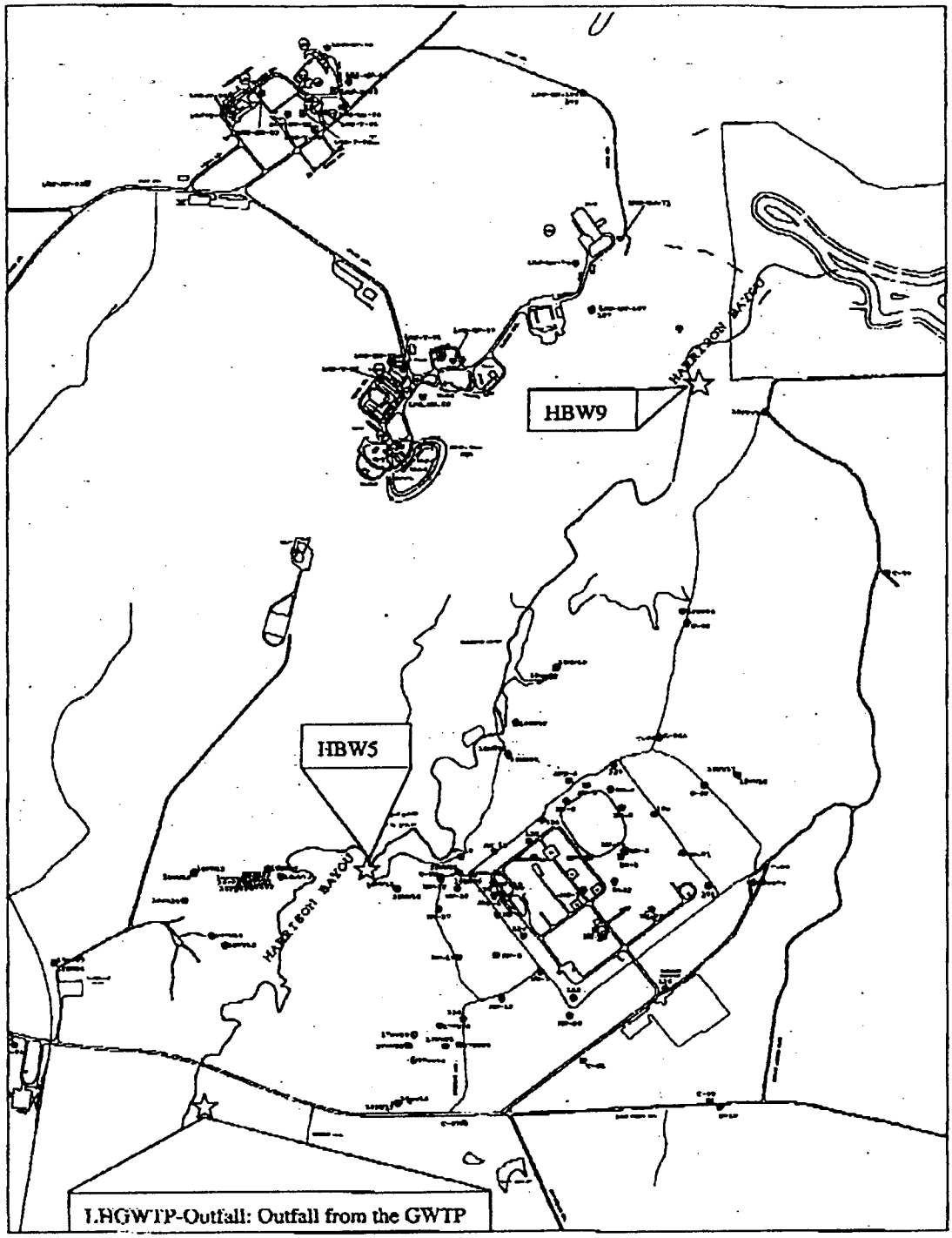


Figure 1. Harrison Bayou Perchlorate Sampling Locations

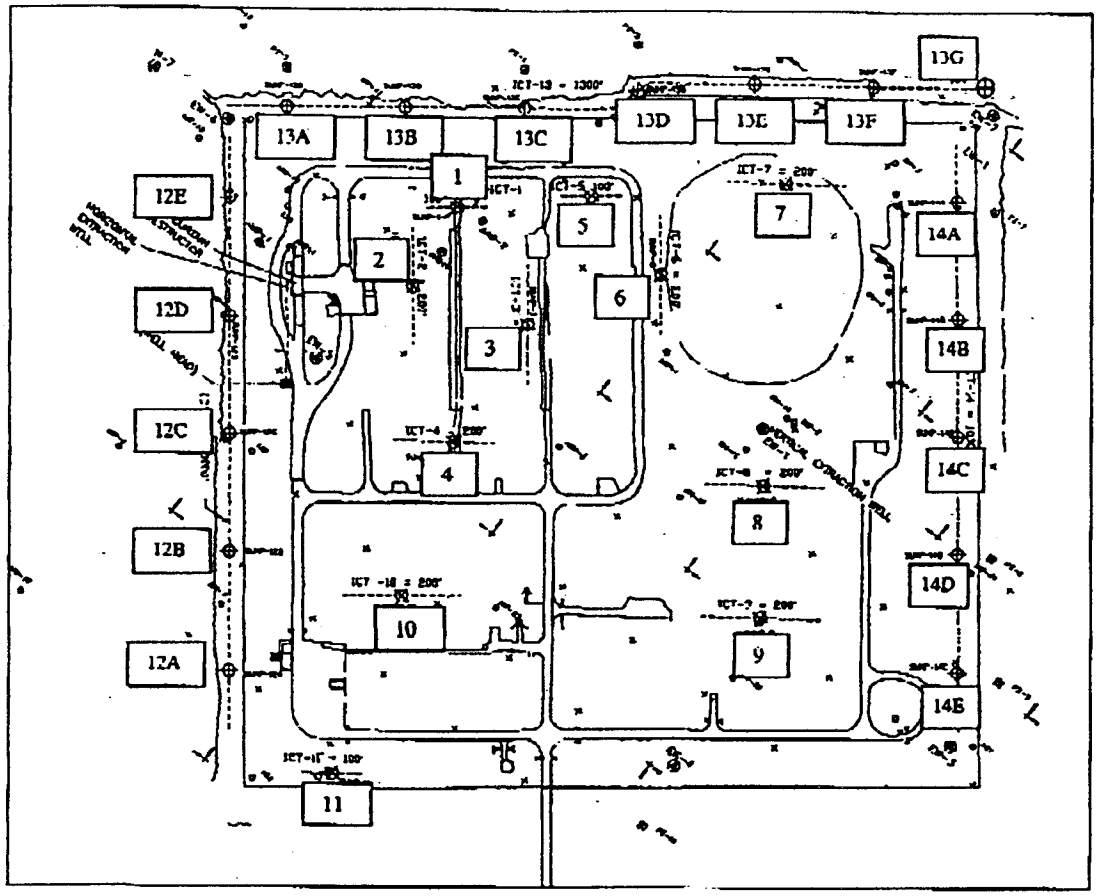
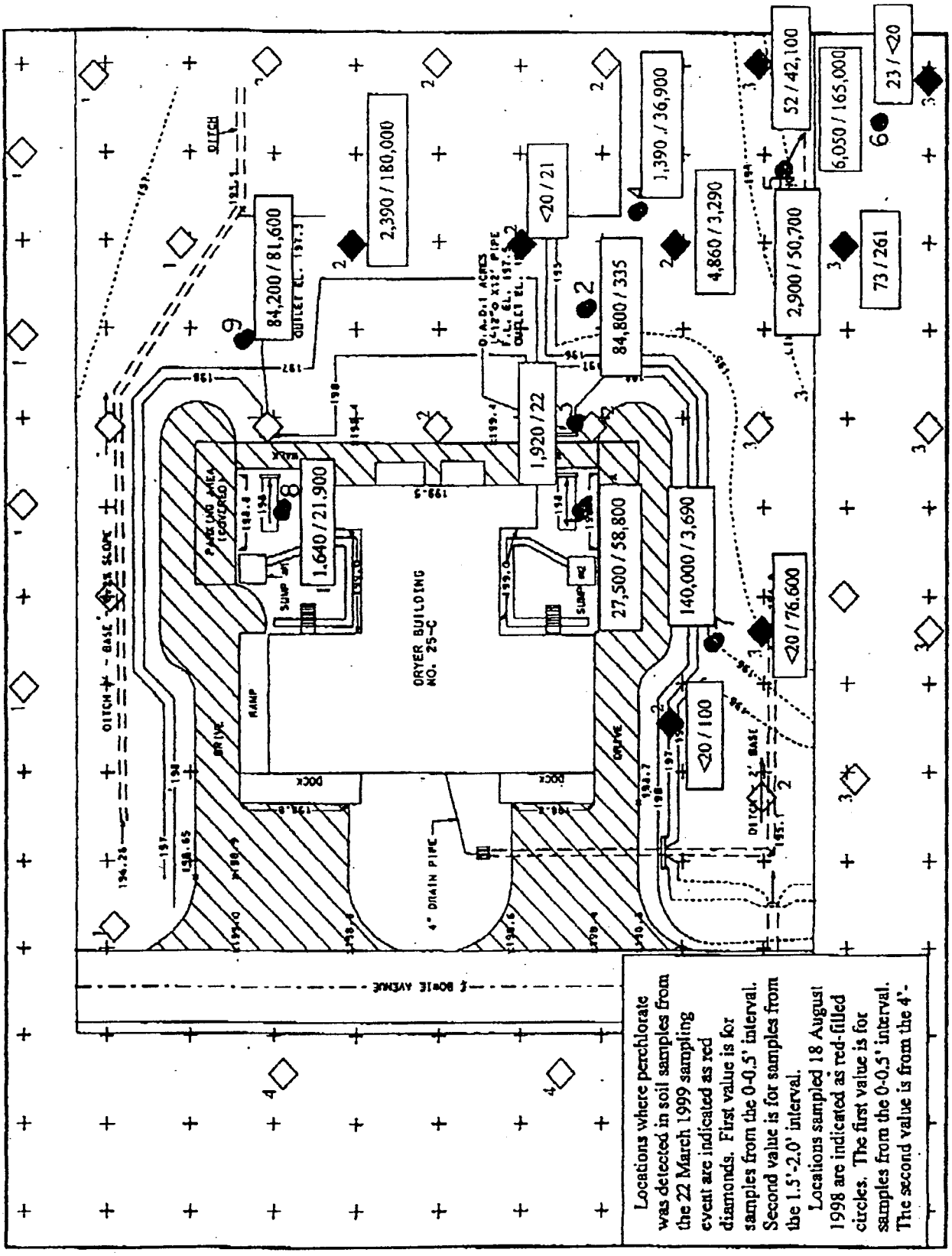


Figure 2. Burning Ground No. 3 ICT Sump Locations

ENCLOSURE B

024628



SCALE IN FEET

INFORMATION TAKEN FROM BUILDING 25-C CONSTRUCTION DRAWINGS - APRIL 2, 1954

GRID - 50' INCREMENTS

Longhorn Army Ammunition Plant
Building 25-C
Perchlorate Results (ug/kg)
Sampled 18 August 1998

Sampling Depths (ft)	Sampling Location								
	25C1	25C2	25C3	25C4	25C5	25C6	25C7	25C8	25C9
0-0.5'	27,500	84,800	1,920	1,390	2,900	6,050/ 5,880 QC/ 11,000 QA	140,000	1,640	84,200
4'-5'	58,800	335	22.1/ 23.1QC/ <40QA	36,900	50,700	165,000	3,690	21,900	81,600
9'-10'	10,700	5,720	12,300	3,570	15,200	118,000	2,310	14,400	8,090

