LONGHORN ARMY AMMUNITION PLANT KARNACK, TEXAS

ADMINISTRATIVE RECORD

Volume 4 of 13

2009

Bate Stamp Numbers
00073694 – 00074707

Prepared for

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Longhorn Army Ammunition Plant

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LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
ADMINISTRATIVE RECORD – CHRONOLOGICAL INDEX

VOLUME 4 of 13

2009

A. Title: Meeting Minutes – Monthly Manager's Meeting Minutes, Longhorn Army Ammunition Plant, Karnack, Texas
Author(s): Shaw Environmental, Inc., Houston, Texas
Recipient: All Stakeholders
Date: May 19, 2009
Bate Stamp: 00073694 - 00073711

B. Title: Meeting Minutes – Monthly Manager's Meeting Minutes, Longhorn Army Ammunition Plant, Karnack, Texas
Author(s): Shaw Environmental, Inc., Houston, Texas
Recipient: All Stakeholders
Date: June 16, 2009
Bate Stamp: 00073712 - 00073722

C. Title: Report – Final Site Evaluation for LHAAP-49, Former Acid Storage Area, Longhorn Army Ammunition Plant, Karnack, Texas
Author(s): Shaw Environmental, Inc., Houston, Texas
Recipient: All Stakeholders
Date: June 16, 2009
Bate Stamp: 00073723 - 00074707

LONGHORN ARMY AMMUNITION PLANT

Karnack, Texas

MONTHLY MANAGERS' MEETING

AGENDA

DATE: Tuesday, 19 May 2009
TIME: 1:00 p.m.
PLACE: Teleconference
Dial in number: 866-797-9304, code - 4155734

Welcome **RMZ**

Action Items:

Army

- Update site status spreadsheet/schedule and provide to EPA before the May meeting.
- Put Site Status supporting information into Memo format and submit to regulators.

EPA

- Provide comments to Army on the site schedule before the June meeting.

TCEQ

- Check with TCEQ management regarding how to identify small sites (i.e., the industrial sumps under LHAAP-35/36 and the sanitary septic systems under LHAAP-55) that are closed to industrial levels within larger areas that have been closed to residential levels.

Shaw

- Provide site status spreadsheet to the Army before May meeting for review and revision before the June RAB.
- Provide TCEQ with electronic tables from the FS for LHAAP-29.
- Provide the MNA evaluation for LHAAP-58.
- Provide the Army with 5-Year Review recommendations table with additional column for completion date.

Defense Environmental Restoration Program (DERP) PBC Update **PS**

- Document Status/Environmental Sites (Table)
- Groundwater Treatment Plant Update
- Path forward for LHAAP-49
- Path forward for LHAAP-04 and Pistol Range
- Feasibility Study meeting in Austin on April 27-28 Status/Re-cap
- Five Year Review Follow-Up Table

DERP Total Environmental Restoration Contract Update **RMZ**

- Status of Draft Final ROD for Sites 37/67

BRAC-Funded Environmental Restoration

- LHAAP-19 – Demolition Landfill Progress **DB**

MMRP **JRL/DB**

- Status of regulatory review
  - DF MEC Removal Action Report
  - DF MC Data Summary Report

Transfer Update

- Electrical ROW Lease to USFWS
- Transfer of LHAAP-12 Parcel
- ECOP VI - Issues

Other Issues

- 2009 IAP Status
- Powerhouse Demolition Status
- June Meetings

Adjourn

Shaw® Shaw Environmental, Inc.

Subject: **Draft Final Minutes, Monthly Managers Meeting, Longhorn Army Ammunition Plant (LHAAP)**

Location of Meeting: **Teleconference**

Date of Meeting: **May 19, 2009; 1:00 PM – 2:10 PM**

Meeting Participants:

BRAC:	Rose M. Zeiler
USACE-Tulsa:	Aaron Williams, John Lambert
Shaw:	Praveen Srivastav, Greg Jones, Kay Everett, Susan Watson
USEPA Region 6:	Steve Tzhone
TCEQ:	Fay Duke, Dale Vodak
USFWS:	Barry Forsythe

Previous Action Items

Army

- Update site status spreadsheet/schedule and provide to EPA before May meeting. *(Completed)*
- Put Site Status supporting information into memo format and submit to regulators. *(In progress)*

EPA

- Provide comments to Army on the site schedule before the June meeting. *(In progress)*

TCEQ

- Check with TCEQ management regarding how to identify small sites (i.e., the industrial sumps under LHAAP-35/36 and the sanitary septic systems under LHAAP-55) that are closed under industrial cleanup levels within larger areas that have been closed under residential cleanup levels. *(In Progress)*

Shaw

- Provide site status spreadsheet to the Army before meeting in May for review and revision before the June RAB. *(Completed)*
- Provide TCEQ with electronic tables from the FS for LHAAP-29. *(Completed)*
- Provide the MNA evaluation for LHAAP-58. *(Completed)*
- Provide the Army with 5-Year Review recommendations table with additional column for completion date. *(Completed)*

Defense Environmental Restoration Program (DERP) PBC Update **Praveen Srivastav**

Document Status/Environmental Sites (Table)

Praveen Srivastav briefly went over the document status/environmental sites table. The Decision Document for LHAAP-02 is in progress with groundwater monitoring issues to be resolved. RTCs for the Draft Final SI Report for LHAAP-03 have been submitted to the Army. After regulatory review and concurrence with responses, the Final document will be submitted. A Draft Action Memo for the Pistol Range and LHAAP-04 has been submitted to the Army for review and signatures. The Draft Final Removal Action Work Plan for the Pistol Range and LHAAP-04 is in preparation. Surveying and county notification requirements for sites LHAAP-06, -07, -51, -55, -64, -66, and -68 are on hold until additional clarification is made on how to survey smaller sump and septic tank sites. The comment resolution for the Draft Final Feasibility Study (FS) Addendum for LHAAP-16 is in progress. The RTCs for the Draft Final FS for LHAAP-17 are in preparation; revisions will include a "trigger" for turning off the extraction system. The Draft FS for LHAAP-18/24 is currently in comment resolution with the Army. The Draft Final FS for LHAAP-29 is in regulatory review with EPA comments pending. Responses to the DF FS for LHAAP-46 have been submitted for Army's review. Responses to Army's comments for the Draft FS for LHAAP-47 are in progress. Shaw collected a new round of samples from the wells at LHAAP-49 and the results reported prior to the meeting. Arsenic concentration was 12.8 µg/L and nitrate/nitrite concentration was below MCL. EPA and TCEQ agreed that all groundwater issues have been addressed and no further action for groundwater or soil is required. They agreed that the SE Report can be finalized with proposed plan and ROD to follow. RTCs to the Draft Final FS for LHAAP-50 were submitted to the EPA and TCEQ. MNA evaluation for LHAAP-58 was submitted to regulators, and the RTCs are in Army review. Surveying and county notification requirements for LHAAP-60 will be scheduled at the same time as other site surveys are conducted. The draft Decision Document for LHAAP-35/36 is in preparation.

Praveen also provided an additional table showing the tracking details of each document for the sites targeted for Sept 2009 RODs.

Praveen referred everyone to the two LHAAP-02 figures that were supplied in the handouts. A discussion followed regarding the path forward for site LHAAP-02. The group discussed the difficulty of obtaining useful SPLP results and the location of the nearest well. Praveen indicated that the groundwater protection issue can be addressed by either installing and sampling a well in the area, since the existing well 35AWW03 does not have much water, or by collecting sediment samples for SPLP. He pointed out a potential problem with SPLP sampling that the total metal

results may not match those of original samples collected by USACHPPM. Fay said she would need to consider the existing data further.

Groundwater Treatment Plant Update
Normal operations continued. Steve Tzhone said he had comments on the last couple of groundwater treatment operation quarterly reports. He indicated that he did not expect these changes to be made to the existing reports, but asked that the comments be incorporated in future reports.

Path Forward for LHAAP-49
Praveen indicated that May 2009 data was emailed prior to the meeting. EPA submitted concurrence before the meeting and suggested steps for path forward. Fay said that TCEQ would provide an email indicating concurrence.

Path Forward for LHAAP-04 and Pistol Range
No public comments were received on the EE/CA for either site. Removal of the soil at these two sites is currently being planned for June, assuming that the demolition activities occurring adjacent to LHAAP-04 at the Power House will be completed by then. The draft final work plan will be available to the regulators by the end of this week.

Feasibility Study Meeting in Austin on April 27-28/Recap
The group felt that much was accomplished at the meeting. Praveen asked that everyone review the minutes of that meeting and provide any comments. Shaw had submitted the minutes to all participants during the week after the meeting.

Five Year Review Follow-up Table
Steve said that he will look at this table and call if he has questions. He indicated that this task will be conducted every quarter because Longhorn has been flagged for follow-up on the 5-Year Reviews, and that this information will go to the inspector general.

DERP Total Environmental Restoration Contract (TERC) Update **Rose Zeiler**

Status of Draft Final ROD for Sites 37/67
Steve and Rose indicated that regional legal staff at EPA (George Malone) and BRAC were trying to resolve the language for the ROD. If they can't finalize it at their level, then George Malone of EPA will send it up to EPA HQ. Steve asked if a deadline should be proposed, but Rose suggested giving them a few more days before considering that. It was noted that HQ has already been notified, although George is still trying to resolve the issue. Rose still expects the ROD to be signed this year. There is agreement between EPA and Army that MCLs should be included in the RODs as ARARs, and that they are ARARs because they are "relevant and appropriate" (as opposed to "applicable"). However, there appear to be differences about the wording of the RAOs that drive the need to include the MCLs.

BRAC-Funded Site Operations **John Lambert**

LHAAP-19—Demolition Landfill Progress
The work plan is in regulatory review.

MMRP **John Lambert**
Status of Regulatory Review
John said he is awaiting regulatory comments on the Removal Action Report and the MC Data Summary Report.

DF MEC Removal Action Report and DF MC Data Summary Report
Fay mentioned she had some questions on some of the data. Rose indicated that perchlorate is the only contaminant she needed to review since that was the only data gap. Steve suggested he would like to follow up with Fay before submitting comments. Fay reminded participants that she no longer has MEC contractors to assist on review of these reports.

Transfer Update **Rose Zeiler**

Electrical ROW Lease to USFWS
Rose indicated that the license for the electrical right-of-way at LHAAP-49 had been signed.

Transfer of LHAAP-12 Parcel
Rose said she has not heard anything from USFWS on the LHAAP-12 transfer.

ECOP VI
ECOP VI should be finished by the end of the fiscal year. Rose indicated that LHAAP-48 and -53 are suitable for unrestricted use, but that co-located Sites 35/36 and 55 are not.

Other Issues **Rose Zeiler**

2009 IAP Schedule
There was a status change on the table regarding LHAAP-56 and -69. The status for LHAAP-65 is still TBD. The schedule is still under internal review. An Army 2009 IAP data validation call will be conducted on Thursday. Fay indicated that she had not reviewed the document.
Public meetings for the sites will be done separately from the upcoming quarterly RAB since most of the sites probably will not be at the proposed plan stage yet. Tom Lederle with BRAC is expected to visit the site and attend the RAB meeting.

Powerhouse Demolition Status
The schedule of the Powerhouse demolition was discussed briefly at the beginning of the meeting. The demolition is currently in progress. Heavy truck traffic is expected from the end of May until

early June in conjunction with removing the debris. John Lambert noted that a vial of mercury was found behind some bricks.

June Meetings
The next monthly manager's meeting will be held at Longhorn on June 16, 2009 at 2 PM. The RAB meeting date is June 16 at 6:30 PM.

Meeting Adjourned

Action Items:

Army
- Update site status spreadsheet/schedule and provide to public at the June meeting.

EPA
- Provide comments to Army on the site schedule before the June meeting.

TCEQ
- Check with TCEQ management regarding how to identify small sites (i.e., the industrial sumps under LHAAP-35/36 and the sanitary septic systems under LHAAP-55) that are closed to industrial levels within larger areas that have been closed to residential levels.

LONGHORN ARMY AMMUNITION PLANT
MONTHLY MANAGERS' MEETING

Location	Longhorn Army Ammunition Plant, Karnack, Texas		
Date	19-May-2009	**Time**	1:00 PM

ATTENDEES

Name (printed)	Signature	Organization	Phone	E-mail
Longhorn Team Members				
Rose M. Zeiler		BRAC	(479) 635-0110	rose.zeiler@us.army.mil
Jeff Armstrong		USAEC	(410) 436-1510	jeffrey.armstrong@us.army.mil
Aaron Williams		USACE, Tulsa	(918) 669-4915	aaron.k.williams@usace.army.mil
John Lambert		USACE, Tulsa	(918) 669-4992	john.r.lambert@SWT03.usace.army.mil
Scottie Fiehler		USACE, Tulsa	(918) 669-7232	scottie.fiehler@us.army.mil
Stephen Tzhone		USEPA, Dallas	(214) 665-8409	tzhone.stephen@epa.gov
Raji Josiam		USEPA, Dallas	(214) 665-8529	josiam.raji@epa.gov
Fay Duke		TCEQ, Austin	(512) 239-2443	fduke@tceq.state.tx.us
Dale Vodak		TCEQ, Tyler	(903) 535-5142	dvodak@tceq.state.tx.us
Barry Forsythe		USFSW, Dallas	(214) 665-8467	forsythe.barry@epa.gov
Paul Bruckwicki		USFSW, Karnack	(903) 679-4536	paul_bruckwicki@fws.gov
Mark Williams		USFSW, Karnack	(903) 679-9144	mark_williams@fws.gov
Praveen Srivastav		SHAW, Houston	(713) 996-4588	praveen.srivastav@shawgrp.com
Kay Everett		SHAW, Houston	(713) 996-4421	kay.everett@shawgrp.com
Greg Jones		SHAW, Houston	(713) 996-4472	greg.n.jones@shawgrp.com
Susan Watson		SHAW, Houston	(713) 996-4407	susan.watson@shawgrp.com

Shaw® Shaw Environmental, Inc.

Status of Sites and Technical Documents
Longhorn Army Ammunition Plant – PBC Contract
19 May 2009

No.	Document in Progress	Submittal Date	Army	Regulator	Next Submittal	Expected Date	Army	Regulator	Comment Resolution	Status	Remarks
1	Draft Decision Document, LHAAP-02	4/06/09	x		Draft Final DD	6/30/09	x	x		Trying to evaluate how to address soil to groundwater COCs within LHAAP-02, without having to include monitoring within LHAAP-58	
2	Draft Final SI Report for LHAAP-03, Rev 01	12/30/07		x	RTC	5/30/09	x	x		RTCs submitted for Army's review on 4/2/09	Final SI report to be submitted after RTCs are resolved.
3	Final EE/CA, LHAAP-04	3/05/09	x	x						Final EE/CA submitted on 3/5/09. Public comment period 3/15/09 – 4/15/09	
4	Draft Action Memorandum, LHAAP-04/Pistol Range	3/13/09	x		Revised Draft Action Memo	4/14/09	x			Revised Draft Action Memo submitted to Army on 4/14/09.	No regulatory review or signatures required
5	Draft Removal Action Work Plan, LHAAP-04/Pistol Range	5/7/09	x		Draft Final	5/21/09	x	x		Army comments received and resolved, 5/14/09. DF in preparation	
6	Final Decision Document, LHAAP-06, 07, 51, 55, 64, 66, 68	12/18/08	x		NA				NA	Final copies were distributed on 12/18/08.	Scheduling survey, followed by County notification.
7	Draft Final Feasibility Study Addendum, Rev 01, LHAAP-16	7/3/08		x	RTC	05/30/09	x		In progress	EPA and TCEQ comments rec'd. RTCs reviewed by Army. RTC revision in progress	
8	Draft Final Feasibility Study, LHAAP-17	4/14/09	x	x	Final	5/30/09	x	x	In progress	Shaw to provide revised text for alternatives, include a trigger for turning off extraction	

Shaw® Shaw Environmental, Inc.