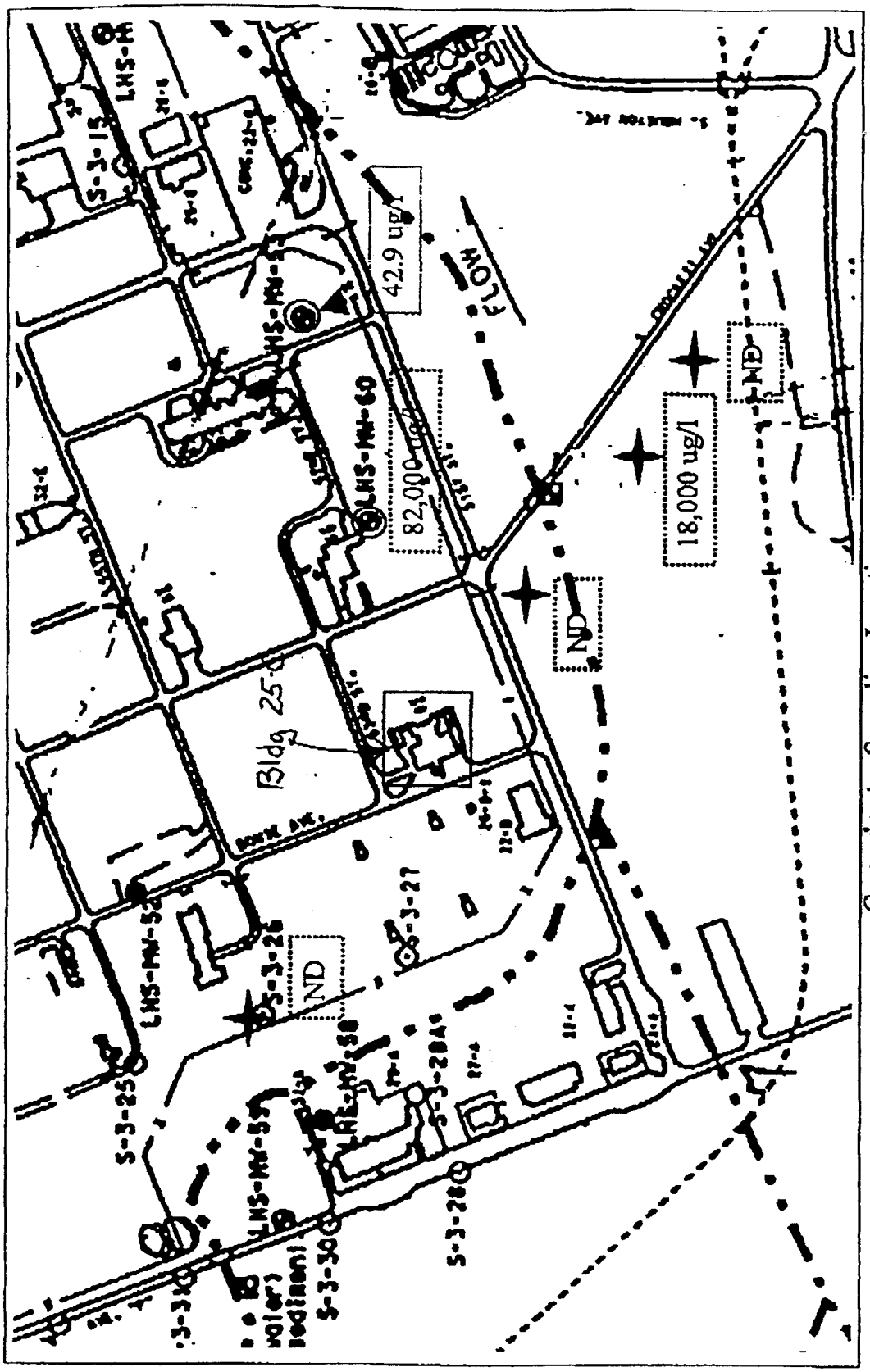
Sample Description

Sampling Depths (ft)	Sampling Location								
	25C1	25C2	25C3	25C4	25C5	25C6	25C7	25C8	25C9
0-0.5'	Yellow Brown silty Sand	Tan silty Sand	Yellow Brown/ Gray silty Sand	Light Brown silty Sand	Brown Silty Sand	Yellow Brown silty Sand	Brown Sand	Mixed Sand/ Gravel	Yellow Brown silty Sand
4'-5'	Gray-red stiff Clay	Gray clayey Sand	Gray clayey silty Sand (wet)	Gray silty Sand	Mottled Brown/ Gray clayey silty Sand	Gray silty Sand	Gray silty Sand w/dk brown woody type fiber mixed	Brown Gray silty Sand	Mottled Brown/ Gray silty Sand
9'-10'	Gray clayey Sand (moist)	Yellow Brown clayey Sand (wet)	Brown Sand (wet)	Gray claycy Sand	Gray/Brown clayey Sand	Gray silty Sand	Brown silty Sand (wet)	Gray silty Sand	Gray silty Sand

Longhorn Army Ammunition Plant
Building 25-C
Soil Perchlorate Results
Sampled week of March 22, 1999

	Results = ug/kg		QC Results		QA Results	
Sample Location	0-0.5'	1.5'-2.0'	0-0.5'	1.5'-2.0'	0-0.5'	1.5'-2.0'
25C-10	<20	<20				
25C-11	<20	<20				
25C-12	<20	<20				
25C-13	<20	<20				
25C-14	<20	<20				
25C-15	<20	<20				
25C-16	<20	<20				
25C-17	<20	<20	<20		<40	
25C-18	<20	<20				
25C-19	<20	<20				
25C-20	<20	<20				
25C-21	2,390	180,000		17,600		160,000
25C-22	<20	<20				
25C-23	<20	<20				
25C-24	<20	21.1				
25C-25	<20	<20				
25C-26	<20	<20				
25C-27	<20	100				
25C-28	4,860	3,290				
25C-29	<20	<20				
25C-30	<20	76,600	<20		<40	
25C-31	<20	<20				
25C-32	52	42,100				
25C-33	<20	<20				
25C-34	<20	<20				
25C-35	73	261		401		250
25C-36	<20	<20				
25C-37	<20	<20				
25C-38	23	<20				
25C-39	45	20				
25C-40	<20	<20				
25C-41	<20	<20		<20		<40
25C-42	<20	<20				
25C-43	<20	<20	<20		<40	
25C-44	<20	<20	<20		<40	

ENCLOSURE C



Groundwater Sampling Locations
Perchlorate concentration in groundwater sampled October 22, 1998

ENCLOSURE D

024634

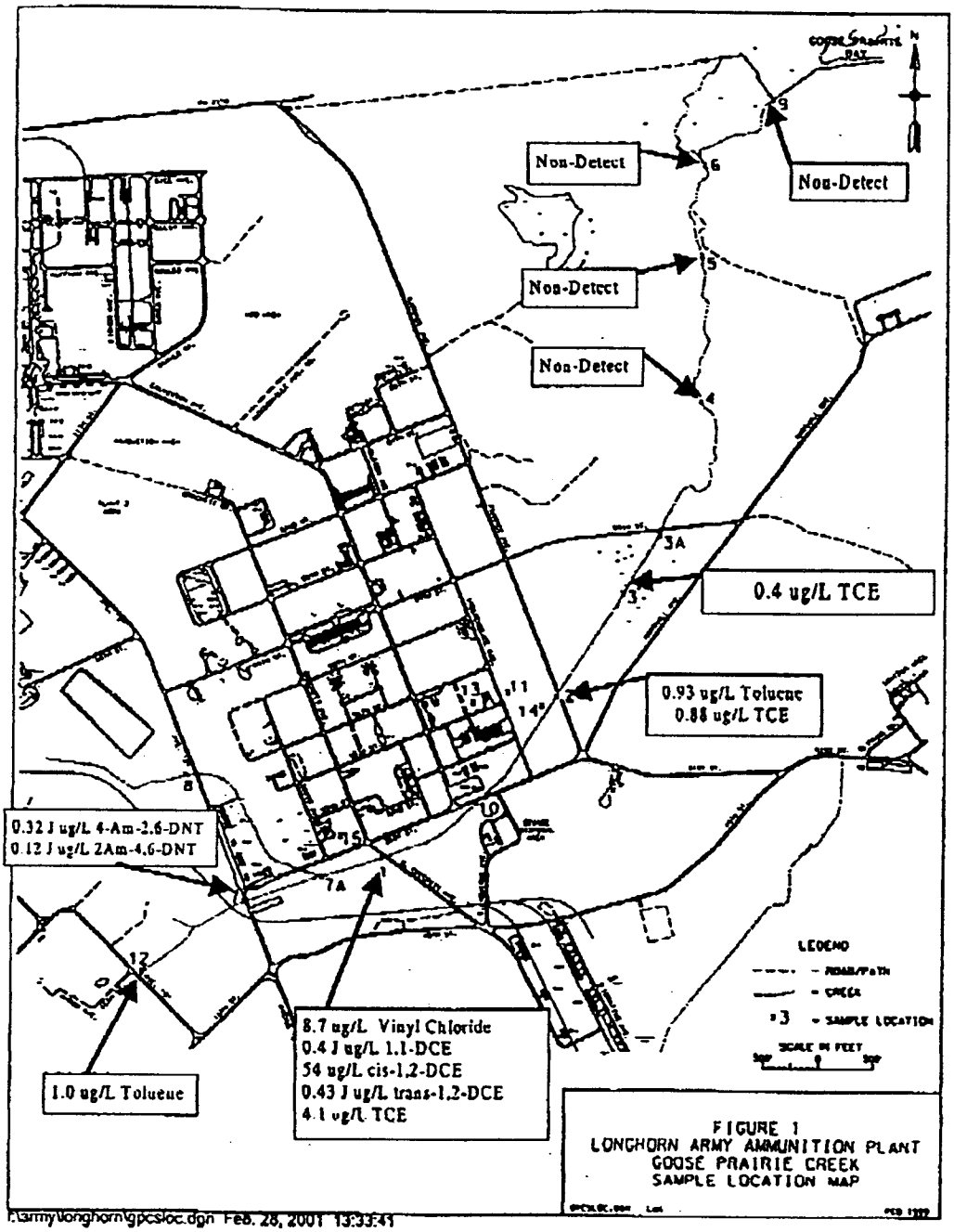
LONGHORN ARMY AMMUNITION PLANT

GOOSE PARAIRIE CREEK SAMPLING RESULTS (ppb)