Status of Sites and Technical Documents
Longhorn Army Ammunition Plant – PBC Contract
19 May 2009

No.	Document in Progress	Submittal Date	Army	Regulator	Next Submittal	Expected Date	Army	Regulator	Comment Resolution	Status	Remarks
9	Draft Feasibility Study, LHAAP-18/24	3/3/09	x		Draft Final	5/30/09	x	x	In progress	Army comments received. Resolution in progress	
10	Draft Final Feasibility Study, LHAAP-29	03/11/09	x	x	Final	5/30/09	x	x	In progress	TCEQ comments received. EPA comments pending.	
11	Draft Final Focused Feasibility Study, LHAAP-46	1/30/09	x	x	Final	5/30/09	x	x	In progress	Responses for TCEQ and EPA comments submitted for review	
12	Draft Focused Feasibility Study, LHAAP-47	12/23/08	x		Draft Final	5/15/09	x	x	In progress	Army comments received. Conducted a new round of groundwater sampling. RTC in prep.	
13	Draft Final Site Evaluation Report for LHAAP-49	3/3/08	x	x	Final	5/30/09	x	x	In progress	Collected a new round of samples from wells. Results reported. Proceeding with Final Report	
14	Draft Final Feasibility Study, LHAAP-50	11/20/08	x	x	Final FS	5/15/09			In progress	Regulatory comments received. RTC submitted 4/06/09	
15	Draft Final Feasibility Study, LHAAP-58	9/20/07	x	x	Final	5/30/09	x	x	In progress	MNA evaluation submitted to regulators. RTCs in Army review	
16	Final Decision Document, LHAAP-60	12/18/08	x						NA	Final copies were distributed on 12/18/08.	Scheduling survey, followed by County notification.
17	Final EE/CA, Pistol Range	2/25/09	x	x						Final EE/CA submitted on 2/25/09	

Shaw® Shaw Environmental, Inc.

Status of Sites and Technical Documents
Longhorn Army Ammunition Plant – PBC Contract
19 May 2009

No.	Document in Progress	Submittal Date	Army	Regulator	Next Submittal	Expected Date	Army	Regulator	Comment Resolution	Status	Remarks
18	Final Addendum, LHAAP-35/36	4/22/09	x	x						Final document submitted.	
19	Draft Decision Document	5/22/09	x							In preparation	

Site	Document	Version	Status	Document To Army	Army comments Received?	Document to EPA/TCEQ	EPA comments Received?	TCEQ comments Received?	RTC To Army	Army comments Received?	To TCEQ	TCEQ concurrence Received?	To EPA	EPA concurrence Received?
LHAAP-04/PR	EE/CA	Final												
	Action Memo	Draft	Army Review	4/14/09	No									
		Final												
	Work Plan	Draft	Army Review	5/7/09	Yes: 5/13/09				5/14/2009	Yes				
		Draft Final	In prep											
		Final												
	Completion Rep	Draft												
		Draft Final												
		Final												
	Proposed Plan	Draft												
		Draft Final												
		Final												
	ROD	Draft												
		Draft Final												
		Final												
LHAAP-16	FS	Draft Final	RTC resolution				Yes	Yes	Yes	Yes				
		Final												
	Proposed Plan	Draft												
		Draft Final												
		Final												
	ROD	Draft												
		Draft Final												
		Final												
LHAAP-17	FS	Draft Final	RTC in prep				Yes: 5/18/09	Yes: 5/1/09						
		Final	In prep											
	Proposed Plan	Draft	In prep											
		Draft Final												
		Final												
	ROD	Draft												
		Draft Final												
		Final												
LHAAP-29	FS	Draft Final	installing deep well				No	No				Yes (new deep well)		
		Final	In prep											

Site	Document	Version	Status	Document To Army	Army comments Received?	Document to EPA/TCEQ	EPA comments Received?	TCEQ comments Received?	RTC To Army	Army comments Received?	To TCEQ	TCEQ concurrence Received?	To EPA	EPA concurrence Received?
	Proposed Plan	Draft	In prep											
		Draft Final												
		Final												
	ROD	Draft												
		Draft Final												
		Final												
LHAAP-46	FS	Draft Final	RTC in prep				Yes	Yes: 5/4/09	TCEQ: 5/4/09 EPA:5/13/09	No	5/4/09			
		Final	In prep											
	Proposed Plan	Draft	In prep											
		Draft Final												
		Final												
	ROD	Draft												
		Draft Final												
		Final												
LHAAP-49	SE Report	Final	In prep											
	Proposed Plan	Draft												
		Draft Final												
		Final												
	ROD	Draft												
		Draft Final												
		Final												
LHAAP-50	FS	Draft Final	RTC resolution				Yes:4/16/09	Yes:4/17/09; more expetd	5/7/2009, 5/15/09	No				
		Final	in prep											
	Proposed Plan	Draft	in prep											
		Draft Final												
		Final												
	ROD	Draft												
		Draft Final												
		Final												
LHAAP-58	FS	Draft Final	RTC Resolution				Yes	Yes	5/11/09	No	MNA: 5/12/09		MNA: 5/12/09	

Site	Document	Version	Status	Document To Army	Army comments Received?	Document to EPA/TCEQ	EPA comments Received?	TCEQ comments Received?	RTC To Army	Army comments Received?	To TCEQ	TCEQ concurrence Received?	To EPA	EPA concurrence Received?
		Final	In prep											
	Proposed Plan	Draft	In prep			[redacted]								
		Draft Final												
		Final												
	ROD	Draft				[redacted]								
		Draft Final												
		Final												

Path Forward on 5-Year Review Recommendations for LHAAP-12, -16, and -18/24

Site(s)	Issue[1]	Recommendations/ Follow-up Actions[1]	Party Responsible[1,2]	Oversight Agency[1]	Milestone Date[1]	Path Forward/Status	Completion Date
18/24	Perchlorate has occasional effluent results that exceed the discharge limit.	Evaluate means of reducing reporting time for perchlorate analyses for GWTP.	U.S. Army	State/USEPA	12/31/08	Based on efforts by Shaw Chemist, Shaw has found that on-site analysis is impractical. Shaw has arranged for the analytical laboratory to immediately flag any high effluent perchlorate results (results that exceed the discharge criteria) and report them to Shaw on a preliminary basis.	August 2008
18/24	Vegetation growing in fence line around the site	Cut vegetation in fence line.	U.S. Army	State/USEPA	12/31/08	This recommendation refers to vegetation in the fence line around the GWTP. Vegetation removal activities were initiated in December 2008 utilizing Shaw's on-site personnel. To expedite removal, additional personnel were hired. Removal at the GWTP was completed and Shaw has proceeded to clear vegetation from the fence line at the well field itself.	April 2009
16 & 18/24	No groundwater use restrictions are in place	Address as part of final remedy implementation of each site.	U.S. Army	State/USEPA	To be determined in site-specific RI/FS documents	Groundwater use restrictions will be addressed as part of the final remedy for each site. Final remedies will be determined via the CERCLA RI/FS/PP/ROD process. The draft final LHAAP-16 FS Addendum and the draft LHAAP-18/24 FS have been issued, and both documents include LUCs that restrict groundwater use.	In progress.
18/24	Metal precipitation process may not be required	Evaluate need for process and associated sampling.	U.S. Army	State/USEPA	12/31/08	Based on review of historical data, influent metal concentrations sometimes exceed discharge criteria. Hence, the metals removal process is needed unless the discharge criteria are modified. While some of the metals criteria are more stringent than MCLs (likely because they are based on surface water quality criteria), there is currently no reason to modify those criteria. Therefore, the metals removal process should be maintained.	February 2009
18/24	Contamination at Northwest of Burning Ground	Address as part of final remedy implementation of the site.	U.S. Army	State/USEPA	Per LHAAP-18/24 RI/FS schedule	Contamination northwest of the Burning Ground will be addressed in the LHAAP-18/24 FS. That FS is currently in preparation.	In progress.
18/24	Eight extraction wells were not installed.	Issue ESD to delete extraction wells from interim remedy	U.S. Army	USEPA	6/30/09	Based on previous discussion between USEPA and U.S. Army, an ESD will be prepared.	June 2009
16	Need operation and maintenance plan	Prepare O&M Plan for the landfill.	U.S. Army	State/USEPA	12/31/08	Required O&M activities for the LHAAP-16 Landfill were identified in Part VI of the Early Interim Remedial Action Design. Shaw has expanded on that general guidance by preparing a checklist for landfill inspection (see attachments). The March 2009 inspection of the LHAAP-16 Landfill was based on the Early Interim Remedial Action Design requirement for semi-annual inspections.	December 2008 (locate IRA Design) March 2009 (conducted inspection)
16	Groundwater monitoring (chemical sampling and water levels) not conducted regularly or documented properly	Implement regular groundwater monitoring program.	U.S. Army	State/USEPA	12/31/08	Selected monitoring wells in the shallow, intermediate, and upper deep zones at LHAAP-16 will now be sampled on the same semi-annual schedule as the groundwater sampling that is performed at LHAAP-18/24. The revised monitoring wells were included in the March 2009 sampling event.	December 2008 (added wells to semi-annual sampling program) March 2009 (sampling event)
12 & 16	Some minor erosion and unwanted vegetation on landfill caps	Repair erosion and remove small pine trees.	U.S. Army	State/USEPA	12/31/08	The pine trees were sprayed with herbicide in December 2008. The caps were inspected in March 2009, and the decision was made to spray again. Shaw is currently identifying a subcontractor with the proper licensing to use a stronger herbicide. Erosion locations are being observed during each inspection. Areas that erode further will be repaired with clean fill and seeded.	In progress.
16 & 18/24	Age and condition of piezometers	Inspect condition of piezometers during monitoring activities and, when applicable, identify for repair, replacement or abandonment	U.S. Army	State/USEPA	12/31/08	Due to lack of information about their construction, the degree of silting at the piezometers cannot be determined. Given the concerns about their condition, Shaw has stopped using the piezometers for potentiometric surface maps. Water levels were measured monthly through April 2009, but Shaw will no longer be measuring water depths at the piezometers. The piezometers will be abandoned when the final remedies are implemented at LHAAP-16 and -18/24.	Deferred to final remedies.

Notes:

1. *Text in the second through sixth columns was taken directly from Table 9-1 of the Final Five-Year Review Report (Shaw, 2008).*
2. *The U.S. Army is responsible for implementation of remedial activities at LHAAP. Those activities are typically executed by companies contracted to the U.S. Army. Currently, most contracted functions are performed by Shaw Environmental, Inc.*

LHAAP-16: Old Landfill

Longhorn Army Ammunition Plant
Karnack, Texas

Sl. No.	Item	Findings/Existing Conditions	Action Needed?	Action Performed (Duration)
1	Condition of Access Road			
2	Site Fencing and Signage			
3	Evidence of Trespassers?			
4	Inspection of Erosion Control Measures			
5	Inspection of Drainage Culverts and Pipes			
6	Drainage Channel/Ditches			
7	Erosion Damage			
8	Status of Cover Vegetation? Bare Spots, Dead Grass, etc.			
9	Presence of Tree Seedlings, Kudzu, etc.?			
10	Height of Vegetation			
11	Inspect Monitoring Wells Surrounding Site			
12	Note Any Changes to Land Use			

Name of Site Inspected:
Weather Conditions:
Signature:

Date of Inspection:
Name/Organization: Shaw Environmental

LHAAP 12 AND 16 LANDFILLS

LONGHORN ARMY AMMUNITION PLANT

KARNACK, TEXAS

EARLY INTERIM REMEDIAL ACTION DESIGN

PRELIMINARY

JULY 1995

PREPARED BY

U.S. ARMY CORPS OF ENGINEERS
TULSA DISTRICT

PART VI - OPERATIONS AND MAINTENANCE.

1. Inspection and Maintenance. The multilayer cap and cover for the LHAAP 12 and 16 landfills shall be inspected once a month or immediately following a heavy rainfall event for the first 6 months after construction of the cap is complete. Following the 6 month anniversary of construction completion, the cap will be inspected once every 6 months. The cap will be inspected for signs of rodent activities, deep rooted vegetation, erosion, or excessive settlement. Any cracks, tunnels, cavities, depressions, or gullies shall be repaired immediately to as-built conditions. Grasses shall be replaced where lost. Regular maintenance of the cap is limited to mowing the vegetation twice a year or whenever deemed necessary to control the growth of brush and woody vegetation.

2. Annual Report. An annual report shall be developed to describe any deficiencies noted in the cap during inspections and actions taken to correct the deficiencies.

LONGHORN ARMY AMMUNITION PLANT,

Karnack, Texas

MONTHLY MANAGERS' MEETING

AGENDA

DATE: Tuesday, 16 June 2009
TIME: 2:00 p.m.
PLACE: Caddo Lake NWR Office Conference Room, Karnack
Call-In Number 866-797-9304, Passcode 4155734

Welcome **RMZ**

Action Items:

Army

- Update site status spreadsheet/schedule and provide to public at the June meeting.
  Put Site Status supporting information into Memo format and submit to regulators.

EPA

- Provide comments to Army on the site schedule before the June meeting.

TCEQ

- Check with TCEQ management regarding how to identify small sites (i.e., the industrial sumps under LHAAP-35/36 and the sanitary septic systems under LHAAP-55) that are closed to industrial levels within larger areas that have been closed to residential levels.

Defense Environmental Restoration Program (DERP) PBC Update **PS/GJ**

- Document Status/Environmental Sites (Table)
- Path forward for LHAAP-04 and Pistol Range
- Feasibility Study meeting in Austin on April 27-28 Status/Re-cap
- Five Year Review Follow-Up
- Groundwater Treatment Plant Update
- Results of Latest Creek Sampling

DERP Total Environmental Restoration Contract Update **RMZ**
Status of Draft Final ROD for Sites 37/67

BRAC-Funded Environmental Restoration

- LHAAP-19 – Demolition Landfill Progress **JRL/AW**

MMRP **JRL/AW**

- Status of regulatory review
  DF MEC Removal Action Report
  DF MC Data Summary Report

Transfer Update **RMZ**

- Transfer of LHAAP-12 Parcel
- ECOP VI - Issues

Other Issues

- 2009 IAP Status
- Powerhouse Demolition Status

Adjourn

Shaw® Shaw Environmental, Inc.

Subject: **Draft Final Minutes, Monthly Managers Meeting, Longhorn Army Ammunition Plant (LHAAP)**

Location of Meeting: **Longhorn AAP at USFWS Office**

Date of Meeting: **June 16, 2009; 2:00 PM – 3:10 PM**

Meeting Participants:

BRAC:	Rose M. Zeiler, Tom Lederle
USAEC:	Matthew Mechenes
USACE-Tulsa:	Aaron Williams, John Lambert, Scottie Fiehler
Shaw:	Greg Jones, Kay Everett
USEPA Region 6:	Raji Josiam, Terry Burton
TCEQ:	Fay Duke
USFWS:	Paul Bruckwicki, Barry Forsythe (phone)
USGS:	Kent Becher (phone)

Previous Action Items

Army

- Update site status spreadsheet/schedule before June meeting and provide to public. Updated and ready for distribution for the RAB meeting.
- Put Site Status supporting information into Memo format and submit to regulators. *Memo has been submitted by Tulsa to RMZ where it is in review*

EPA

- Provide comments to Army on the site schedule before the June meeting. No comments.

TCEQ

- Check with TCEQ management regarding how to identify small sites (i.e., the industrial sumps under LHAAP-35/36 and the sanitary septic systems under LHAAP-55) that are closed under industrial cleanup levels within larger areas that have been closed under

residential cleanup levels. *(Fay Duke stated that each small site, closed under industrial, must be surveyed. Fay asked about the sumps at LHAAP-56 and LHAAP-65. COR indicated that the LHAAP-65 site sumps were not originally part of Shaw's scope under LHAAP-35/36 and would be addressed by Army. LHAAP-56 was previously evaluated under the assessment for LHAAP-35/36. Army asked when Shaw can get the NFA sites on the schedule for surveying. Greg Jones indicated the task can probably be implemented by the end of July through the first of August.)*

Defense Environmental Restoration Program (DERP) PBC Update **Greg Jones**

Document Status/Environmental Sites (Table)

Greg Jones briefly went over the document status/environmental sites table. The Decision Document for LHAAP-02 is in progress with groundwater monitoring issues to be resolved. RTCs for the Draft Final SI Report for LHAAP-03 have been submitted to the TCEQ. After regulatory review and concurrence with responses, the Final document will be submitted. A Draft Action Memoramdum for the Pistol Range and LHAAP-04 has been submitted to the Army for review and comments received. The final memo will be signed by the Army and issued to EPA and TCEQ for their files. The Draft Final Removal Action Work Plan for the Pistol Range and LHAAP-04 is in regulatory review. Comments have been received from the TCEQ. Surveying and county notification requirements for sites LHAAP-06, -07, -51, -55, -64, -66, and -68 had been on hold pending clarification on how to survey smaller sump and septic tank sites; however, with additional discussion from the TCEQ, these sites can now be scheduled. The comment resolution for the Draft Final Feasibility Study (FS) Addendum for LHAAP-16 is in progress. The RTCs for the Draft Final FS for LHAAP-17 are in preparation; responses will include revised text for alternatives and a "trigger" for turning off the extraction system. The Draft FS for LHAAP-18/24 is currently in comment resolution with the Army. The Draft Final FS for LHAAP-29 is in regulatory review with EPA comments pending. A new well was installed and sampled at LHAAP-29 in the groundwater zone below the intermediate zone. Responses to the DF FS for LHAAP-46 have been submitted for Army's review. Army comments have been received for the Draft FS for LHAAP-47, and response preparation is in progress. A new round of groundwater sampling was conducted at LHAAP-49. The Site Evaluation Report for LHAAP-49 is being finalized this week; the Draft Proposed Plan should be issued by the end of the month. Regulatory comments were received for the Draft Final FS for LHAAP-50 and revised comments were submitted to the Army for review. The MNA evaluation for LHAAP-58 was submitted to regulators, and the revised RTCs are in Army review. Surveying and county notification requirements for LHAAP-60 will be scheduled at the same time as other site surveys are conducted. Army comments to the draft Decision Document for LHAAP-35/36 have been received and are being addressed.

Rose Zeiler indicated that site surveys for the TERC sites have been completed. When the rest of the NFA site surveys are completed, Rose requested that Shaw coordinate with BRAC to schedule one visit to the county office to file the deed notification requirements.

Path Forward for LHAAP-04 and Pistol Range
Shaw collected and analyzed samples beneath the slab at LHAAP-04. The objective was to determine if perchlorate or mercury was present in the soil beneath the slab at concentrations that would require removal. Results will be available shortly. Shaw also collected samples near the power poles. If the results are favorable, then the poles may be left in place. If contamination is found, the poles will need to be moved.

Feasibility Study Meeting in Austin on April 27-28/Recap
The draft meeting minutes have been developed and provided to the group for any questions or comments.

John Lambert acknowledged that Shaw has tried to work through remedies and has gone beyond their original proposal for some of the Longhorn sites. He also emphasized that everyone at the meeting performed well by moving quickly on what they were asked to do. However, disagreement regarding some of the proposed remedies has impacted the schedule regarding moving these sites through the feasibility study and later stages. John indicated that the disagreement came from higher level management at the Army, which does not agree with utilizing a two-component remedy, when the MNA remedy's effectiveness is not fully resolved by all parties. This is becoming a contractual issue. The issue impacts several sites that were previously expected to have their RODs by the end of the fiscal year. Raji Josiam said that she would inform Steve Tzhone of possible schedule impacts.

Five-Year Review Follow-up Table
Greg asked if there were any comments regarding that Five-Year Review Follow-up Table that Army had distributed prior to the previous meeting. Army indicated that they were preparing a draft of the Explanation of Significant Differences (ESD). The purpose of that ESD is to address the use of ICTs alone (rather than a combination of both ICTs and extraction wells) for groundwater extraction at LHAAP-18/24 as part of the Interim Remedial Action.

Groundwater Treatment Plant Update
Normal operations continued. Since the last meeting, a new main compressor has been installed.

Perimeter Well and Surface Water Monitoring
Results for the last perimeter well and creek sampling event were handed out and discussed. Nothing out of the ordinary was reported.

DERP Total Environmental Restoration Contract (TERC) Update **Rose Zeiler**

ROD for Sites 37/67
Rose indicated that regional legal staff at EPA (George Malone) and BRAC were trying to resolve the language for the ROD.

MMRP **John Lambert**

The Army has received all regulatory comments on the MMRP documents. In regards to the MC Data Summary Report, the Army is considering how best to approach the white phosphorus and perchlorate issues in order to move forward. John said that the Army is concerned about the appropriateness of addressing constituents that were already addressed by the HTRW ROD in 1998. Rose added that the Technical Planning Process (TPP) had identified only two constituents that need to be addressed - white phosphorus and perchlorate, and that perchlorate was dropped for two of the sites.

Other Environmental Restoration Issues/Concerns **Rose Zeiler**

Construction Debris Landfill
The feedback from ECC is that everything has been pulled into one work plan. It is plausible that the documents should come back in early July. The cover on Landfill 19 is expected to be seeded with native vegetation (e.g. or tall grass prairie or other native grass).

2010 IAP
This will be finalized in June and will be placed on the website after that time.

Road Maintenance
USFWS is determining which roads at the facility should be maintained. If Shaw has any related requests, they may provide input for consideration.

Transfer Update **Rose Zeiler**

Powerhouse Demolition
The schedule of the Powerhouse demolition was discussed briefly. The demolition is currently in progress and the contractor expects to complete it this month. Scottie Fiehler mentioned that more asbestos was encountered than expected. The contractor found some asbestos-containing insulation exterior to the bricks of the furnace.

Transfer of LHAAP-12 Parcel
There is nothing new to report regarding the transfer of this parcel.

ECOP VI
There are some issues to the ECOP; however, Rose anticipates the parcels in ECOP VI to be transferred by the end of the fiscal year.

The next monthly manager's meeting will be held via teleconference on July 14, 2009 at 2 PM. [*The time was subsequently changed to 9 AM.*]

Meeting Adjourned

Action Items:

Army

- RMZ to forward MMRP LUC notification language to Fay Duke.

- Aaron to coordinate with FWS and contractor to ensure appropriate native vegetation is seeded on Landfill 19

LONGHORN ARMY AMMUNITION PLANT
MONTHLY MANAGERS' MEETING

Location	Longhorn Army Ammunition Plant, Karnack, Texas	CLNWR Conf. Room	
Date	16-Jun-2009	**Time**	2:00 PM

ATTENDEES

Name (printed)	Signature	Organization	Phone	E-mail
Longhorn Team Members				
Rose M. Zeiler		BRAC	(479) 635-0110	rose.zeiler@us.army.mil
Matthew Mechenes		USAEC	(410) 436-1505	matthew.mechenes@us.army.mil
Aaron Williams		USACE, Tulsa	(918) 669-4915	aaron.k.williams@usace.army.mil
John Lambert		USACE, Tulsa	(918) 669-4992	john.r.lambert@SWT03.usace.army.mil
Scottie Fiehler		USACE, Tulsa	(918) 669-7232	scottie.fiehler@us.army.mil
Stephen Tzhone		USEPA, Dallas	(214) 665-8409	tzhone.stephen@epa.gov
Raji Josiam		USEPA, Dallas	(214) 665-8529	josiam.raji@epa.gov
Fay Duke		TCEQ, Austin	(512) 239-2443	fduke@tceq.state.tx.us
Dale Vodak		TCEQ, Tyler	(903) 535-5142	dvodak@tceq.state.tx.us
Barry Forsythe	phone	USFSW, Dallas	(214) 665-8467	forsythe.barry@epa.gov
Paul Bruckwicki		USFSW, Karnack	(903) 679-4536	paul_bruckwicki@fws.gov
Mark Williams		USFSW, Karnack	(903) 679-9144	mark_williams@fws.gov
Greg Jones		SHAW, Houston	(713) 996-4472	greg.n.jones@shawgrp.com
Kay Everett		SHAW, Houston	(713) 996-4421	kay.everett@shawgrp.com
Kent Becker	phone			
~~Barry Fo~~				
Terry Burton		USEPA, ORD, DALLAS	(214)665-7139	burton.terry@epa.gov
TOM LEDERLE		HQDA BRAC	7036022854	thomas.lederle@us.army.mil

Shaw® Shaw Environmental, Inc.

Status of Sites and Technical Documents
Longhorn Army Ammunition Plant – PBC Contract
16 June 2009

No.	Document in Progress	Submittal Date	Army	Regulator	Next Submittal	Expected Date	Army	Regulator	Comment Resolution	Status	Remarks
1	Draft Decision Document, LHAAP-02	4/06/09	x		Draft Final DD	06/30/09	x	x		Evaluating how to address soil-to-groundwater COCs within LHAAP-02, without having to include monitoring within LHAAP-58	
2	Draft Final SI Report for LHAAP-03, Rev 01	12/30/07		x	Final	07/02/09	x	x		RTCs submitted to Army for review on 05/29/09	Final SI report to be submitted after RTCs are resolved.
3	Final EE/CA, LHAAP-04	3/05/09	x	x					NA	Final EE/CA submitted on 3/5/09. Public comment period 3/15/09 – 4/15/09	
4	Draft Action Memorandum, LHAAP-04/Pistol Range	3/13/09	x		Final Action Memo	6/30/09	x		In progress	Revised Draft Action Memo submitted to Army on 4/14/09. Comments reeived from Army on 06/15/09.	No regulatory review or signatures required
5	Draft Final Removal Action Work Plan, LHAAP-04/Pistol Range	5/21/09	x	x	Final	06/25/09	x	x	In progress	TCEQ comments received.	
6	Final Decision Document, LHAAP-06, 07, 51, 55, 64, 66, 68	12/18/08	x		NA				NA	Final copies were distributed on 12/18/08.	Scheduling survey, followed by County notification.
7	Draft Final Feasibility Study Addendum, Rev 01, LHAAP-16	7/3/08		x	RTC	06/30/09	x		In progress	EPA and TCEQ comments rec'd. RTCs reviewed by Army. RTC revision in progress	
8	Draft Final Feasibility Study, LHAAP-17	4/14/09	x	x	Final	06/30/09	x	x	In progress	Revised RTCs submitted to Army on 5/29/09. RTCs include revised text for alternatives and trigger for turning off extraction.	

Shaw® Shaw Environmental, Inc.

Status of Sites and Technical Documents
Longhorn Army Ammunition Plant – PBC Contract
16 June 2009

No.	Document in Progress	Submittal Date	Army	Regulator	Next Submittal	Expected Date	Army	Regulator	Comment Resolution	Status	Remarks
9	Draft Feasibility Study, LHAAP-18/24	3/3/09	x		Draft Final	07/02/09	x	x	In progress	Army comments received. Resolution in progress	
10	Draft Final Feasibility Study, LHAAP-29	03/11/09	x	x	Final	07/09/09	x	x	In progress	TCEQ comments received. EPA comments pending. New well installed and sampled week of 06/08/09 in groundwater below the intermediate zone.	
11	Draft Final Focused Feasibility Study, LHAAP-46	1/30/09	x	x	Final	06/30/09	x	x	In progress	Responses for TCEQ and EPA comments submitted to Army for review on 05/13/09.	
12	Draft Focused Feasibility Study, LHAAP-47	12/23/08	x		Draft Final	07/02/09	x	x	In progress	Army comments received. Conducted a new round of groundwater sampling. RTC in prep.	
13	Draft Final Site Evaluation Report for LHAAP-49	3/3/08	x	x	Final	6/16/09	x	x	Completed.	Collected a new round of samples from wells. Results reported. Proceeding with Final Report.	
14	Draft Final Feasibility Study, LHAAP-50	11/20/08	x	x	Final	06/30/09	x	x	In progress	Regulatory comments received. Revised responses submitted to Army for review on 05/13/09.	
15	Draft Final Feasibility Study, LHAAP-58	9/20/07	x	x	Final	06/30/09	x	x	In progress	MNA evaluation submitted to regulators. Revised RTCs submitted to Army for review on 05/12/09.	
16	Final Decision Document, LHAAP-60	12/18/08	x						NA	Final copies were distributed on 12/18/08.	Scheduling survey, followed by County notification.
17	Final EE/CA, Pistol Range	2/25/09	x	x					NA	Final EE/CA submitted on 2/25/09.	See LHAAP-04 regarding Action Memorandum and Work Plan

Shaw® Shaw Environmental, Inc.

Status of Sites and Technical Documents
Longhorn Army Ammunition Plant – PBC Contract
16 June 2009

No.	Document in Progress	Submittal Date	Army	Regulator	Next Submittal	Expected Date	Army	Regulator	Comment Resolution	Status	Remarks
18	Final Addendum, LHAAP-35/36	4/22/09	x	x					NA	Final document submitted.	
19	Draft Decision Document, LHAAP-35/36	5/22/09	x		Draft Final	06/25/09	x	x	In progress	Draft Decision Document submitted to Army on 05/21/09; Army comments received on 06/09/09.	

Shaw® Shaw Environmental, Inc.

Date: June 16, 2009

Project No.:117591

TRANSMITTAL LETTER:

To: Mr. Aaron Williams

Address: US Army Corps of Engineers - Tulsa
CESWT-PP-M
1645 South 101st East Ave
Tulsa, Oklahoma 74128

Re: Final Site Evaluation Report LHAAP-49, Former Acid Storage Area
Longhorn Army Ammunition Plant, Karnack, Texas, June 2009

Contract No. W912QR-04-D-0027/DS02

For: Review ____ As Requested ____ Approval ____ Corrections ____ Submittal ____ Other X ____

Item No:	*No. of Copies*	*Date:*	*Document Title*
1	2	June 2009	**Final Site Evaluation Report LHAAP-49, Former Acid Storage Area** Longhorn Army Ammunition Plant, Karnack, Texas

Aaron – Enclosed please find two copies of Shaw's final version of the above-named document.

The document has been distributed according to the list below. Please call if any questions or comments.

Sincerely:

Praveen Srivastav
Project Manager

CC: Distribution List:
J. Lambert/S. Fiehler – USACE, Tulsa (sent to A. Williams for distribution)
M. Mechenes – AEC
Rose Zeiler – BRAC-LHAAP
S. Tzhone – EPA Region 6 (2)
F. Duke – TCEQ, Austin (2)
D. Vodak – TCEQ, Tyler
P. Bruckwicki –U.S. Fish and Wildlife Service

3010 Briarpark Drive, Suite 400, Houston, Texas 77042 Phone: (713) 996-4522/Fax: (713) 996-4436

DEPARTMENT OF THE ARMY
LONGHORN ARMY AMMUNITION PLANT
POST OFFICE BOX 220
RATCLIFF, AR 72951

June 16, 2009

DAIM-ODB-LO

Mr. Stephen Tzhone
US Environmental Protection Agency
Superfund Division (6SF-AT)
1445 Ross Avenue
Dallas, TX 75202-2733

Re: Final Site Evaluation Report, LHAAP-49, Former Acid Storage Area, Longhorn Army Ammunition Plant, Karnack, Texas, June 2009

Dear Mr. Tzhone,

The above-referenced document is being transmitted to you for your records. The document has been prepared by Shaw Environmental, Inc. (Shaw) on behalf of the Army as part of Shaw's performance based contract for the facility.

The point of contact for this action is the undersigned. I ask that Praveen Srivastav, Shaw's Project Manager, be copied on any communications related to the project. I may be contacted at 479-635-0110, or by email at rose.zeiler@us.army.mil.

Sincerely,

Rose M. Zeiler, Ph.D.
Longhorn AAP Site Manager

Copies furnished:
F. Duke, TCEQ, Austin, TX
D. Vodak, TCEQ, Tyler, TX
A. Williams, USACE, Tulsa District, OK
M. Mechenes, USAEC, MD
J. Lambert/S. Fiehler, USACE, Tulsa District, OK
P. Bruckwicki, Caddo Lake NWR, TX
P. Srivastav, Shaw – Houston, TX (for project files)

DEPARTMENT OF THE ARMY
LONGHORN ARMY AMMUNITION PLANT
POST OFFICE BOX 220
RATCLIFF, AR 72951

June 16, 2009

DAIM-ODB-LO

Ms. Fay Duke
Texas Commission on Environmental Quality
TCEQ Environmental Cleanup Section I, Team 2, MC-136
12100 Park 35 Circle, Bldg D
Austin, TX 78753

Re: Final Site Evaluation Report, LHAAP-49, Former Acid Storage Area, Longhorn Army Ammunition Plant, Karnack, Texas, June 2009
SUP 126

Dear Ms. Duke,

The above-referenced document is being transmitted to you for your records. The document has been prepared by Shaw Environmental, Inc. (Shaw) on behalf of the Army as part of Shaw's performance based contract for the facility.