	Sampling Point ID	GPW-1	GPW-2	GPW-4	GPW-5	GPW-6	GPW-9	GPW-10	GPW-12	GPW-15
	Sampling Date	10-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98
	SWD Report No.	16888-2	16888-2	16888-2	16888-2	16888-2	16888-2	16888-2	16888-2	
e	2,4,6-TNT	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	7.0	NT
e	2,4-DNT	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	NT
	2,6-DNT	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	1.3	NT
e	2-Am-DNT	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	7.5	NT
e	4-Am-DNT	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	14.7	NT
	2-Nitrotoluene							<0.25		NT
e	4-Nitrotoluene	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	NT
e	HMX	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	NT
e	RDX	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	NT
s	Diethylphthalate	NT	NT	NT	NT	NT	NT	NT	NT	NT
v01	1,2,4-Trichlorobenzene	<1	<1	<1	<1	<1	<1	<1	<1	NT
v02	4-Isopropyltoluene	<1	<1	<1	<1	<1	<1	<1	<1	NT
v03	Bromodichloromethane	<1	<1	<1	<1	<1	<1	2.4	<1	NT
v04	Chloroform	<1	2.6	1.3	1.0	<1	<1	4.6	<1	NT
v05	cis-1,2-Dichloroethene	<1	1.1	<1	<1	<1	<1	<1	<1	NT
v06	Dibromochloromethane	<1	<1	<1	<1	<1	<1	<1	<1	NT
v07	Methylene Chloride	<1	<1	<1	<1	<1	<1	<1	<1	NT
v08	Tetrachloroethene	<1	<1	<1	<1	<1	<1	<1	<1	NT
v09	Trichloroethene	<1	12.1	3.9	3.0	2.6	<1	<1	<1	NT
v10	Vinyl Chloride	<1	<1	<1	<1	<1	<1	<1	<1	NT
	Perchlorate	6.8	190	180	200	210	11	460	12	11,000
	Toluene			<1	<1	<1	<1	<1	<1	NT

NT = Not tested.

GPC-1 On Goose Prairie Creek, Immediately upstream from bridge on Crocket Ave
GPC-2 On Goose Prairie Creek, immediately upstream from bridge on Karnack Ave
GPC-3 On Goose Prairie Creek, approximately halfway between Karnack Ave and 59th Street.
GPC-4 On Goose Prairie Creek, downstream from 59th Street. Accessed from Marshall Ave.
GPC-5 On Goose Prairie Creek, accessed from trail extending northwest from magazine area.
GPC-6 On Goose Prairie Creek, accessed from trail extending northwest from magazine area.
GPC-7 On tributary of Goose Prairie Creek, immediately upstream of bridge on Ave "P".
GPC-8 On Goose Prairie Creek, immediately upstream from bridge on Ave "P".
GPC-9 On Goose Prairie Creek, at Plant boundary. Sampling point normally surrounded by water extending at least100' in all directions. Accessed from trail extending northwest from magazine area.
GPC-10 At outfall of water treatment plant (sewage).
GPC-11 East of Independence Ave. in ditch of intermittent tributary east of building 32-H at corner of 55th Street and Independence Ave.
GPC-12 On tributary upstream of sampling point no. 7 east of Ave "D".
GPC-13 Water sample taken from impounded area west of building 32-H.
GPC-14 Drainage point for water flowing from production area downstream from sampling point no. 11 immediately prior to flowing into Goose upstream from sampling point no. 2.
GPC-15 Surface runoff southeast of Building 25-C sampled during a heavy rain .


Non-Detect
Non-Detect
Non-Detect
Non-Detect
0.4 ug/L TCE
0.93 ug/L Toluene
0.88 ug/L TCE
0.32 J ug/L 4-Am-2,6-DNT
0.12 J ug/L 2Am-4,6-DNT
8.7 ug/L Vinyl Chloride
0.4 J ug/L 1,1-DCE
54 ug/L cis-1,2-DCE
0.43 J ug/L trans-1,2-DCE
4.1 ug/L TCE
1.0 ug/L Toluene
LEGEND
SAMPLE LOCATION
FIGURE 1
LONGHORN ARMY AMMUNITION PLANT
GOOSE PRAIRIE CREEK
SAMPLE LOCATION MAP
n:\army\longhorn\gpcsloc.dgn Feb. 28, 2001 13:33:41

ENCLOSURE E

024637

From: David Tolbert <d_tolbert@msn.com>
To: James Sher <JSHER@tnrcc.state.tx.us>
Date: 7/26/99 10:53pm
Subject: Fw: Perchlorate Areas on LHAAP

James
As requested in the meeting on 20 July, the process buildings involved in the production/loading of propellant follows. A/P was an ingrediant of the propellant.

Also, I have confirmed the date for the Installation Action Plan (IAP). We are scheduled to arrive in San Antonio Sunday 17 Oct. The meeting is scheduled to start at 8:00 am and will be over by noon on the 20th. Exact location will be determined later.

David

----Original Message----
From: Bill Corrigan <billr@shreve.net>
To: David Tolbert <d_tolbert@msn.com>
Cc: Paul Bechtel <paul_bechtel@radian.com>; Steve Winton <steve_winton@radian.com>; Ira Nathan <inathan@msn.com>
Date: Tuesday, July 27, 1999 9:08 AM
Subject: Perchlorate Areas on LHAAP

Listed are areas at LHAAP where there is likely some contamination from perchlorates. Grinding areas are highly likely to have contamination. Mixer buildings are less likely to have contamination, although there was surely A/P released as it was being added to the mixer. Casting buildings are less likely than the mixer building to have contamination, because the A/P was already mixed into the propellant.

There are certainly other buildings in Plant 3 that were used for casting buildings that are not listed on this list. More thorough research will be necessary to identify these buildings.

Bldg. 25-C A/P grinding facility
Bldg. 29-D A/P grinding facility prior to the use of 25-C as a grinding facility. Also used as storage of A/P.
Bldg. 25-D Blending facility to add flow agents to A/P.
Bldg. 26-E Experimental facility to mix small batches of propellant for engineering tests.
Bldg. 41-E Mixer building. 200 Gallon Baker-Perkins mixer. Used to mix Sergeant, M58's(Hawk), XM-10, XM-30's, and some Pershings.
Bldg. 42-E Mixer building. 300 gallon vertical mixer. Used to mix Sergeant, M58's, XM-10, XM-30's, and some Pershings
Bldg. 41-G Mixer building. Building destroyed after mixer explosion on January 8, 1960. After it blew, buildings 41-E and 42-E were constructed. Buildings 47-B? and 50-B used in the interim as mixer buildings.
Bldg. 42-H Mixer building. Mainly used for the Pershing motors and more recently for the M864 base burner.
Bldg. 45-E Casting building.
Bldg. 68-F Casting building.
Bldg. 50-B Mixer building. Destroyed on 13 July 1961.
Bldg. 46-N Mixer building? Planned to be used after bldg. 50-B was destroyed.
Bldg. 50-G Mixer washout building.