The point of contact for this action is the undersigned. I ask that Praveen Srivastav, Shaw's Project Manager be copied on any communications related to the project. I may be contacted at 479-635-0110, or by email at rose.zeiler@us.army.mil.

Sincerely,

Rose M. Zeiler, Ph.D.
Longhorn AAP Site Manager

Copies furnished:
S. Tzhone, USEPA Region 6, Dallas, TX
D. Vodak, TCEQ, Tyler, TX
P. Bruckwicki, Caddo Lake NWR, TX
J. Lambert/S. Fiehler, USACE, Tulsa District, OK
A. Williams, USACE, Tulsa District, OK
M. Mechenes, USAEC, MD
P. Srivastav, Shaw – Houston, TX (for project files)

FINAL
SITE EVALUATION REPORT
LHAAP-49
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

JUNE 2009

Response to Comments on Draft Final Site Evaluation Report, LHAAP-49 (published September 2007)
Longhorn Army Ammunition Plant, Karnack, Texas

January 2009

Reviewer: TCEQ and USEPA
Respondent: Shaw Environmental, Inc.

1. Respondent Concurs (C), Does Not Concur (D), Takes Exception (E), or Delete (X).
2. Commenter Agrees (A) with response, or Does not Agree (D) with response.

<table>
<tr><th>Comment #</th><th>Page</th><th>Section/ Paragraph</th><th>Comment</th><th>C, D[1], E or X</th><th>Response</th><th>Subsequent Comment</th><th>Follow-up Response</th></tr>
<tr><td colspan="8">Fay Duke, Project Manager/TCEQ</td></tr>
<tr><td>1</td><td></td><td>Section 2.4</td><td>It is stated in Section 2.4 of the report that a few samples from the RI and USFWS investigations that are separated from the site by roadways and/or significant distances were excluded from the data set that is considered within this report. Please identify which samples were excluded.</td><td>C</td><td>The following text will be added to the end of the 5th paragraph of Section 2.4:
The samples that were excluded, and their associated lead and mercury analytical results, are as follows:
<table>
<tr><th>Location</th><th>Depth (feet bgs)</th><th>Lead (mg/kg)</th><th>Mercury (mg/kg)</th></tr>
<tr><td>FWS-026</td><td>0-0.5</td><td>51.9</td><td>0.117</td></tr>
<tr><td>49SS40</td><td>0-0.5</td><td>6.92</td><td>0.0335</td></tr>
<tr><td>49SS41</td><td>0-0.5</td><td>10.3</td><td>0.0353</td></tr>
<tr><td>49SS42</td><td>0-0.5</td><td>58.4</td><td>0.0441</td></tr>
<tr><td>49SS43</td><td>0-0.5</td><td>9.38</td><td>0.0337</td></tr>
<tr><td>49SS44</td><td>0-0.5</td><td>7.56</td><td>0.0151</td></tr>
<tr><td>49SS46</td><td>0-0.5</td><td>27.3</td><td>0.0323</td></tr>
<tr><td>49SB06</td><td>0-0.5</td><td>65.1</td><td>0.0705</td></tr>
<tr><td>49SB06</td><td>1-2</td><td>17.9</td><td>0.081</td></tr>
</table>
A figure showing the approximate locations of these points is attached to these responses (Figure RTC-1).</td><td>Agree.</td><td>— — —</td></tr>
<tr><td>2</td><td></td><td>Section 2.5.2.2</td><td>Section 2.5.2.2 summarizes the analytical results of the soil and sediment samples. As shown in Figure 2-5, the elevated concentrations of lead are located in the central portion of the site while the elevated concentrations of mercury were localized in a small area northwest of 4th Street. We are concerned with the high concentration of mercury in the area of samples 49SB32 (84.2 ppm) and 49SD05 (778 ppm). Because the concentrations in these two samples are highly elevated relative to the other areas at this site, this area should be evaluated as a localized "hot spot". We further recommend that limited remedial action be considered to address the highly localized mercury contamination in this area.</td><td>D</td><td>While the 2002 risk assessment for LHAAP-49 conservatively assumed an industrial scenario, we now know that the future land use at the facility will be as a wildlife refuge (Federal Register: October 19, 2000; Volume 65, Number 203; Pages 62748-62749). In the future, humans may enter the site for maintenance or recreational activities. However, those activities will be spread across a refuge with a total area in excess of 8,500 acres. Neither LHAAP-49 as a whole nor the subparts that are referenced in the comment have characteristics that make them any more likely to be subject to those activities than other parts of the refuge. Therefore, the assumption of “hot spot” impacts is unrealistic. The current evaluation, which examines exposure point concentrations across the 30-acre area of LHAAP-49, is itself conservative, since LHAAP-49 constitutes only 0.4 percent of the ultimate refuge land area.</td><td>We remain concerned with the elevated concentrations of mercury in the localized area northwest of 4th street. We disagreed with the assertion that in the future a person activities at the site can be assumed to move randomly across the 8,500 acres site. It is our understanding from the USFWS that this area is adjacent to a proposed public use wildlife observation trail. This trail will allow public access for a multitude of Refuge visitors. Additionally, some chemical at high concentration in a localized hot spot can produce an effect after a single or very short-term exposure. Therefore, it is also important to assess whether exposure to "hot spot", the high concentration of mercury, under short-term exposure duration to the high concentration of mercury, that human health is protected.</td><td>Per subsequent discussions between TCEQ, EPA, Army, and Shaw, soil at and around the two locations with highest mercury concentrations was excavated and disposed off site. The removal report is attached to the SER as Appendix D.</td></tr>
</table>

Response to Comments on Draft Final Site Evaluation Report, LHAAP-49 (published September 2007)
Longhorn Army Ammunition Plant, Karnack, Texas

January 2009

Reviewer: TCEQ and USEPA
Respondent: Shaw Environmental, Inc.

1. Respondent Concurs (C), Does Not Concur (D), Takes Exception (E), or Delete (X).
2. Commenter Agrees (A) with response, or Does not Agree (D) with response.

Comment #	Page	Section/ Paragraph	Comment	C, D[1], E or X	Response	Subsequent Comment	Follow-up Response
3		Section 3.1.3	It is stated in Section 3.1.3 of the report that based the anticipated future use of the facility as a wildlife refuge, the groundwater will not be used in the future as a drinking water source and limited use of groundwater as a drinking water source if the facility future land use were assumed to be an industrial scenario. Please note that under the Texas Risk Reduction Rule (RRR), groundwater that is a current or potential source of drinking water must be restore to meet the Maximum Contaminant Levels (MCLs) or, if MCLs are not available, levels that are acceptable for human ingestion.	E	Noted. The chemicals that previously exceeded MCLs at LHAAP-49 were antimony, chromium, and nitrate/nitrite. Shaw has performed additional sampling using low flow methods. **Attachment 1** present some proposed text changes and a revised summary of groundwater results for metals is included as **Table RTC-1**. As presented in those attachments, antimony did not exceed its MCL in results from the recent low flow samples. Total arsenic and total selenium were detected above their MCLs in one of the 2007 samples, but dissolved arsenic and dissolved selenium in the same sample were below their MCLs. These results demonstrate the variability of natural metal concentrations in the shallow groundwater at LHAAP and the impact of particulates. Please see response to Comment #8 regarding nitrate/nitrite.	Numerous metals and nitrite/nitrate concentrations in wells are above MCLs. Various justifications were provided as to why it is not necessary to implement any actions to addressing these chemicals in groundwater. It is reported that both filtered and unfiltered samples were taken to assessed whether the concentrations in groundwater were attributed to particulate. Please note that it is the TCEQ policy to use unfiltered sample results for decision making. In accordance with the TCEQ Implementation of the Existing Risk Reduction Rule memorandum dated July 1998, groundwater samples should be collected using a low flow purge and collection. If the turbidity measurement of the water to be sampled is greater than 10 nephelometric turbidity units (NTU), the water can be filtered through a 10 micrometer (or larger) pore size filter into the sample container containing any necessary preservative. Use of low flow collection techniques and filtering through a filter with a pore size of 10 um or larger ensures the sample collected represents the groundwater with its naturally suspended solids, e.g., collodials, and does not exclude any of those solids that could migrate with the water in the saturated zone. Please clarify whether the filtered samples were conducted in accordance with this guidance? While we acknowledge that at sites LHAAP-48 and LHAAP-53, in additions to the installation of a PVC well adjacent to the stainless steel well, filter and unfiltered samples were collected as an additional weight of evidence that concentrations of chromium and nickle were the result corrosion of the steel well casing. It is not acceptable to us that the justifications for not considering a metal contaminant in risk evaluation is based on the assumption that the well is corroded. Additionally, we have concerns that evaluation of other metals that is not typically associated	Over the past 11 years, five parameters have been detected at concentrations exceeding MCLs. These parameters should be considered individually: ▪ Antimony. Antimony was detected above its MCL (0.006 mg/L) once at 49WW01 (0.015 mg/L) and once at 49WW02 (0.012 mg/L). Both these samples were collected in 1998, and the field duplicate at 49WW01 had a non-detect result (0.005U mg/L). In the three subsequent sampling events (December 2000, May 2005, and October 2007) at 49WW01, the results (mg/L) were 0.005U, 0.000594J, and 0.0025U, respectively, well below the MCL of 0.006. Similarly, the later results at 49WW02 were 0.005U in December 2000 and 0.0005U in May 2005 (49WW02 was dry in 2007). 49WW03 has consistently had non-detect results for antimony. The new well 49WW06 (near 49WW03) had a detection of antimony, but the result was only 0.00181 – well below the MCL. The 1998 results may have been biased high due to the sampling methods in use at that time. However, regardless of sampling method, the results since 1998 have consistently shown that antimony is not a problem at LHAAP-49. ▪ Arsenic. Total arsenic was detected above its MCL (0.010 mg/L) only four times in 16 analyses – at 49WW03 in October 2007 (0.0131 mg/L) and at 49WW06 in December 2008 (0.0483 mg/L), April 2009 (0.0139 mg/L), and May 2009 (0.0128 mg/L. ▪ Chromium. Of 15 total chromium analyses, six have been above the MCL (0.100 mg/L). One exceedance occurred at 49WW01 in 2000; it was only 10% above the MCL, and was followed by much lower results in 2005 and 2007. Five of the six exceedances were at 49WW03 and varied from 2 to 8 times the MCL. Because chromium is a component of stainless steel and the well at 49WW03 has a stainless steel screen, corrosion was suspected to be the source of the chromium. To confirm this, a new well with a PVC screen (49WW06) was installed approximately 15 feet up-gradient of 49WW03 and sampled. The December 2008 chromium result at 49WW06 was 0.00673 mg/L, which was much less than the most recent result at 49WW03 (0.207 mg/L in October 2008). This one to two orders-of-magnitude difference is similar to that seen between total and dissolved (based on 0.45 µm filtration) chromium results at 49WW03 in 2005 and 2007 (see **Table RTC-1**). The comparison between 49WW03 and 49WW06 points toward well materials as the likely source of the difference in chromium concentrations. ▪ Selenium. Of 14 total selenium analyses, selenium was detected above its MCL (0.005 mg/L) at 49WW03 in October 2007 (0.0581 mg/L) and at 49WW06 in December 2008 (0.0603 mg/L). Both results are below the concentrations representative of perimeter wells at

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						with well corrosion is based on filtered samples. Please note that if it is believed that corrosion of the well screens is not localized and is expected though out the installation, a well survey of all existing wells with stainless well screens should be conducted to evaluate which wells are corroded. Additionally, well with a corroded well screen must be plugged and replacement well be installed. We recommend that the abandonment of the corroded well includes pulling out the a few selected well screens for inspection and confirmation. Chemicals that may be the results of the corrosion of the stainless well screen must be identified. For site LHAAP-49, wells should be inspected. If it cannot be done, a comparison study should be conducted using PVC wells. If it is determined that wells screens are indeed corroded, than the weight of evidence approach may be used to justify for not remediate based on the chromium and nickel concentrations.	Longhorn AAP (see *Evaluation of Perimeter Well Data for Use as Groundwater Background* [Shaw, 2007a]). ▪ Nitrate/nitrite. Shaw performed additional investigations in 2008 and 2009 to delineate nitrate/nitrite. This included installation of a new well (49WW04) adjacent to 49WW02, but screened at a lower interval to provide a more reliable source of groundwater samples. The investigation also included new wells to the north, south, and west of 49WW02. The attached figure (**Figure RTC-2**) provides a map of the nitrate/nitrite region and includes a table of all historical nitrate/nitrite results. As demonstrated in that figure, the nitrate/nitrite is limited to the immediate vicinity of 49WW02 and 49WW04. Based on the points presented in the above discussion, antimony, arsenic, chromium, selenium, and nitrate/nitrite should not be designated as COCs. The above discussion incorporates the results of additional sampling in 2008 and 2009. Five new wells were installed at LHAAP-49 to support that sampling. To incorporate this new well and sampling information into the Site Evaluation Report, the document will be revised at the following points: ▪ Section 2.4 – new paragraph and response to comment added ▪ Section 2.5 – new ▪ Section 2.6 – new (formerly 2.5) ▪ Section 2.6.1 – new paragraph (formerly 2.5.1) ▪ Section 2.6.2.2 – two new paragraphs (formerly 2.5.2.2) ▪ Section 2.6.2.4 – replace first paragraph and bullet (formerly 2.5.2.4) ▪ Section 3.1.3 – replace with response to comment #14 ▪ Section 3.2 – new paragraph and seven bullets added ▪ Section 3.4 – replacement text ▪ Section 4.0 – replacement text ▪ New **Appendix F** with new results, field notes, and laboratory reports [Note: See "Summary of Subsequent Discussions on Comment #3" for additional information.] <u>Sample Filtration</u> The filtered samples presented in conjunction with earlier responses (see **Table RTC-1**) utilized filters with a smaller pore size (0.45µm) than the 10 µm pore size of the TCEQ methodology. Shaw did additional sampling in 2008 and 2009, and those results are provided in **Table RTC-1**. Because of low turbidity, the 2008 and 2009 samples did not require filtering through 10 µm filters.

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4		Section 3.2	It is stated in Section 3.2 of the report that the findings documented in the updated baseline risk assessment (Appendix C) confirm the results of the previous baseline risk assessment performed by Jacobs. The TCEQ toxicologist has reviewed the updated baseline risk assessment and comments from the TCEQ toxicologist are provided as an attachment.	- - -	Please see the responses to Comments 10, 11, and 12.	No response necessary	— — —
5		Section 3.2	It is stated in Section 3.2 of the report that the chemicals of potential concerns (COPCs) identified for groundwater are not the same as the COPCs identified for soil, and soil contaminants have had more than 60 years to potentially migrate from the surface soil to the groundwater. Therefore, the COPCs present in the groundwater at elevated levels do not appear to be related to past site activities. We believe this reasoning is not sufficient to justify that the groundwater contaminants are not site-related. We note that many of the chemicals including those that were not identified as COPCs for groundwater exhibit concentrations in soil which exceeded the Texas soil-to-groundwater medium specific concentrations (MSC) for soil. However, the above reasoning may suggest that the COPEC in soil is unlikely to be a continuous source of groundwater contamination at this site.	E	It is reasonable to assume that any spills or leakage associated with site operations would have had their greatest effect in the upper soil layers and that migration of contaminants would result in impacts that decrease with depth down to the water table. Despite this, the metals that are COPCs in soil (lead, mercury, and vanadium) are not found to have significant concentrations in groundwater at LHAAP-49, while the metals that are COPCs in groundwater (antimony, chromium, nickel, and strontium) are not found to have significant concentrations in the soil. Furthermore, groundwater COPCs have relatively high adsorption factors which would mean that they should have been soil COPCs if they were site related. Therefore, the statement that metals in groundwater “do not appear to be related” to past operations seems realistic without overstating the relationship. Please note that this discussion addresses only metals. The other groundwater COPC, nitrate/nitrite may have been associated with nitric acid stored during site operations, ammonia storage in the early 1950s (Plexus, 2005), or prior agricultural usage. However, as noted in the response to Comment #8, nitrate/nitrite was detected only in 49WW02, which is intermittently dry and not considered a potential water supply source. LHAAP-49 was the subject of a site-specific risk assessment under Texas Risk Reduction Rule, Standard 3, prepared by Jacobs in 2002 and approved by USEPA and TNRCC (now TCEQ). That assessment addressed soil and groundwater risks at LHAAP-49. Therefore, comparison of results against Standard 2 MSCs, including soil to groundwater MSC as suggested in the comment, would not be applicable. However, in response to the reviewer’s comment, Shaw performed modeling to evaluate the potential for transport of contaminants from soil to groundwater. For conservatism, the two COCs with the most significant soil concentrations (lead and mercury) were modeled. Using the EPA’s VLEACH Model, the concentration of each metal for the entire top 2 feet of soil was set at the highest concentrations detected. Below 2 feet, background values were used. The results were as follows: • Lead – Using the average soil pH measured at LHAAP-49, the adsorption coefficient (Kd) was calculated per the equation presented in "Understanding Variation in Partition Coefficient, Kd, Values,” Volume II: Review of	The soil to groundwater modeling calculation was forwarded to the staff from the TCEQ technical support section. Listed below are their comments: *Information regarding VLEACH model setup and input data is incomplete in the subject document. Input parameter information should comprise, at a minimum, the data discussed in Section 6.0 and Appendix E of the USEPA VLEACH Model document. *VLEACH model output data is incomplete in the subject document. Model output information as described in Section 9.0 and appendix D of USEPA VLEACH model document is requested. Also specifically requested are the graphical printouts depicting predicted COC soil concentration profiles vs model times and predicted groundwater impact vs model time. *The additional input and output information requested is essential to further evaluation of the model submitted.	The requested information will be provided as electronic files in a format analogous to that utilized in the draft final EE/CA for the Former Pistol Range.