The first mix of live propellant was produced in plant 3 in December of 1954. Various rocket motors produced were the Falcon, Lacrosse, the second-stage sustainer units for the Nike Hercules missiles and the motors for both the single-stage Sergeant and the two-stage Pershing missle systems. Rocket motor production continued until late 1979. I'm sending you a fax of a chart listing quantities of rocket propellant produced.

Sincerely,

Bill Corrigan

024638

DEPARTMENT OF THE ARMY
HEADQUARTERS, U.S. ARMY INDUSTRIAL OPERATIONS COMMAND
ROCK ISLAND, ILLINOIS 61299-6000

REPLY TO ATTENTION OF

November 10, 1999

Ms. Jacqueline S. Hardee, P.E.
Director Remediation Division
Texas Natural Resource Conservation Commission
12100 Park 35 Circle, Bldg. D,
Austin, TX 78753

Re: Longhorn AAP (LHAAP) Meeting on Perchlorate Environmental Restoration Plan

Dear Ms. Hardee,

The Army is committed to continue its leadership role in addressing the environmental restoration activities and issues at LHAAP. We are committed to address the perchlorate issue at LHAAP with USEPA and TNRCC, at the technical and project managers' level. We should address the perchlorate issues within the framework of the LHAAP's Federal Facility Agreement (FFA), the Department of the Army's interim guidance on perchlorate and the guidance provided by the Interagency Perchlorate Steering Committee.

Request that the USEPA Region 6 and TNRCC technical project managers and your representatives meet with the LHAAP's Army environmental restoration team members on 1-2 December 1999. The meeting objective is to reach consensus on a Perchlorate Restoration Plan, to include near term schedules and integration with evolving knowledge, standards, and technologies. The Army will present a draft perchlorate restoration plan.

The meeting is scheduled to take place at the TNRCC in Austin, Texas. Location and meeting details are being finalized and will be provided separately. The proposed agenda for the meeting is enclosed.

If you have any further questions or suggestions, please call Mr. Cyril Onewokae at (309) 782-1350.

Enclosure

Sincerely,

BG Murphy

B. G. Murphy
Chief, Environmental Team

LHAAP's Perchlorate Agenda

1. Administrative/Introductory Remarks (TNRCC/LHAAP/EPA/Army)
2. Update on the interim action at building 25-C site at LHAAP (LHAAP)
3. Discuss the latest round of perchlorate sampling at LHAAP (LHAAP)
4. Summarize status of Public Health Standards Development (TNRCC/EPA)
5. Regulators' expectations for Perchlorate Restoration at LHAAP (TNRCC/EPA)
6. Presentation and discussion of the LHAAP's perchlorate restoration plan (HQ IOC)
7. Other issues and the scheduling of the next meeting (ALL)
8. Adjourn meeting

Note: Meeting facilitator - Mr. James McPherson, Commander's Representative, LHAAP

024640

TNRCC

Protecting Texas by Reducing and Preventing Pollution

FAX TRANSMITTAL

DATE: November 17, 1999 NUMBER OF PAGES: 5

TO: Mr. David Tolbert
Lone Star Army Ammunition Plant
318/459-5112

FROM: TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
James Sher (MC-143)
Superfund Cleanup Section/Remediation Division
Phone : 512/239-2444
Fax : 512/239-2450

NOTES:

Please see attached letter

SUPERFUND CLEANUP SECTION

REMEDIATION DIVISION

024641

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

November 17, 1999

VIA FAX AND CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Myron O. Knudson, P.E., Director
Superfund Division
U.S. Environmental Protection Agency
1445 Ross Avenue
Dallas, TX 75202-2733

Re: Longhorn Army Ammunition Plant (LHAAP)

Dear Mr. Knudson:

This letter responds to your October 7, 1999, correspondence. Our interpretation of the Federal Facility Agreement (FFA) provisions under which the Texas Natural Resource Conservation Commission (TNRCC) invoked dispute resolution is clarified in this letter. It also sets out the practical and legal theories supporting TNRCC's position that the perchlorate related work outlined in our September 27, 1999, Notice of Dispute Resolution (NDR) needs to be done. This letter will advise you of the TNRCC's understanding of the current state of negotiations with the Army. Finally, this letter concludes that the Environmental Protection Agency's (EPA's) assertion that this dispute is not ripe for consideration by the Dispute Resolution Committee (DRC) is wrong, establishes a second DRC meeting date, and advises EPA of the position TNRCC will take if the Army or the EPA is unable to participate in a DRC meeting.

The TNRCC submitted its September 27, 1999, Notice of Dispute Resolution pursuant to FFA Section XV. B. (2) which provides:

> Within 30 days after . . . (2) any action which leads to or generates a dispute, the disputing party shall submit to the Dispute Resolution Committee (DRC) a written statement of dispute setting forth the nature of the dispute, the work affected by the dispute, the disputing Party's position with respect to the dispute and the technical, legal, *or* factual information the disputing party is relying upon to support its position. [Emphasis added.]

As indicated in the NDR, on September 21, 1999, the Army advised it could not obtain funding to perform TNRCC's requested perchlorate corrective action. The TNRCC determined that such notice was an "action which generate[d] a dispute", and within 30 days after receiving the Army's notice submitted to the Dispute Resolution Committee (DRC) its written statement of dispute.

Drawing from FFA Section XV. C., the TNRCC has, since July 9, 1999, engaged the Army and EPA in informal dispute resolution about the need for the Army to establish and execute a corrective action plan for perchlorate. For reasons ranging from refusal to accept perchlorate as a legitimate chemical of concern pursuant to CERCLA and the FFA, to a policy of no off-site sampling, to lack of funding, the Army as of TNRCC's September NDR had not taken any meaningful steps toward addressing perchlorate contamination at Longhorn Army Ammunition Plant (LHAAP.) Despite consistent communication between July 9, 1999, and September 27, 1999, project managers failed at informal resolution of whether, how, and when the Army will correct perchlorate contamination at LHAAP. Despite even more intense discussion since your October 7, 1999 letter, the same is still true of the most fundamental question of whether and to what degree the Army must or should treat perchlorate at LHAAP.

Your letter notes potential confusion as to the provisions of the FFA that apply to the dispute. TNRCC believes this confusion arises because the dispute applies to distinct parts of the site which are in different stages of the Superfund process. One part of the site in dispute (and TNRCC's priority) includes the groundwater treatment plant which is subject to a May, 1995, Record of Decision (ROD) For Early Interim Remedial Action at Burning Ground Number Three. The other area in dispute involves monitoring, data reporting, and delineation issues as well as a risk of stormwater runoff in the part of the site still in the RI/FS stage.

Arguably, the groundwater treatment plant issues fit into FFA Section XX, because the LHAAP perchlorate problem is an "additional release" of a "pollutant or contaminant at or from the Site" that arose "subsequent to finalization of the ROD," (FFA Section XX. A.). Perchlorate at LHAAP meets both conditions that prompt a supplemental response action. TNRCC asserts that "as a result of the release or threat of release of [the] . . . pollutant or contaminant [perchlorate] at or from the Site an additional response action is necessary and appropriate to ensure the protection of human health and the environment." (FFA Section XX. B. 1.). And the "determination is based upon information received in whole or in part by EPA following finalization of the ROD." (FFA Section Section XX. B. 2.).

On July 9, 1999, the TNRCC notified the Army and EPA in writing that a supplemental response action is necessary at LHAAP. Pursuant to FFA Section XX. C., the parties have had 45 days to reach consensus on the need for such action. By its September 3, 1999, letter, TNRCC informed the

Army of its intent to seek dispute resolution. Further following FFA Section XX. C., fourteen days passed after TNRCC so notified the Army. By September 27, 1999, the project managers failed to reach consensus and TNRCC sent its NDR.

This matter is ripe for dispute resolution under FFA Sections XV. *and* XX.

The nature of the dispute is whether, when, and how the Army will correct perchlorate releases and the potential for perchlorate releases at LHAAP. The scope of the dispute is up to the Army. As referenced above, the dispute potentially involves three categories of work: discharges from the groundwater treatment plant, the potential for stormwater discharge, and the cluster of tasks involving well monitoring, data reporting and delineation of contamination. The Army has indicated a willingness to deal with the potential for stormwater discharge, and the cluster of tasks involving well monitoring, data reporting and delineation of contamination issues but has been reluctant to embrace the groundwater treatment issues. The rest of this letter will explain the TNRCC's legal theory for requiring the work it is seeking at the groundwater treatment plant.

The TNRCC considers perchlorate a "pollutant or contaminant " as that term is defined in CERCLA and used in the FFA. Section II A. of the FFA specifically states it is:

> intended to cover the investigation, development, selection, and implementation of response actions for all releases or threatened releases of hazardous substances, contaminants, hazardous wastes, hazardous constituents, or pollutants from the Longhorn Army Ammunition Plant.

If the Army or EPA believe perchlorate is not covered by the FFA or CERCLA, then please advise TNRCC of this position immediately, and the TNRCC will commence its enforcement process under its own water quality laws.

The ROD that covers the groundwater treatment plant specifically states that water discharges to a surface body of water must satisfy the substantive requirements of the National Pollution Discharge Elimination System Program (now delegated to Texas), as codified in 40 CFR Part 125 and 30 Texas Administrative Code. Substantive provisions of 30 Texas Administrative Code provide appropriate discharge criteria for perchlorate with which TNRCC asserts the Army must comply. The TNRCC water quality regulations govern discharge limits, point of compliance, and mixing zones to which the Army must adhere when discharging the pollutant perchlorate. By this dispute resolution, the TNRCC insists the Army adhere to the criteria stated in TNRCC's September 27, 1999, NDR.

The TNRCC has been in constant contact with the LHAAP and the Army since receipt of your October 7, 1999, correspondence in a genuine effort to resolve this entire matter. The parties last

024644

spoke on November 16, 1999, and have not resolved the fundamental issues of (a) whether the Army must or should treat perchlorate at LHAAP, (b) to what level should perchlorate be treated, and,(c) what is the compliance point. The Army and TNRCC technical staff will meet December 1, 1999, to establish sampling, monitoring and treatability study criteria. However, the TNRCC will not allow further delays of this matter and hereby advises all parties that the TNRCC intends for the Dispute Resolution Committee (DRC) to convene to resolve the disputes referenced in (a). (b), and (c) above at 9:45 a.m. December 2, 1999, at the TNRCC 12100 Park 35 Circle Building "D" Room 200-33, Austin, Texas 78753.

The TNRCC will consider failure of the DRC to meet and attempt to resolve the matter by or before December 2, 1999 as failure of the DRC to unanimously resolve the dispute. The TNRCC will therefore elevate the dispute to the Senior Executive Committee level pursuant to FFA Section XV. E, at which time the senior Executive Committee will have until December 23, 1999, to unanimously resolve the dispute.

We look forward to seeing you December 2, 1999. My staff and I are available to work with you, your staff and the Army to formulate a meaningful and productive agenda for the DRC. Please feel free to call me or Mr. David Cooney at (512) 239-0455 with any questions.

Sincerely,

Jacqueline S. Hardee

Jacqueline S. Hardee, P.E., Director
Remediation Division

JSH/DC/mmw

cc: James McPherson, LHAAP
Dennis Bates, Army Industrial Operations Command
Chris Villarreal, USEPA, Region 6
Michael Barra, USEPA Region 6

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FACSIMILE TRANSMITTAL

U.S. EPA REGION 6
HAZARDOUS WASTE MANAGEMENT DIVISION
1445 ROSS AVENUE
DALLAS, TEXAS 75202-2733

TO: James A. McPherson, Commander's Representative **Longhorn/Louisiana Army Ammunition Plants**	
MACHINE NUMBER: **(318) 459-5112**	VERIFICATION NUMBER: ( )
FROM: Chris G. Villarreal **Project Manager**	
PHONE: (214) 665-6758	MAIL CODE: 6SF-AP
OFFICE: Superfund, Texas Section	
DATE: November 30, 1999	PAGES, INCLUDING COVER SHEET: 2
PLEASE NUMBER ALL PAGES	
INFORMATION FOR SENDING FACSIMILE MESSAGES	
OUR EQUIPMENT	FACSIMILE NUMBER
PANAFAX UF-766	(214) 665-6660

COMMENTS:

Re: Longhorn Army Ammunition Plant
Notification of Delegation - Bill Honker to Dispute Resolution Committee

Copies to:

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

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November 30, 1999

James S. H. Sher, P.E.
Project Manager
Texas Natural Resource Conservation Commission (MC-144)
P.O. Box 13087
Austin, Texas 78711

James A. McPherson
Commander's Representative
Longhorn/Louisiana Army Ammunition Plant
Attn: SIOLH-CR
P.O. Box 658
Doyline, Louisiana 71023

Re: Longhorn Army Ammunition Plant Dispute Resolution Proceedings

Dear Ms. Sher and Mr. McPherson:

In accordance with Section XV (Dispute Resolution), paragraph D, of the Federal Facility Agreement ("FFA") concerning the Longhorn Army Ammunition Plant, I am providing notice pursuant to Section XIV (Notification) of the FFA that I am delegating my authority as the Environmental Protection Agency's representative on the Dispute Resolution Committee ("DRC") to Bill Honker, Chief, Arkansas, Oklahoma, Texas Branch, Superfund Division, U.S. Environmental Protection Agency Region 6, for purposes of the pending DRC consideration of the disputes concerning perchlorate elevated to the DRC by the State of Texas.

If you have any questions, please contact Bill Honker at (214) 665-3187.

Sincerely,

Bill for Myron Knudson

Myron O. Knudson, P.E.
Director
Superfund Division

cc: David W. Cooney (TNRCC)
Dennis Bates (Industrial Operations Command)

Longhorn Army Ammunition Plant
Perchlorate Resolution Meeting
December 1, 1999

The following is a list of participants:

James Sher, TNRCC
Chris Villarreal, EPA
Jeff Armstrong, USAEC
Jim Daniel, USAEC
Cyril Onewokae, US Army, Industrial Operations Command
B.G. Murphy, US Army, Industrial Operations Command
James McPherson, LAAP/LHAAP
Paul Bruckwicki, TNRCC Tyler Office
Ira Nathan, LAAP/LHAAP
Stephen Ligon, TNRCC (W.W. Permits)
Wade Stone, TNRCC
David Tolbert, LHAAP
Scott Crouch, TNRCC
Cliff Murray, COE-Tulsa
Robert Custro. TNRCC

1. Mr. James Sher of the TNRCC welcomed the participants and stated the issues listed on the agenda at enclosure 1. The participants reviewed and discussed the issues listed at enclosure 1.