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					Geochemistry and available Kd values for Cadmium, Cesium, Chromium, Lead, Plutonium, Radon, Strontium, Thorium, Tritium (^{3}H), and Uranium", EPA Report no. EPA 402-R-99-004B, August 1999. The maximum predicted leachate concentration was approximately 6 µg/L - below the MCL (15 µg/L) and consistent with the measured groundwater concentrations at LHAAP-49. • Mercury – The lowest adsorption coefficient reported in the literature was 322 ml/g. Also, a site-specific value was calculated using soils at background and the groundwater detection limit. The site-specific Kd value was 288 ml/g, which is comparable to the minimum value reported in the literature. For both values, the maximum predicted leachate concentration was less than the MCL (2 µg/L) for at least 1000 years. The model predictions are slightly higher than the measured groundwater concentrations at LHAAP-49. The modeling will be summarized in the text in **Section 2.5.2.4**, and an appendix will be added to describe the model, identify the input, tabulate the output, and evaluate the results. The results of the modeling will also be briefly mentioned in **Sections 3.4** and **4.0**. Please see **Attachment 1** for the proposed changes to **Section 4.0**.		
6		Section 3.2	It is further stated in Section 3.2 of the report that metal contaminants found in groundwater may be attributable to the methods utilized in the collection of groundwater or as the result of well corrosion. We believe additional data would be necessary to substantiate these statements.	C	To address this concern, Shaw collected additional groundwater samples in October 2007 and located some previously missed data from May 2005, both of which utilized low flow procedures. **Attachment 1** provides some related text changes. **Table RTC-1** provides a summary of the new metal and anion results along with the earlier results. The response to Comment #3 is also related to this topic.	Please see response to Comment 3.	— — —
7		Section 4.0	In Section 4.0 of the report, the rationale for the no-action recommendation includes the reasoning that dioxins are ubiquitous at the facility and not specifically related to any process at LHAAP-49. We recommend that this reasoning be deleted.	C	The 3rd sentence of the 1st bullet item in **Section 4.0** will be deleted.	Agree.	— — —
8			Nitrate/nitrite was detected in groundwater above the MCL in one of the three samples collected in 1998. We believe that additional data is necessary to delineate the extent of groundwater contamination.	C	Shaw has performed additional sampling and will add the results to the evaluation (see **Table RTC-1**). Nitrate/nitrite has been detected in only one well, 49WW02, which is the most shallow of the three monitoring wells. Well 49WW02 was dry in October 2007. Hence, the well could not be a continuous source of drinking water and the MCL should not apply. Text in **Sections 2.4, 2.5.1, 2.5.2.4, 3.1.3, 3.2, 3.4,** and **4.0** will be checked and revised as necessary to reflect this (see **Attachment 1**).	The response does not adequately address our concern regarding the delineation of the extent of the nitrate/nitrite contamination in groundwater. Just because a well goes dry cannot be used as a rational that the aquifer is not a drinking water source. There are various reasons that wells goes dry (e.g., depth of well screen). Is well 49WW02 installed in a different water bearing zone from other wells at this site? Finally even if restoration of groundwater to MCL at this well does not applied, delineation is still necessary to ensure that the	Please see Follow-up Response to Comment #3.

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						contamination would not migrate to other part of the same aquifer where it does not go dry.	
9			Finally, please note that a deed certification must be filed in the county record in order to comply with the nonresidential soil requirements for site closure/remediation under RRR Standard 3. The deed certification must indicate that future land use is considered suitable for nonresidential use. An example format of the deed certification is provided in 30 Texas Administrative Code 5335.569.	C	Notification will be provided if required.	Agree.	— — —
Joseph Haney, Toxicology Section/TCEQ							
10		Section 2.4 Identification of Chemicals of Potential Concern (COPC) for Industrial Use Assessment	This section uses various statistical methods for comparing site data to background concentrations. While Section VI.3 of the Consistency Document does not give a detailed description of appropriate comparison methods, the April 30, 1998 memorandum *Use of Statistics for Determining Soil/Groundwater Cleanup Levels under the Risk Reduction Rules* (available at *http://tceq.com/assets/public/remediatiodvcp/statisti.pdf)* indicates to compare only single data points (not a statistic) to the background 95% upper tolerance limit (UTL). Furthermore, it states, "Any single data point from the site that exceeds the background UTL indicates that contamination is present." The statistical comparisons made in the updated BHHRA were not reviewed as TS does not have expertise in this area. However, this may affect the BHHRA as it was part of the COPC selection process. TS defers review of these statistical comparisons to TCEQ staff with expertise in that area.	C	**Table 2-2** of the draft final report will be revised to include the 95%/95% upper tolerance limit (UTL) of the background data set as reported in *Final Background Soil Study Report, Longhorn Army Ammunition Plant, Karnack, Texas*, Shaw Environmental, Inc., July 2004. The background concentration of aluminum is the Texas-specific median background concentration provided in June 28, 2000 TCEQ memorandum from Chet Clarke to Remediation Division Project Managers. **Table 2-2** will be revised further to demonstrate that comparisons of the greater of the maximum detected concentration or the maximum reporting limit to the background screening concentrations identified four metals COPCs (lead, mercury, vanadium, and dioxins). The revised table will identify the same COPCs as identified in the draft final document. The statistical methods cited in **Appendix C** are standard statistical tests provided in USEPA guidance cited as (USEPA, 2002a) in **Appendix C** of the document.	Agree.	— — —
			This section indicates that COPCs were eliminated if they were detected in less than 5% of at least 20 samples at "low" concentrations and they were not known to be associated with site operations. This screening procedure may be a misunderstanding of Section 111.1 of the Consistency Document, which indicates that a COPC may be eliminated from further consideration in the risk assessment if it meets all the following criteria: (1) it is detected in less than 5% of at least 20 samples; (2) it is only detected in one media; (3) its maximum concentration (i.e., the higher of the maximum detected concentration or the appropriate proxy value for non-detect samples per Section 11.4.3) is less than its Standard No. 2 MSC; and (4) there is no reason to believe it is present at the site. However, upon review of Tables 2-2 and 2-3, it does not appear that the frequency of detection criteria referred to in the updated BHHRA were actually used to screen out any COPCs.	C	As the comment notes, none of the chemicals were eliminated on the basis of frequency of detection. The footnote describing this potential screening condition will be removed from the revised **Table 2-2**, and **Table 2-4**.		
			It does not appear that non-detects were considered in the screening process. However, review of Tables 2-2 and 2-3 appears to indicate that consideration of maximum reporting limits (e.g., silver) would not have altered the COPC selection process for this site. For future reference, the maximum concentration for COPC screening should be considered the higher of the maximum detected concentration or the appropriate proxy value for non-detects per Section 11.4.3 of the Consistency	E	The use of the maximum reporting limit was applied as required by the Consistency Document and will be clarified in the revised **Table 2-2**.		

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			Document.				
11		Section 2.5 Comparison of Chemicals of Potential Concern Identified in the Jacobs (2002) Industrial Risk Assessment Groundwater	This section indicates that three groundwater COPCs (i.e., antimony, chromium, nitrate/nitrite) exceed their respective federal MCLs, nickel and strontium exceed screening levels, and 2,3,7,8-TCDD and thallium were not detected at concentrations exceeding their MCLs. TS defers to the TCEQ project manager as to whether elimination of manganese as a COPC is appropriate based on similarity to perimeter well results. Section 5.6.1 of the August 2002 final BHHRA indicates a HI of 2.3 for future maintenance worker exposure to groundwater, which exceeds the RRR target HI of 1.0.	---	Noted.	— — —	— — —
			Soil This section indicates that 95% upper confidence limits (UCLs) on the mean were calculated for use as source term concentrations. As mentioned in comment 3 of the 2002 TS memorandum regarding group 2 LHAAP sites, please note that per Section IV.3.1.2 of the Consistency Document, the exposure area for a commercial/industrial site should be assumed to be ½ acre. At an active, operational facility, responsible parties may demonstrate that a larger area is appropriate based on *documented* and *verifiable* worker activity pattern information. Alternatively, responsible parties may use analytical data to demonstrate that contamination is homogeneous across a larger assumed exposure area. If an exposure area larger than ½ acre is used for 95% UCL calculations, the responsible party should be required to note this fact by filing a deed notice within the real property records of the county of the affected property. See Section IV.3.1.2 of the Consistency Document for additional information.	C	Please see response to Comment #2 regarding area of site expected to be used by a worker at the wildlife refuge.	The response indicates that future land use will be as a wildlife refuge. Under the RRR, land use is classified as non-residential (i.e., commercial/industrial) or residential. While the land use designation of a wildlife refuge under the RRR (appears to be commercial/industrial) is deferred to other TCEQ staff, if the exposure area used for 95% UCL calculations is larger than the default exposure area for the land use as classified under the RRR (e.g., 1/2 acre for commercial/industrial), then the responsible party should be required to note this fact by filing a deed notice within the real property records of the county of the affected property per the Consistency Document.	Noted.
			TS defers to the TCEQ project manager as to whether elimination of aluminum and manganese as soil COPCs is appropriate based on background levels.	---	Noted.		
12		Table 2-4	TS notes that the 95% UCL for mercury (16.9 ppm) exceeds the Standard No. 2 SAI-Ind medium-specific concentration (SAI-Ind MSC of 0.15 ppm) by more than 100 times, yet the updated BHHRA indicates that soil hazard is acceptable. Footnote "d" to Table 3-84 of the August 2002 final BHHRA indicates that chemicals with a Henry's law constant greater than 1E-05 and a molecular weight less than 200 g/mole were evaluated as volatile. The Henry's law criterion is met by mercury, but the molecular weight (201 g/mole) very slightly exceeds the BHHRA cutoff (200 g/mole). Section X.I and Attachment D of the Consistency Document do not contain a molecular weight cutoff for consideration of volatilization when evaluating the inhalation pathway, only a Henry's law cutoff. TCEQ includes the volatilization of mercury in calculating cleanup values and inhalation hazard. The exclusion of mercury volatilization from the BHHRA likely resulted in significant underestimation of inhalation hazard.	E	The BHHRA was prepared by Jacobs in 2002. As a Standard 3 risk assessment under the Texas Risk Reduction Rules, the document provides realistic, site-specific assumptions related to the receptors and exposure pathways. The assessment approach presented in that document was based on an approved 1998 work plan and subsequent coordination meetings with USEPA and TCEQ. The resulting BHHRA was approved after review by the regulatory agencies. The BHHRA forms the basis of future actions at several LHAAP sites, including LHAAP-49, and revisiting the document at this time would be inappropriate. However, it can be noted that the use of more conservative assumptions to calculate risks at LHAAP would not yield more realistic results. In the case of the mercury vapor inhalation pathway, the mercury in soil at LHAAP-49 cannot realistically be expected to be 100% in the volatile metallic form that would maximize hazards associated with inhalation. Also, since LHAAP will be a wildlife refuge, a	The response indicates that it would be inappropriate to revisit the BHHRA at this time, and that mercury at LHAAP-49 cannot be expected to be 100% present in the volatile metallic form. However, no analytical data, information, or discussion is provided in the response pertaining to the form of mercury likely present at LHAAP-49 and how the calculated hazard would be affected based on that information.	Per subsequent discussion, the volatilization concern was associated with the two high mercury concentrations from samples north of 4th Street. As discussed in the Follow-up Response to Comment #2, the soil in the vicinity of those samples has been removed and disposed off site.

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					human receptor would not be expected to work in a limited area (specifically, the small area where mercury is elevated) for 250 days per year for 25 years, which are exposure assumptions that are typically used for evaluation of inhalation hazard. Please see response to Comment #2.	Please also see response 2.	Please see Follow-up Response to Comment #2.
			Additionally, Figure **A-1** of the *Draft Final Site Evaluation Report* for LHAAP-49 indicates surface soil mercury concentrations of up to 778 ppm (sample location 49SD65). Under Section IV.3.1 of the Consistency Document, hot spots may need to be addressed separately.	---			
Raji Josiam, Remedial Project Manager/USEPA Region 6							
13		Section 2.5.2.2 Soil and Sediment	The text states "At locations 49SB12, 14, 18, 19, and 27, the lead concentration in the surface soil (0 to 0.5 feet bgs) varied from 659 to 1740 mg/kg. These locations also had samples at 1 to 2 feet bgs; the lead concentrations in those samples varied from 12.8 to 125 mg/kg. Thus, the vertical migration of lead in the soil appears to be limited." Were samples taken between 0.5 feet and 1 feet? What were the results?	C	The full LHAAP-49 analytical results are provided in **Appendix A**. As noted there, the sampling depths did not include the 0.5 to 1.0 foot interval.	Concur.	— — —
14		Section 3.1.3 Groundwater	Paragraphs 2 indicate three water supply wells in use. What are the depths of these wells? Please indicate in text.	C	The following information will be added to the text: • Well 150 feet south-southeast of fire station: 128 feet • Well ½ mile southwest of fire station: 195 feet • Well at USFWS facility: 220 feet	First paragraph: Concur on added text.	— — —
			Also text states "Based on the anticipated future use of the facility as a wildlife refuge, the groundwater will not be used in the future as a drinking water source". Isn't the groundwater considered a potential drinking water source and hence the need for MCLs at the site?	C	As noted subsequently in the same paragraph, it has been the practice at LHAAP to conservatively assume an industrial use scenario; that scenario assumes potential limited use of groundwater as a drinking water source.	Last paragraph: Do not agree, changes necessary. The groundwater at LHAAP-49 is designated as a potential future source of drinking water by the State of Texas, and as such, must meet Maximum Contaminant Levels (MCLs). For additional information, see attached letter, dated April 10, 2008, regarding the Department of Army's Draft Five-Year Review, Response to Comments (specifically, Part 1: Rationale for Restoration of the Groundwater to MCLs). (See attached file: letter_2008_04_10_EPA to Army_5yr Review Pre-Concurrence Letter.pdf)	The third paragraph of Section 3.1.3 will be replaced with the following: “Based on the anticipated future use of the facility as a wildlife refuge, the groundwater will not be used in the future as a drinking water source.” However, the Army recognizes that the State of Texas considers all groundwater to be a potential future source of drinking water.” Please see Follow-up Response to Comment #3 regarding compliance with MCLs at LHAAP-49.
15		Section 3.2 Human Health Risk Assessment	The text indicates "Also, it does not identify manganese as a COPC because manganese results at LHAAP-49 were consistent with concentrations found in perimeter background wells at LHAAP (Shaw, 2007b). The antimony detections in groundwater at LHAAP-49 (12 and 15 mg/L) were slightly outside the range of results found in perimeter wells at LHAAP (2.79 to 11.5 mg/L)" How do we know that manganese is not migrating from another LHAAP area upstream of LHAAP-49? Does manganese in	E	Since manganese is consistent with background concentrations, there is no need to look for an up-gradient source. Shaw performed additional sampling using low-flow procedures to better evaluate the metals occurrences at LHAAP-49. Antimony was not detected above its MCL in the low-flow samples. Please see the related response to	Do not agree completely, changes or clarification necessary. Please provide additional information regarding the procedures associated with the collection of additional samples. In addition, this response to comment present that the elevated metals in groundwater is associated with the	Shaw’s groundwater monitoring procedures are available to EPA via documents provided on the ExtraNet portal. USGS has examined these procedures and found them to be acceptable. To evaluate the corrosion issue, Shaw installed a new PVC well adjacent to 49WW03. Please see Follow-up Response to Comment #3 regarding the results.

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			LHAAP-49 need to be included as part of remedial action for an upstream site? Since antimony has exceeded the MCLs it needs to be evaluated further. The text states that the metals present in the groundwater at elevated levels do not appear to be related to past site activities. Possible explanations for the elevated metals are given. One explanation was that associated with collection and analytical procedure uncertainties and corrosion of well casings. Resampling and analyzing is needed using correct methods to verify that this is indeed the case.	C	Comment #8 as well as **Table RTC-1.** Shaw has performed additional sampling using low-flow procedures to better evaluate the metals occurrences at LHAAP-49. Please see **Table RTC-1**.	corrosion of well casings. If this is so, additional tests (i.e., downhole video logging, installation of PVC wells and verification sampling) should be completed to confirm that the high levels of nickel and chromium are indeed a result of corrosion.	
16		Section 3.4 Summary	"The parameters that cause the groundwater HI to exceed 1 and that exceed MCLs are not the same parameters that were found at elevated concentrations in the soil. Hence, the chemicals of concern in groundwater are not related to known site operations and are likely an artifact of sampling methods and monitoring well corrosion." As indicated before the groundwater needs to be sampled and analyzed using correct methods to verify this. How do these parameters compare to levels at other LHAAP areas? Were the other LHAAP areas sampled and analyzed using correct methods. Is this a localized issue or a widespread issue? How do we know that these contaminants are not migrating vertically or horizontally? Since the groundwater is considered a potential drinking water source, the MCL are relevant and appropriate here. These MCLs need to be met or need to be waived according to the NCP (NCP 40 CFR300.430).	C C	Shaw has performed additional sampling using low flow methods and will update the document with the results. Other sampling methods were considered acceptable at the time of the earlier groundwater sampling. However, those methods are now known to yield metals results that are biased high due to particulates. The detected concentrations (including the exceedances of MCLs) appear to be localized and likely naturally occurring. They are not sufficient to lead to widespread contamination via migration. Noted.	Do not agree completely, changes or clarification necessary. Please see previous comments regarding clarification of sampling procedures, verification of corrosion of the well casings, and restoration of groundwater to MCLs.	Please see Follow-up Response to Comments #3.
17		Section 4.0 Conclusions and Recommendation	- "Antimony was detected in two of six groundwater samples at 12 and 15 mg/L. These results exceed the MCL (6 mg/L) and contribute 16% of the HI, but are only narrowly outside the range of results found in perimeter wells at LHAAP (2.79 to 11.5 mg/L). This needs further evaluation since MCLs are exceeded. - "Nickel (which contributes 22% of the HI) and chromium are likely associated with monitored well corrosion". This needs further evaluation to establish this statement. - "In general, the metals results are for unfiltered samples and are likely to be elevated due to the presence of particulates". Suggest resampling using correct methods. - "The metals that contribute to the groundwater findings are not COPCs in the soil. Hence they do not appear to be related to past operations". How do we know that these are not migrating from upstream? Should this be addressed in the remedial action at the upstream site?	C	Shaw has collected additional samples from the wells at LHAAP-49 utilizing low-flow sampling procedures. The results from analyses of those additional samples will be added to the report. Please see **Table RTC-1**. As presented in that table: – Antimony did not exceed its MCLs in results from the low flow samples – Total Arsenic was detected above its MCL in one of the 2007 samples, but dissolved arsenic in the same sample was below the MCL – Total chromium was detected above its MCL in one sample from 49WW01 and five samples from 49WW03, but dissolved chromium results from the same wells have been below the MCL. The results for nickel in 2005 and 2007 were inconclusive. Most of these nickel results exceeded the TCEQ's RBSV (0.073 mg/L). However, the results were below the exposure point concentration (1 mg/L, which contributed 22% of the HI at LHAAP-49) and also less than half the TCEQ's GW-Ind value for nickel (2 mg/L). It should also be noted that there are no known candidates for up-gradient sources of contamination. Those areas that are potentially up-gradient of LHAAP-49 are within the	Do not agree completely, changes or clarification necessary. Please see previous comments regarding clarification of sampling procedures, verification of corrosion of the well casings, and restoration of groundwater to MCLs.	Please see Follow-up Response to Comment #3.

Response to Comments on Draft Final Site Evaluation Report, LHAAP-49 (published September 2007)
Longhorn Army Ammunition Plant, Karnack, Texas

January 2009

Reviewer: TCEQ and USEPA
Respondent: Shaw Environmental, Inc.

1. Respondent Concurs (C), Does Not Concur (D), Takes Exception (E), or Delete (X).
2. Commenter Agrees (A) with response, or Does not Agree (D) with response.

Comment #	Page	Section/ Paragraph	Comment	C, D[1], E or X	Response	Subsequent Comment	Follow-up Response
					West Further Investigation Area, which had water towers, some parking areas, and undeveloped lands. The West Further Investigation Area was investigated for metals contamination in soil and found to be suitable for transfer to the USFWS (U.S. Army, 2005; USEPA, 2005).		

Response to Comments on Draft Final Site Evaluation Report, LHAAP-49 (published September 2007)
Longhorn Army Ammunition Plant, Karnack, Texas

January 2009

Reviewer: TCEQ and USEPA
Respondent: Shaw Environmental, Inc.

1. Respondent Concurs (C), Does Not Concur (D), Takes Exception (E), or Delete (X).
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<table>
<tr><th>Comment #</th><th>Page</th><th>Section/ Paragraph</th><th>Comment</th><th>C, D[1], E or X</th><th>Response</th><th>Subsequent Comment</th><th>Follow-up Response</th></tr>
<tr><td>Summary of Subsequent Communications on Comment #3</td><td></td><td></td><td colspan="4">Following the responses presented above, there were a number of communications via email between Army, Shaw, TCEQ, and USEPA to resolve the remaining concern – the presence of elevated levels of nitrates, chromium, and arsenic in groundwater. Those emails are summarized below:

<table>
<tr><th>Date</th><th>From</th><th>To</th><th>Summary of Contents</th></tr>
<tr><td>March 11, 2009</td><td>Shaw</td><td>EPA, TCEQ, Army</td><td>Results for sampling in February 2009:
• Nitrate/nitrite at 49WW04
• Arsenic and chromium at 49WW06</td></tr>
<tr><td>April 2, 2009</td><td>Shaw</td><td>EPA, TCEQ, Army</td><td>Shaw and Army propose sampling the groundwater now to resolve the issue before the ROD. The following are noted:
• Arsenic is not a site operation-related contaminant and shows up in the groundwater not just at Longhorn, but other sites, at low levels which can sometimes exceed the MCL of 10 µg/L. In most cases it is related to samples that may be turbid, even if the turbidity is less than 10 NTU. Arsenic gets attached to iron oxides, and any time iron content is high in a sample, arsenic can also be high. It is naturally occurring arsenic, not resulting from a release.
• Even though nitrate/nitrite are considered site-related because nitric acid was stored in large tanks at LHAAP-49, the last two rounds of data indicate that the concentrations are now below MCLs.
• Water is currently high and we can catch the seasonal fluctuations now rather than postpone it to post-ROD period. We propose that two more rounds of data, instead of one round suggested by the EPA reviewer, be collected in the next months and a decision be made at that point. We can collect the first round next week from two wells- one for arsenic (49WW06) and the other for nitrate/nitrite (49WW04), followed by another round in 3-4 weeks. We can make a decision based on these results and there will still be time to get a ROD done by Sept 2009.</td></tr>
<tr><td>April 7, 2009</td><td>TCEQ</td><td>Shaw, Army, EPA</td><td>Request for well logs and groundwater levels</td></tr>
<tr><td>April 8, 2009</td><td>Shaw</td><td>EPA, TCEQ, Army</td><td>Recent groundwater elevations and the requested well logs</td></tr>
<tr><td>April 14, 2009</td><td>Shaw</td><td>EPA, TCEQ, Army</td><td>Results of April sampling for nitrate/nitrite from 49WW04 and arsenic at 49WW06.</td></tr>
<tr><td>April 16, 2009</td><td>EPA</td><td>Shaw, Army, TCEQ</td><td>1) EPA and TCEQ agree with the proposed approach (i.e., two more rounds of data: one in early April, one in early May).
2) If in April and May, the nitrate/nitrite results are below MCL and the arsenic results are right around MCL or below, proceed to:
• Finalize the LHAAP-49 RTCs and SER with the additional sampling data and explanation provided in the 4/2/2009 email;
• Document no groundwater COCs for the upcoming proposed plan and ROD; and,
• Complete abandonment of well 49WW03.
3) If any of the sampling results do not fit the above, then we'll revisit.</td></tr>
<tr><td>April 16, 2009</td><td>TCEQ</td><td>Shaw, EPA, Army</td><td>TCEQ concurs with EPA approach.</td></tr>
<tr><td>May 18, 2009</td><td>Shaw</td><td>EPA, TCEQ, Army</td><td>Results of May 2009 sampling</td></tr>
<tr><td>May 18, 2009</td><td>EPA</td><td>Army, Shaw, TCEQ</td><td>EPA agrees. With this set of LHAAP-49 sampling results from May 2009, please proceed forward as outlined previously:
• Finalize the LHAAP-49 RTCs and SER with all the additional sampling data, including arsenic explanation provided in the 4/2/2009 email;
• Document no groundwater COCs for the upcoming proposed plan and ROD; and,
• Complete abandonment of well 49WW03.</td></tr>
<tr><td>May 20, 2009</td><td>TCEQ</td><td>Army, EPA, Shaw</td><td>The TCEQ concurs with the proposed path forward.</td></tr>
</table>
Based on the conclusions of these communications, the Site Evaluation Report will be revised as presented in Attachment 1 and noted in these comment responses.</td></tr>
</table>

Attachment 1
Responses to Comments
Draft Final Site Evaluation Report, LHAAP-49

As noted in the responses to comments, Shaw performed additional sampling of the LHAAP-49 monitoring wells in October 2007, October and December 2008, and February, April and May 2009. Also, an earlier round of sampling (May 2005) was erroneously omitted from the Site Evaluation Report. These additional results will be added to **Appendix F**, Table F-1.

In Section 2.4, new paragraph describing Shaw GW sampling

Additional groundwater sampling has been conducted in response to comments from Texas Commission on Environmental Quality (TCEQ) and USEPA. Groundwater samples were collected in October 2007, October and December 2008, and February, April, and May 2009 to address concerns about metals and nitrate in groundwater. This sampling effort involved advancing four direct push technology (DPT) borings, installing five new wells, and collecting 14 groundwater samples. The results of these sampling events, including summary tables, laboratory reports, and well installation documentation, are included as **Appendix F**.

In Section 2.4, Response to comment 1, add this at the end of Section 2.4 5th paragraph

The samples that were excluded, and their associated lead and mercury analytical results, are as follows:

Location	Depth (feet bgs)	Lead (mg/kg)	Mercury (mg/kg)
FWS-026	0-0.5	51.9	0.117
49SS40	0-0.5	6.92	0.0335
49SS41	0-0.5	10.3	0.0353
49SS42	0-0.5	58.4	0.0441
49SS43	0-0.5	9.38	0.0337
49SS44	0-0.5	7.56	0.0151
49SS46	0-0.5	27.3	0.0323
49SB06	0-0.5	65.1	0.0705
49SB06	1-2	17.9	0.081

Insert New Section 2.5 Soil Removal Action (Section 2.5 Summary of Findings becomes 2.6)

Section 2.5 Soil Removal Action

Via a risk assessment (Jacobs, 2002b) and further evaluation present in this Site Evaluation Report, the overall human health and ecological risks associated with the soil at site LHAAP-49 have been shown to be acceptable. However, two soil sample locations at LHAAP-49 had mercury concentrations that were markedly higher than mercury concentrations from samples elsewhere within LHAAP-49. The U.S. Army and the TCEQ agreed that removal of soil in the vicinity of these two sample locations would eliminate the need for evaluation of hot spot risks (TCEQ, 2008).

In October 2008, Shaw completed an excavation to a depth of 1.0 feet bgs around soil sample locations 49SB32 and 49SD65, then backfilled it with clean soil. The Soil Removal Action Report (**Appendix D**) contains the details of the field activities.

Insert in Section 2.5.1 – new paragraph after paragraph 1 (section # now 2.6.1)

The five monitoring wells installed by Shaw (49WW04, 49WW05, 49WW06, 49WW07, and 49WW08) were also completed in the shallow zone with 10-foot screens (49WW04, 49WW05, and 49WW06) or 20-foot screens (49WW07 and 49WW08). The wells were installed to depths of 32 to 35 feet bgs. The wells were constructed with polyvinyl chloride (PVC) screens and risers. The soils encountered at the five new wells are generally consistent with those at the first three wells, silty clay underlain by silty sand. Monitoring well 49WW04 was installed near 49WW02 and deeper by 10 feet to sample the shallow zone groundwater at that location since 49WW02 had gone dry. Monitoring well 49WW06 was installed near 49WW03 to provide a check of chromium and nickel concentrations in a well constructed of PVC

instead of stainless steel. In June 2009, wells 49WW02 and 49WW03 were pulled and abandoned per State of Texas requirements after successful sampling of their replacement wells.

Insert in Section 2.5.2.2 – two new paragraphs at end (section # now 2.6.2.2)

Modeling with VLEACH indicates that remaining mercury and lead concentrations in soil are not expected to leach into groundwater (**Appendix E**).

To address concerns expressed by TCEQ and USEPA, two locations with high concentrations of mercury were excavated in October 2008 (See **Appendix D**).

Section 2.5.2.4 – replace first paragraph and first bullet (section # now 2.6.2.4). Based on this additional data, the first paragraph and first bullet of Section 2.5.2.4 will be replaced with the following:

Nine rounds of sampling have been performed at the monitoring wells within LHAAP-49:

Event (Reference)	Analyses
December 1998 (Sverdrup, 2000)	VOCs, explosives, metals, anions
December 2000 (Jacobs, 2002a)	VOCs, explosives, metals, anions, SVOCs, pesticides, PCBs, perchlorate
May 2005	metals, nitrate
October 2007	metals, nitrate/nitrite
October 2008	metals
December 2008	metals, nitrate/nitrite
February 2009	metals, nitrate/nitrite
April 2009	metals, nitrate/nitrite
May 2009	metals, nitrate/nitrite

Low-flow sampling techniques were implemented during the 2005 through 2009 events. One well, 49WW02, was dry during October 2007 and was not sampled.

PCBs, pesticides, perchlorate, explosives, and SVOCs were not detected in the samples. Detected results from groundwater sampling activities are provided in **Appendix B** (Table B-2) and **Appendix F** (Table F-1), and summarized in **Table 2-4**. Those results are summarized as follows:

- Twenty-two different metals/inorganics, and three anions were detected in the groundwater. Antimony, arsenic, chromium, selenium, and nitrate/nitrite were detected above their MCLs in one or more samples. The antimony MCL exceedances occurred in 1998 and were not repeated in subsequent events, including those utilizing low-flow techniques in 2005 and later. Arsenic was detected above its MCL in 49WW03 in 2007 and in 49WW06 in 2008 and 2009; these arsenic concentrations are typically associated with high results for other inorganics and are considered to be naturally occurring. Chromium exceeded the MCL in 6 of 15 groundwater samples; 5 from 49WW03 and 1 from 49WW01. The exceedance at 49WW01 in 2000 was not repeated. Installation and sampling of 49WW06 demonstrated that the chromium exceedances at 49WW03 were associated with the stainless steel material used to construct 49WW03. Selenium was detected above its MCL in 49WW03 in 2007 and 49WW06 in 2008; both results were below the upper threshold limit for site background concentration (Shaw, 2007a). No metal (including chromium) exceeded an MCL in a filtered sample. Nitrate/nitrite exceeded its MCL in two samples from 49WW02 in 1998 and 2005. Although 49WW02 has been dry since 2005, additional nitrate/nitrite sampling beneath and around 49WW02 in 2007, 2008, and 2009 found nitrate/nitrite levels all less than the MCL.
- SECOND AND THIRD BULLETS UNCHANGED

Section 3.1.3 replace last paragraph with response to comment #14

Based on the anticipated future use of the facility as a wildlife refuge, the groundwater will not be used in the future as a drinking water source. However, the Army recognizes that the State of Texas considers all groundwater to be a potential future source of drinking water.