2. The following is the Army's position prior to this meeting. This information was used by TNRCC to develop the meeting agenda:

a. Update on the interim action at building 25-C site at LHAAP.
b. Discuss the latest round of perchlorate sampling at LHAAP.
c. Presentation and discussion of the LHAAP's perchlorate response plan

* Proposed trip to the Navy site in McGregor, Texas on 9 Dec 1999
* Characterization and additional hydrogeological work to be performed by WES
* Perchlorate risks modeling to be performed by WES
* Fate and transport modeling
* Bench scale treatability study
* RI/FS – Incorporation of perchlorate (for the groups 2 and 4 sites)

d. Other issues and the scheduling of the next meeting.
e. Adjourn meeting.

3. The previously agreeable items on part A of the agenda were reiterated. However, the Army

stated that the USEPA should also be added to item A 5 on the agenda at enclosure 1.

4. The unresolved issues at part B of the agenda were discussed in detail.

B.1. The Army agreed to provide a schedule for the completion of the bench scale treatability study. The schedule will be made available at the 19 January 2000, monthly managers' meeting at TNRCC office in Austin, Texas.

The TNRCC provided information on several promising technologies (Biological fluidized bed reactor and continuous stirred biological reactor, apparently most favorable technologies.) that should be considered at LHAAP. The TNRCC further provided a "Longhorn Army Ammunition Plant Schedule for Perchlorate Activities". The Army thanked TNRCC and stated that the Army will study the schedule and probably modify it to meet the Army's need on the perchlorate issues at LHAAP. The Army further stated that it will work with the regulators to determine the appropriate perchlorate technology to be used at LHAAP.

B.2. The Army and the regulators agreed that a system shall be in place in three years. This system should be capable of handling the high levels of perchlorate in the effluent of the pump and treat system at LHAAP. The Army and regulators agreed that the three-year clock should begin on 1 December 1999 (the system should be in place NLT 1 Dec 2002).

B.3. The Army stated that this item should be placed in the previously agreed items/task list. The army will address the extent of perchlorate in soil and groundwater in the RI/FS process.

B.4. Items B.4.c and B.4.d were deleted because the Army has already agreed to the sampling of the storm water in the Goose Prairie Creek, when the conditions are appropriate to sample for perchlorate. The attendees agreed that item B.4.c be added to the list of items previously agreed to prior to this meeting. The Army has also addressed the item at B.4.d, by placing a cover material at building 25-C site to prevent any storm water run off that may contain perchlorate at this site. The LHAAP shall send a letter through its chain of command to seek permission to do some limited (*Quarterly sampling at least 200 feet into Caddo Lake. Location will be determined with TNRCC (Tyler) assistance)* off post sampling of Caddo Lake for perchlorate. The Army did not make any commitments that "All public drinking water system intakes down the stream from the site" shall be sampled.

5. The TNRCC spent a considerable amount of time to explain the rationale for applicable discharge limits of 375 ppb and 22 ppb perchlorate discharge requirements and where these limits are applicable.

6. A summary of the previously agreed to issues and the resolved issues or task is at enclosure 2. These are the issues resolved by the technical team (The Army, USEPA and TNRCC).

7. The next managers' meeting will take place on 19 January 2000, at TNRCC in Austin Texas.

8. The Army, USEPA Region VI, and TNRCC legal agreed to meet on 2 December 1999, and use the agreement reached by the technical team to confirm how the Army will address the perchlorate issues at LHAAP.

9. The TNRCC's developed schedule for perchlorate activities at Longhorn AAP and the list of applicable perchlorate technologies provided by TNRCC are not included as enclosures to this meeting minutes.

ENCLOSURE 1

LONGHORN ARMY AMMUNITION PLANT
PERCHLORATE MEETING AGENDA
DECEMBER 1, 1999 1:00 pm
AUSTIN, TEXAS

A. PREVIOUS AGREEABLE TASKS FOR PERCHLORATE

1) Conduct Bi-weekly Effluent Sampling at Groundwater Treatment Plant (GWTP).

2) Search Alternatives to Reduce the Influent Perchlorate Concentration for GWTP.

3) Conduct Quarterly Perimeter Monitoring Sampling.

4) Conduct Quarterly Goose Prairie Creek and Harrison Bayou Sampling.

5) Submit all analytical data to the TNRCC (and EPA) within 45 days of sample collection.

B. UNRESOLVED TASKS FOR PERCHLORATE

1) Schedule for Completing the bench and Pilot Scale Perchlorate Treatability Study of the GWTP

2) Schedule for the Effluent Water from the GWTP to Meet the Discharge Criteria set by the State of Texas.

3) Schedule for Fully Delineating the Extent and Degree of Perchlorate in:
   a. The Soil.
   b. The Groundwater.

4) Under what circumstance will the Army
   a. Sample Caddo Lake
   b. All Public Drinking Water System Intakes down stream from the site.
   c. Sample storm water in Goose Prairie Creek.
   d. Install storm water runoff controls to stop the discharge of perchlorate via storm water in areas other than Building 25-C.

ENCLOSURE 2

LONGHORN ARMY AMMUNITION PLANT
PERCHLORATE RESOLUTION MEETING

DECEMBER 1, 1999

A. PREVIOUS AGREEABLE TASKS FOR PERCHLORATE

1) Conduct Bi-weekly Effluent Sampling at Groundwater Treatment Plant (GWTP).
2) Search Alternatives to Reduce the Influent Perchlorate Concentration for GWTP.
3) Conduct Quarterly Perimeter Monitoring Sampling.
4) Conduct Quarterly Goose Prairie Creek and Harrison Bayou Sampling.
5) Submit all analytical data to the TNRCC (and EPA) within 45 days of sample collection.
6) Delineating extent and degree of perchlorate in groundwater and soil. This will be addressed in the RI/FS process.
7) Collect storm water samples for perchlorate analysis at Goose Prairie Creek.

B. RESOLVED TASKS FOR PERCHLORATE

1) Schedule for Completing the bench and Pilot Scale Perchlorate Treatability Study of the GWTP

   An example schedule was provided by TNRCC. Army will take schedule for review. At managers' meeting, tentatively scheduled for 19 January 2000, the Army will provide it's version of the schedule taking into account funding and all logistical constraints.

2) Schedule for the Effluent Water from the GWTP to Meet the Discharge Criteria Set by the State of Texas.

   Army will put forth it's best effort to be in compliance within the three year period beginning 1 December 1999.

3) Under what circumstance will the Army sample Caddo Lake

   Army will request approval to go off post to sample Caddo Lake.

12/1/99.

Longhorn Army Ammunition plant Technical mtg
Austin, Tx.