Section 3.2 add new paragraph

In addition to the five COPCs identified in the risk assessment, two additional metals (arsenic and selenium) had at least one groundwater sample concentration that exceeded the MCL. Arsenic was not previously identified as a COPC because it was not included in the Baseline Human Health Risk Assessment. Selenium was not previously identified as a COPC because it was only detected above the MCL in samples from 2007 and 2008

Section 3.2 add seven bullets

- Antimony (which contributes 16% of the HI) was detected in two groundwater samples in 1998 at 12 and 15 µg/L, which exceed the MCL (6 µg/L). However, antimony concentrations were less than the MCL or not detected in the subsequent rounds of sampling, including sampling with low flow procedures in 2005 through 2009.
- Total arsenic exceeded its MCL in four samples – one at well 49WW03 and three at the adjacent 49WW06. These elevated concentrations are typically associated with high results for other inorganics (i.e., iron and aluminum) and are considered to be naturally occurring.
- Total chromium exceeded the chromium MCL in six samples. One exceedance was at 49WW01 and was not repeated in subsequent low flow sampling. The remaining exceedances were at 49WW03, a stainless steel well. A PVC well, 49WW06, was installed nearby, and chromium results at 49WW06 were well below the MCL. This demonstrated that the elevated chromium at 49WW03 is associated with monitoring well corrosion.
- Nickel (which contributes 22% of the HI) is likely associated with monitoring well corrosion.
- Nitrate/nitrite exceeded its MCL in one well, 49WW02. While a shallow DPT sample also had an elevated result, a new permanent well (49WW04) adjacent to 49WW02 but deeper, and four other new wells installed and sampled, found nitrate/nitrite levels to be less than the MCL.
- Total selenium exceeded its MCL in two samples – one at well 49WW03 and one at the adjacent 49WW06. Dissolved selenium was well below the MCL. The elevated totals were due to particulates and are naturally occurring, and are below the upper threshold value representative of perimeter wells at Longhorn AAP (Shaw, 2007b).

Section 3.4 replacement text

Results for antimony, arsenic, chromium, selenium, and nitrate/nitrite in groundwater also exceeded MCLs in at least one sample. However, subsequent investigations of groundwater at LHAAP-49 found concentrations of these parameters to be below the MCLs, or related to naturally occurring particulates or well corrosion. Additionally, the parameters that cause the groundwater HI to exceed 1 and that exceed MCLs are not the same parameters that were found at elevated concentrations in the soil. Hence, the COCs in groundwater are not related to known site operations.

Section 4.0 replacement text

In Section 4.0, Conclusions and Recommendations, the paragraph and bullet items on groundwater will be replaced with text similar to the following:

However, the highest concentrations of mercury and lead in soil were of concern to TCEQ and USEPA for their potential to migrate into groundwater. Accordingly, modeling was performed to evaluate the potential for transport of contaminants from soil to groundwater. For conservatism, the two COCs with the most significant soil concentrations (lead and mercury) were modeled. Using the USEPA's VLEACH Model, the concentration of each metal for the entire top 2 feet of soil was set at the highest concentration detected. The results were as follows:

- Lead – The maximum predicted leachate concentration was approximately 6 µg/L, which was below the MCL (15 µg/L) and consistent with the measured groundwater concentrations at LHAAP-49.
- Mercury – The maximum predicted leachate concentration was less than the MCL (2 µg/L) for at least 1000 years. The model predictions are slightly higher than the measured groundwater concentrations at LHAAP-49.

The results indicated no significant potential for migration to groundwater, but due to continued concern by TCEQ and USEPA, the locations with the highest mercury concentrations were removed as documented in **Appendix D**.

Evaluation of groundwater at LHAAP-49 indicated that cancer risk is within the acceptable range. Non-cancer HI for the hypothetical future maintenance worker was calculated to be 2, narrowly exceeding the target value of 1, and the major contributors to the HI were manganese, strontium, nickel, and antimony. Five parameters (antimony, arsenic, chromium, nitrate/nitrite, and selenium) were also detected in groundwater samples at concentrations that exceeded their MCLs. However, no remedial action for groundwater is recommended for the following reasons:

- The cancer risk, which is just within the acceptable range, is entirely attributable to the 2,3,7,8-TCDD TEQ. The analytical results for the 2,3,7,8-TCDD TEQ are below its MCL.
- Groundwater results for manganese, which contributes 28% of the HI, were consistent with background levels in perimeter wells at LHAAP.
- Nickel (which contributes 22% of the HI) is likely associated with monitoring well corrosion.
- Antimony (which contributes 16% of the HI) was detected in two groundwater samples in 1998 at 12 and 15 μg/L, which exceed the MCL (6 μg/L). However, antimony concentrations were less than the MCL or not detected in the subsequent rounds of sampling, including sampling with low flow procedures in 2005 through 2009.
- Total arsenic exceeded its MCL in four samples – one at well 49WW03 and three at the adjacent 49WW06. The elevated concentrations are typically associated with high results for aluminum or iron and are considered naturally occurring.
- Total chromium exceeded the chromium MCL in six samples. One exceedance was at 49WW01 and was not repeated in subsequent low flow sampling. The remaining exceedances were at 49WW03, a stainless steel well. A PVC well, 49WW06, was installed nearby, and chromium results at 49WW06 were below the MCL. This demonstrated that the elevated chromium is associated with monitoring well corrosion.
- Nitrate/nitrite exceeded its MCL in one well, 49WW02. However, that well is screened within a formation that is not a sustainable water supply, as evidenced by that fact that it was dry during the 2007 sampling event. A new well 49WW04 adjacent to 49WW02 but deeper, and four other new wells installed and sampled, found nitrate/nitrite levels to be less than the MCL.
- Total selenium exceeded its MCL in two samples – one at well 49WW03 and one at adjacent 49WW06. Dissolved selenium was well below the MCL. The elevated totals were due to particulates, are consistent with background data, and are considered naturally occurring.

Based on the findings summarized above, no chemicals of concern were identified for the groundwater at LHAAP-49.

Table RTC-1
Anions and Metals in Groundwater

	LOCATION_CODE		49WW01				49WW01				49WW01				49WW01				49WW01			
		SAMPLE_NO	49WW01-981207				49WW01-981207FD				49WW01-001220				49WW01-050517				49WW01-071023			
		SAMPLE_DATE	7-Dec-98				7-Dec-98				20-Dec-00				17-May-05				23-Oct-07			
Test Group	Parameter	Units	MCL	Result	Qual	ValQual	RC	Result	Qual	ValQual	RC	Result	Qual	ValQual	RC	Result	Qual	ValQual	RC	Result	Qual	ValQual	RC
GEN CHEMISTRY	Chloride	mg/L		1420				1330															
GEN CHEMISTRY	Nitrate	mg/L																		0.025	U	U	
GEN CHEMISTRY	Nitrate / Nitrite	mg/L	10	0.1	<	U		0.1	<	U						0.05	U	UJ	17				
GEN CHEMISTRY	Nitrite	mg/L	1																	0.005	U	U	
GEN CHEMISTRY	Sulfate	mg/L		2200				2100															
METALS	Aluminum	mg/L		0.2	<	U		0.2	<	U		0.544				0.614				0.05	U	U	
METALS	Antimony	mg/L	0.006	0.015				0.005	<	U		0.005	<	U		0.000594	J	J	15	0.0025	U	U	
METALS	Arsenic	mg/L	0.01	0.01	<	U		0.01	<	U		0.007	<	U		0.002	U	U		0.00745	J	J	15
METALS	Barium	mg/L	2	0.2	<	U		0.2	<	U		0.0286				0.0216				0.026	J	J	15
METALS	Beryllium	mg/L	0.004	0.0005	<	U		0.0005	<	U		0.0008	<	U		0.00025	U	U		0.0005	U	U	
METALS	Cadmium	mg/L	0.005	0.0008	<	U		0.0008	<	U		0.0038				0.00315	J	J	15	0.00125	U	U	
METALS	Calcium	mg/L		590				610				495				394				229			
METALS	Chromium	mg/L	0.1	0.05				0.03				0.11				0.0248		J	08B,17	0.0394			
METALS	Cobalt	mg/L		0.05	<	U		0.05	<	U		0.0104				0.00669	J	J	15	0.0025	U	U	
METALS	Copper	mg/L	1.3	0.033				0.025	<	U		0.0132		J		0.0103	J	J	15	0.005	U	U	
METALS	Iron	mg/L		2				1.8				1.33				0.555				0.109			
METALS	Lead	mg/L	0.015	0.003	<	U		0.003	<	U		0.003	<	U		0.01				0.0025	U	U	
METALS	Magnesium	mg/L		450				480				361				303				180			
METALS	Manganese	mg/L		2.47				2.59				1.41				1.22				0.166			
METALS	Mercury	mg/L	0.002	0.0002	<	U		0.0002	<	U		0.0002	<	U		0.0001	U	U		0.0001	U	U	
METALS	Nickel	mg/L		0.14				0.13				0.186		J		0.0616				0.0349	J	J	15
METALS	Potassium	mg/L		6.9				7.2				5.3				9.7		J	13	5	U	U	
METALS	Selenium	mg/L	0.05	0.005	<	U		0.005	<	U		0.013				0.0171				0.0363			
METALS	Silver	mg/L		0.01	<	U		0.01	<	U		0.002	<	U		0.005	U	U		0.0025	U	U	
METALS	Sodium	mg/L		590				610				520				448		J	13	381		J	13
METALS	Strontium	mg/L		36				38				13.2											
METALS	Thallium	mg/L	0.002	0.001	<	UJ		0.0012		J		0.005	<	U		0.0001	U	U		0.000274			
METALS	Vanadium	mg/L		0.05	<	U		0.05	<	U		0.01	<	U		0.005	U	U		0.1	U	U	
METALS	Zinc	mg/L		0.05				0.05				0.0141		J		0.005	U	U		0.00935	J	J	15
METALS-DISS	Aluminum	mg/L														0.284		B	06A	0.05	U	U	
METALS-DISS	Antimony	mg/L	0.006													0.0005	U	U		0.0025	U	U	
METALS-DISS	Arsenic	mg/L	0.01													0.002	U	U		0.00365	J	J	15
METALS-DISS	Barium	mg/L	2													0.0768				0.0288	J	J	15
METALS-DISS	Beryllium	mg/L	0.004													0.00025	U	U		0.0005	U	U	
METALS-DISS	Cadmium	mg/L	0.005													0.00328	J	J	15	0.00125	U	U	
METALS-DISS	Calcium	mg/L														411				214			
METALS-DISS	Chromium	mg/L	0.1													0.0025	U	U		0.00885	J	J	15
METALS-DISS	Cobalt	mg/L														0.00599	J	J	15	0.0025	U	U	
METALS-DISS	Copper	mg/L	1.3													0.00898	J	J	15	0.005	U	U	
METALS-DISS	Iron	mg/L														0.0358	J	J	15	0.025	U	U	
METALS-DISS	Lead	mg/L	0.015													0.0101				0.0025	U	U	
METALS-DISS	Magnesium	mg/L														316				164			
METALS-DISS	Manganese	mg/L														1.2				0.119			
METALS-DISS	Mercury	mg/L	0.002													0.0001	U	U		0.000114	J	J	15
METALS-DISS	Nickel	mg/L														0.0608				0.0512			
METALS-DISS	Potassium	mg/L														9.71				5.12			
METALS-DISS	Selenium	mg/L	0.05													0.0142				0.0174			
METALS-DISS	Silver	mg/L														0.005	U	U		0.0025	U	U	
METALS-DISS	Sodium	mg/L														462				415		J	13
METALS-DISS	Thallium	mg/L	0.002													0.0001	U	U		0.000206			
METALS-DISS	Vanadium	mg/L														0.005	U	U		0.05	U	U	
METALS-DISS	Zinc	mg/L														0.00574	J	J	15	0.0073	J	J	15

Notes:

mg/L - milligrams per liter

0.015 Detected results greater than MCL are shaded

RC - Reason Code

Qual - data qualifier from laboratory

ValQual - data qualifier from validation process

Table RTC-1
Anions and Metals in Groundwater

	LOCATION_CODE		49WW02				49WW02				49WW02				49WW03				49WW03			
	SAMPLE_NO		49WW02-981208				49WW02-001220				49WW02-050517				49WW03-981207				49WW03-001220			
	SAMPLE_DATE		8-Dec-98				20-Dec-00				17-May-05				7-Dec-98				20-Dec-00			
Test Group	Parameter	Units	MCL	Result	Qual	ValQual	RC	Result	Qual	ValQual	RC	Result	Qual	ValQual	RC	Result	Qual	ValQual	RC	Result	Qual	ValQual	RC
GEN CHEMISTRY	Chloride	mg/L		545												1670							
GEN CHEMISTRY	Nitrate	mg/L																					
GEN CHEMISTRY	Nitrate / Nitrite	mg/L	10	24								15.4		J	17	0.1	<	U					
GEN CHEMISTRY	Nitrite	mg/L	1																				
GEN CHEMISTRY	Sulfate	mg/L		1200												420							
METALS	Aluminum	mg/L		0.2	<	U		0.05	<	U		0.244		B	06A	0.5				0.0521		J	
METALS	Antimony	mg/L	0.006	0.012				0.005	<	U		0.0005	U	U		0.005	<	U		0.005	<	U	
METALS	Arsenic	mg/L	0.01	0.01	<	U		0.007	<	U		0.002	U	U		0.01	<	U		0.007	<	U	
METALS	Barium	mg/L	2	0.2	<	U		0.041				0.0262				0.2	<	U		0.0964			
METALS	Beryllium	mg/L	0.004	0.0005	<	U		0.0008	<	U		0.00025	U	U		0.0005	<	U		0.0008	<	U	
METALS	Cadmium	mg/L	0.005	0.0008	<	U		0.001	<	U		0.0025	U	U		0.0014				0.00374			
METALS	Calcium	mg/L		280				268				401				390				331			
METALS	Chromium	mg/L	0.1	0.01				0.0145				0.0455		J	08B,17	0.22				0.499			
METALS	Cobalt	mg/L		0.05	<	U		0.01	<	U		0.00655	J	J	15	0.05	<	U		0.0234			
METALS	Copper	mg/L	1.3	0.025	<	U		0.01	<	UJ		0.00696	J	J	15	0.025	<	U		0.0144		J	
METALS	Iron	mg/L		0.87				0.184				0.37				2.9				3.85			
METALS	Lead	mg/L	0.015	0.003	<	U		0.003	<	U		0.00881				0.004				0.003	<	U	
METALS	Magnesium	mg/L		210				198				286				360				289			
METALS	Manganese	mg/L		0.235				0.55				0.244				3.03				2.8			
METALS	Mercury	mg/L	0.002	0.0002	<	U		0.0002	<	U		0.0001	U	U		0.0002	<	U		0.0002	<	U	
METALS	Nickel	mg/L		0.04	<	U		0.611		J		0.477				0.29				0.946		J	
METALS	Potassium	mg/L		7				6.86				12.8		J	13	6.8				6.11			
METALS	Selenium	mg/L	0.05	0.005	<	U		0.01	<	U		0.0157				0.006				0.0166			
METALS	Silver	mg/L		0.01	<	U		0.002	<	U		0.005	U	U		0.01	<	U		0.002	<	U	
METALS	Sodium	mg/L		340				341				391		J	13	580				505			
METALS	Strontium	mg/L		17				9.74								27				10.3			
METALS	Thallium	mg/L	0.002	0.001	<	UJ		0.005	<	U		0.000486				0.0011		J		0.005	<	U	
METALS	Vanadium	mg/L		0.05	<	U		0.01	<	U		0.005	U	U		0.05	<	U		0.01	<	U	
METALS	Zinc	mg/L		0.03				0.01	<	UJ		0.005	U	U		0.04				0.01	<	UJ	
METALS-DISS	Aluminum	mg/L										0.233		B	06A								
METALS-DISS	Antimony	mg/L	0.006									0.0005	U	U									
METALS-DISS	Arsenic	mg/L	0.01									0.002	U	U									
METALS-DISS	Barium	mg/L	2									0.092											
METALS-DISS	Beryllium	mg/L	0.004									0.00025	U	U									
METALS-DISS	Cadmium	mg/L	0.005									0.0025	U	U									
METALS-DISS	Calcium	mg/L										400											
METALS-DISS	Chromium	mg/L	0.1									0.0242											
METALS-DISS	Cobalt	mg/L										0.00624	J	J	15								
METALS-DISS	Copper	mg/L	1.3									0.00556	J	J	15								
METALS-DISS	Iron	mg/L										0.0812											
METALS-DISS	Lead	mg/L	0.015									0.00885											
METALS-DISS	Magnesium	mg/L										287											
METALS-DISS	Manganese	mg/L										0.233											
METALS-DISS	Mercury	mg/L	0.002									0.0001	U	U									
METALS-DISS	Nickel	mg/L										0.482											
METALS-DISS	Potassium	mg/L										12.5											
METALS-DISS	Selenium	mg/L	0.05									0.0142											
METALS-DISS	Silver	mg/L										0.005	U	U									
METALS-DISS	Sodium	mg/L										401											
METALS-DISS	Thallium	mg/L	0.002									0.0001	U	U									
METALS-DISS	Vanadium	mg/L										0.005	U	U									
METALS-DISS	Zinc	mg/L										0.005	U	U									