Name	Agency	phone
James sher	TNRCC	512-239-2449
Chris Villarreal	EPA	214-665-6758
Jeff Armstrong	USAEC	410-436-1510
Jim Daniel	USAEC.	410-436-1501
CYRIL ONEWOKAE	U.S Army IOC	309-782-1350
B.G. MURPHY	" " "	-7021
JAMES McPHERSON	US ARMY/LHAAP	318-459-5100
Paul Bruckwicki	TNRCC Tyler	903 535 5132
IRA NATHAN	LHAAP	318-459-5103
Stephen Ligon	TNRCC (W.W. Permits)	(512) 239-4527
WADE STONE	TNRCC	(512) 239-2487
DAVID TOLBERT	TNRCC	318-459-5109
Scott Crouch	TNRCC	(512) 239-2486
CLIFF MURRAY	COE, Tulsa	918-669-7573
Robert Custro	TNRCC. SCS	(512) 239-~~2~~68[illegible]

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FACSIMILE TRANSMITTAL

U.S. EPA REGION 6
HAZARDOUS WASTE MANAGEMENT DIVISION
1445 ROSS AVENUE
DALLAS, TEXAS 75202-2733

TO: James A. McPherson, Commander's Representative **Longhorn/Louisiana Army Ammunition Plants**	
MACHINE NUMBER: (318) 459-5112	VERIFICATION NUMBER: ( )
FROM: Chris G. Villarreal **Project Manager**	
PHONE: (214) 665-6758	MAIL CODE: 6SF-AP
OFFICE: Superfund, Texas Section	
DATE: December 6, 1999	PAGES, INCLUDING COVER SHEET: 5
PLEASE NUMBER ALL PAGES	
INFORMATION FOR SENDING FACSIMILE MESSAGES	
OUR EQUIPMENT	FACSIMILE NUMBER
PANAFAX UF-766	(214) 665-6660

COMMENTS:

Re: Longhorn Army Ammunition Plant
UNANIMOUS DECISION OF DISPUTE RESOLUTION COMMITTEE

Copies to:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION SIX
AND THE
UNITED STATES DEPARTMENT OF THE ARMY
AND THE
STATE OF TEXAS BY AND THROUGH
THE TEXAS NATURAL RESOURCE CONSERVATION COMMISSION (TNRCC)

IN THE MATTER OF:

The U. S. Department of the Army

LONGHORN ARMY AMMUNITION PLANT
FEDERAL FACILITY AGREEMENT UNDER CERCLA SECTION 120

UNANIMOUS DECISION OF DISPUTE RESOLUTION COMMITTEE

The Dispute Resolution Committee (DRC), met on the second day of December, 1999, to resolve issues the Texas Natural Resource Conservation Commission raised pursuant to Section XV. of the Federal Facilities Agreement (FFA) in a September 27, 1999, letter to the Longhorn Army Ammunition Plant. The DRC understands that the parties have reached agreement as detailed below and adopts the agreement as its unanimous decision.

1. The TNRCC Water Quality rules and guidance will be used to establish effluent discharge limits for perchlorate from the groundwater treatment plant currently in operation under the Interim Record of Decision for Burning Ground No. Three.

2. The Army will, once every two weeks, conduct effluent sampling for perchlorate at the Groundwater Treatment Plant (GWTP) and search for alternatives to reduce the influent

perchlorate concentration for the GWTP.

3. The Army will complete a pilot scale perchlorate treatability study of the GWTP. At a managers' meeting tentatively scheduled for 19 January 2000, the Army will provide a proposed schedule for the treatability study, taking into account funding and all logistical constraints.

4. The Army will, consistent with the Sections XVIII. (FORCE MAJEURE) and XXVIII. (FUNDING) of the FFA, bring the effluent from the GWTP into compliance with the discharge criteria established pursuant to paragraph one no later than 1 December 2002. If the Army determines it cannot meet this deadline, it shall notify the TNRCC and EPA pursuant to Section XVII.(NOTIFICATION) of the FFA.

5. The Army will conduct quarterly sampling for perchlorate in Goose Prairie Creek and Harrison Bayou. The Army will request approval from the Secretary of the Army to go off post to conduct quarterly sampling of Caddo Lake. The Army will notify the parties of approval status no later than 31 January 2000. If the Army does not obtain approval by 31 January 2000, this issue will be elevated to the Senior Executive Committee pursuant to Section XV. (DISPUTE RESOLUTION) of the FFA.

6. The Army will conduct quarterly perimeter groundwater sampling for perchlorate.

7. The Army will collect storm water samples for perchlorate analysis at Goose Prairie Creek as

necessary to adequately characterize perchlorate in storm water.

8. The Army will submit all analytical data to the TNRCC and EPA within 45 days of sample collection.

9. The Army will delineate the extent and degree of perchlorate in groundwater and soil . This will occur pursuant to the CERCLA Remedial Investigation/Feasibility Study (RI/FS) process. At a managers' meeting tentatively scheduled for 19 January 2000, the Army will provide a proposed schedule for the RI/FS, taking into account funding and all logistical constraints.

Entered this 2nd day of December, 1999.

DISPUTE RESOLUTION COMMITTEE

Jacqueline S. Hardee, P. E.
TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

William K. Honker, P. E.
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Colonel Lawrence J. Sowa
UNITED STATES DEPARTMENT OF THE ARMY

024657

DISPUTE RESOLUTION COMMITTEE - LHAAP 12/2/99

WADE STONE	TNRCC	512/239-2437
JACKIE HARDEE	TNRCC	512/239-4450
Billy Murphy	Army, IOC	309-782-7021
Dennis Bates	Army	309-782-8472
Col JOHN SOWA	Army	309-782-343
Bill Hoxker	EPA	214-665-3187
CHRIS VILLARREAL	EPA	214-665-6753
Mike Barra	EPA	214-665-2143
David Cooney	TNRCC	512-239-0455
James Sher	TNRCC	512-239-2444
Robert Castro	TNRCC SCS	512-239-6837
MIKE COWAN	TNRCC	512-239-405[illegible]
Scott Crouch	TNRCC	512 239-2486
THOMAS EDWARDS	OAG	512-475-4003

024658

DEPARTMENT OF THE ARMY
LONGHORN/LOUISIANA ARMY AMMUNITION PLANTS
P. O. Box 658
Doyline, Louisiana 71023-0658

SIOLL-CR

13 December, 1999

MEMORANDUM FOR Commander, U. S. Army, Industrial Operations Command,
ATTN: AMSIO-IBE (Mr. B. G. Murphy),
Rock Island, Illinois 61299-6000

SUBJECT: Permission to Sample Beyond Property Boundary

1. Longhorn Army Ammunition Plant (LHAAP) requests approval from Department of Army to sample surface waters beyond the property boundary. The purpose of the sampling is to determine whether perchlorate detected in surface waters discharging from LHAAP into Caddo Lake is also present in the surface water of the lake. Perchlorate has been detected in the surface water at the LHAAP boundary.

2. During a technical meeting with Texas Natural Resource Conservation Commission (TNRCC) and Environmental Protection Agency (EPA) on 1 December, TNRCC requested that the Army sample all drinking water influent points on Caddo Lake. Before committing to sampling locations several miles from the point at which LHAAP surface waters discharge into Caddo Lake, the Army representatives at the meeting suggested that sampling be conducted just beyond the Army property boundary. TNRCC and EPA agreed with this approach as a first step to identifying any potential off-plant migration of perchlorate.

3. If you have any questions regarding this request, you may contact David Tolbert at DSN 637-5109.

(signed)

JAMES A. McPHERSON
Commander's Representative