Notes:

mg/L - milligrams per liter

RC - Reason Code

Qual - data qualifier from laboratory

ValQual - data qualifier from validation process

Reason Codes:

06A	Method or preparation blank
08B	% RPD outside acceptance criteria (precision)
13	Serial dilution
15	Quantitation
17	Field duplicate RPD criteria is exceeded

Table RTC-1
Anions and Metals in Groundwater

	LOCATION_CODE		49WW03				49WW03				49WW03				49WW03				49WW03			
		SAMPLE_NO	49WW03-001220FD				49WW03-050517				49WW03-050517FD				49WW03-071023				49WW03-100808			
		SAMPLE_DATE	20-Dec-00				17-May-05				17-May-05				23-Oct-07				8-Oct-08			
Test Group	Parameter	Units	MCL	Result	Qual	ValQual	RC	Result	Qual	ValQual	RC	Result	Qual	ValQual	RC	Result	Qual	ValQual	RC	Result	Qual	ValQual	RC
GEN CHEMISTRY	Chloride	mg/L																					
GEN CHEMISTRY	Nitrate	mg/L														0.033	J	J	15				
GEN CHEMISTRY	Nitrate / Nitrite	mg/L	10					0.13		J	17	0.501		J	17								
GEN CHEMISTRY	Nitrite	mg/L	1													0.005	U	U					
GEN CHEMISTRY	Sulfate	mg/L																					
METALS	Aluminum	mg/L		0.05	<	U		0.414								0.05	U	U		0.0774	J	J	15
METALS	Antimony	mg/L	0.006	0.005	<	U		0.0005	U	U						0.0025	U	U		0.00025	U	U	
METALS	Arsenic	mg/L	0.01	0.007	<	U		0.01	U	U						0.0131				0.00823			
METALS	Barium	mg/L	2	0.093				0.0684								0.0878				0.0709			
METALS	Beryllium	mg/L	0.004	0.0008	<	U		0.00025	U	U						0.0005	U	U		0.0005	U	U	
METALS	Cadmium	mg/L	0.005	0.00265				0.0025	U	U						0.00125	U	U		0.001			
METALS	Calcium	mg/L		322				349								381				422			
METALS	Chromium	mg/L	0.1	0.495				0.296		J	08B,17					0.0676				0.207			
METALS	Cobalt	mg/L		0.0239				0.0101	J	J	15					0.0025	U	U		0.0155			
METALS	Copper	mg/L	1.3	0.0127		J		0.00998	J	J	15					0.005	U	U		0.00814			
METALS	Iron	mg/L		4.01				2.55								0.134				1.24			
METALS	Lead	mg/L	0.015	0.003	<	U		0.00868								0.00913				0.000295	J	J	15
METALS	Magnesium	mg/L		278				299								316				314			
METALS	Manganese	mg/L		2.8				1.69								1.54				2.62			
METALS	Mercury	mg/L	0.002	0.0002	<	U		0.0001	U	U						0.0001	U	U		0.0001	U	U	
METALS	Nickel	mg/L		1		J		0.608								0.896				0.964	B		
METALS	Potassium	mg/L		6.04				10.1		J	13					10.6				7.32			
METALS	Selenium	mg/L	0.05	0.0165				0.0297								0.0581				0.0348			
METALS	Silver	mg/L		0.002	<	U		0.005	U	U						0.0025	U	U		0.00025	U	U	
METALS	Sodium	mg/L		493				451		J	13					538		J	13	554			
METALS	Strontium	mg/L		10.2																			
METALS	Thallium	mg/L	0.002	0.005	<	U		0.000111	J	J	15					0.000326				0.000223			
METALS	Vanadium	mg/L		0.01	<	U		0.0052	J	J	15					0.005	U	U		0.1	U	U	
METALS	Zinc	mg/L		0.01	<	UJ		0.005	U	U						0.01	J	J	15	0.0205			
METALS-DISS	Aluminum	mg/L						0.244		B	06A					0.5	U	U					
METALS-DISS	Antimony	mg/L	0.006					0.0005	U	U						0.0025	U	U					
METALS-DISS	Arsenic	mg/L	0.01					0.002	U	U						0.00714	J	J	15				
METALS-DISS	Barium	mg/L	2					0.125								0.0859							
METALS-DISS	Beryllium	mg/L	0.004					0.00025	U	U						0.0005	U	U					
METALS-DISS	Cadmium	mg/L	0.005					0.0025	U	U						0.00125	U	U					
METALS-DISS	Calcium	mg/L						356								346							
METALS-DISS	Chromium	mg/L	0.1					0.0025	U	U						0.0074	J	J	15				
METALS-DISS	Cobalt	mg/L						0.00718	J	J	15					0.0025	U	U					
METALS-DISS	Copper	mg/L	1.3					0.00554	J	J	15					0.005	U	U					
METALS-DISS	Iron	mg/L						0.02	U	U						0.025	U	U					
METALS-DISS	Lead	mg/L	0.015					0.00901								0.00921							
METALS-DISS	Magnesium	mg/L						306								282							
METALS-DISS	Manganese	mg/L						1.48								1.42							
METALS-DISS	Mercury	mg/L	0.002					0.0001	U	U						0.0001	U	U					
METALS-DISS	Nickel	mg/L						0.562								0.915							
METALS-DISS	Potassium	mg/L						10.1								9.57							
METALS-DISS	Selenium	mg/L	0.05					0.0282								0.0291							
METALS-DISS	Silver	mg/L						0.005	U	U						0.0025	U	U					
METALS-DISS	Sodium	mg/L						435								545		J	13				
METALS-DISS	Thallium	mg/L	0.002					0.0001	U	U						0.000368							
METALS-DISS	Vanadium	mg/L						0.005	U	U						0.05	U	U					
METALS-DISS	Zinc	mg/L						0.005	U	U						0.00573	J	J	15				

Notes:		Data Qualifiers:	
mg/L - milligrams per liter		<	Same as U
RC - Reason Code		B	The concentration reported was detected in an associated blank within 5X/10X the blank concentration.
Qual - data qualifier from laboratory		J	The analyte was positively identified; the reported value is the estimated concentration of the constituent detected in the sample analyzed
ValQual - data qualifier from validation process		U	Not detected. The analyte was analyzed for, but not detected above the associated reporting limit.

Table RTC-1
Anions and Metals in Groundwater

	LOCATION_CODE		49WW04				49WW04				49WW04				49WW04				49WW05			
		SAMPLE_NO	49WW04-120308				49WW04-022409				49WW04-040409				49WW04-090507				49WW05-120208			
		SAMPLE_DATE	3-Dec-08				24-Feb-09				4-Apr-09				7-May-09				2-Dec-08			
Test Group	Parameter	Units	MCL	Result	Qual	ValQual	RC	Result	Qual	ValQual	RC	Result	Qual	ValQual	RC	Result	Qual	ValQual	RC	Result	Qual	ValQual	RC
GEN CHEMISTRY	Chloride	mg/L																					
GEN CHEMISTRY	Nitrate	mg/L																					
GEN CHEMISTRY	Nitrate / Nitrite	mg/L	10	1.72				1				0.141				0.097				2.07			
GEN CHEMISTRY	Nitrite	mg/L	1																				
GEN CHEMISTRY	Sulfate	mg/L																					
METALS	Aluminum	mg/L																					
METALS	Antimony	mg/L	0.006																				
METALS	Arsenic	mg/L	0.01																				
METALS	Barium	mg/L	2																				
METALS	Beryllium	mg/L	0.004																				
METALS	Cadmium	mg/L	0.005																				
METALS	Calcium	mg/L																					
METALS	Chromium	mg/L	0.1																				
METALS	Cobalt	mg/L																					
METALS	Copper	mg/L	1.3																				
METALS	Iron	mg/L																					
METALS	Lead	mg/L	0.015																				
METALS	Magnesium	mg/L																					
METALS	Manganese	mg/L																					
METALS	Mercury	mg/L	0.002																				
METALS	Nickel	mg/L																					
METALS	Potassium	mg/L																					
METALS	Selenium	mg/L	0.05																				
METALS	Silver	mg/L																					
METALS	Sodium	mg/L																					
METALS	Strontium	mg/L																					
METALS	Thallium	mg/L	0.002																				
METALS	Vanadium	mg/L																					
METALS	Zinc	mg/L																					
METALS-DISS	Aluminum	mg/L																					
METALS-DISS	Antimony	mg/L	0.006																				
METALS-DISS	Arsenic	mg/L	0.01																				
METALS-DISS	Barium	mg/L	2																				
METALS-DISS	Beryllium	mg/L	0.004																				
METALS-DISS	Cadmium	mg/L	0.005																				
METALS-DISS	Calcium	mg/L																					
METALS-DISS	Chromium	mg/L	0.1																				
METALS-DISS	Cobalt	mg/L																					
METALS-DISS	Copper	mg/L	1.3																				
METALS-DISS	Iron	mg/L																					
METALS-DISS	Lead	mg/L	0.015																				
METALS-DISS	Magnesium	mg/L																					
METALS-DISS	Manganese	mg/L																					
METALS-DISS	Mercury	mg/L	0.002																				
METALS-DISS	Nickel	mg/L																					
METALS-DISS	Potassium	mg/L																					
METALS-DISS	Selenium	mg/L	0.05																				
METALS-DISS	Silver	mg/L																					
METALS-DISS	Sodium	mg/L																					
METALS-DISS	Thallium	mg/L	0.002																				
METALS-DISS	Vanadium	mg/L																					
METALS-DISS	Zinc	mg/L																					
Notes:																							
mg/L - milligrams per liter																							
RC - Reason Code																							
Qual - data qualifier from laboratory																							
ValQual - data qualifier from validation process																							

Table RTC-1
Anions and Metals in Groundwater

	LOCATION_CODE		49WW06				49WW06				49WW06				49WW06				49WW07			
		SAMPLE_NO	49WW06-120308				49WW06-022409				49WW06-040409				49WW06-090513				49WW07-120208			
		SAMPLE_DATE	3-Dec-08				24-Feb-09				4-Apr-09				13-May-09				2-Dec-08			
Test Group	Parameter	Units	MCL	Result	Qual	ValQual	RC	Result	Qual	ValQual	RC	Result	Qual	ValQual	RC	Result	Qual	ValQual	RC	Result	Qual	ValQual	RC
GEN CHEMISTRY	Chloride	mg/L																					
GEN CHEMISTRY	Nitrate	mg/L																					
GEN CHEMISTRY	Nitrate / Nitrite	mg/L	10	1.36																0.661			
GEN CHEMISTRY	Nitrite	mg/L	1																				
GEN CHEMISTRY	Sulfate	mg/L																					
METALS	Aluminum	mg/L		2.34								0.05	U	U		0.05	U	U					
METALS	Antimony	mg/L	0.006	0.00181																			
METALS	Arsenic	mg/L	0.01	0.0483				0.00862				0.0139				0.0128							
METALS	Barium	mg/L	2	0.246																			
METALS	Beryllium	mg/L	0.004	0.000592	J	J	15																
METALS	Cadmium	mg/L	0.005	0.000669																			
METALS	Calcium	mg/L		329																			
METALS	Chromium	mg/L	0.1	0.00673				0.00428	J	J	15												
METALS	Cobalt	mg/L		0.00658																			
METALS	Copper	mg/L	1.3	0.0053																			
METALS	Iron	mg/L		2.21								0.0551	J	J	15	0.025	U	U					
METALS	Lead	mg/L	0.015	0.007																			
METALS	Magnesium	mg/L		237																			
METALS	Manganese	mg/L		2.11																			
METALS	Mercury	mg/L	0.002	0.0001	U	U																	
METALS	Nickel	mg/L		0.0363																			
METALS	Potassium	mg/L		14.2																			
METALS	Selenium	mg/L	0.05	0.0603																			
METALS	Silver	mg/L		0.00025	U	U																	
METALS	Sodium	mg/L		463																			
METALS	Strontium	mg/L																					
METALS	Thallium	mg/L	0.002	0.000321																			
METALS	Vanadium	mg/L		0.005	U	U																	
METALS	Zinc	mg/L		0.0264																			
METALS-DISS	Aluminum	mg/L																					
METALS-DISS	Antimony	mg/L	0.006																				
METALS-DISS	Arsenic	mg/L	0.01																				
METALS-DISS	Barium	mg/L	2																				
METALS-DISS	Beryllium	mg/L	0.004																				
METALS-DISS	Cadmium	mg/L	0.005																				
METALS-DISS	Calcium	mg/L																					
METALS-DISS	Chromium	mg/L	0.1																				
METALS-DISS	Cobalt	mg/L																					
METALS-DISS	Copper	mg/L	1.3																				
METALS-DISS	Iron	mg/L																					
METALS-DISS	Lead	mg/L	0.015																				
METALS-DISS	Magnesium	mg/L																					
METALS-DISS	Manganese	mg/L																					
METALS-DISS	Mercury	mg/L	0.002																				
METALS-DISS	Nickel	mg/L																					
METALS-DISS	Potassium	mg/L																					
METALS-DISS	Selenium	mg/L	0.05																				
METALS-DISS	Silver	mg/L																					
METALS-DISS	Sodium	mg/L																					
METALS-DISS	Thallium	mg/L	0.002																				
METALS-DISS	Vanadium	mg/L																					
METALS-DISS	Zinc	mg/L																					

Notes:

mg/L - milligrams per liter

RC - Reason Code

Qual - data qualifier from laboratory

ValQual - data qualifier from validation process

Table RTC-1
Anions and Metals in Groundwater

		LOCATION_CODE		49WW07				49WW08			
		SAMPLE_NO		49WW07-120208-FD				49WW08-120308			
		SAMPLE_DATE		2-Dec-08				3-Dec-08			
Test Group	Parameter	Units	MCL	Result	Qual	ValQual	RC	Result	Qual	ValQual	RC
GEN CHEMISTRY	Chloride	mg/L									
GEN CHEMISTRY	Nitrate	mg/L									
GEN CHEMISTRY	Nitrate / Nitrite	mg/L	10	0.637				0.213			
GEN CHEMISTRY	Nitrite	mg/L	1								
GEN CHEMISTRY	Sulfate	mg/L									
METALS	Aluminum	mg/L									
METALS	Antimony	mg/L	0.006								
METALS	Arsenic	mg/L	0.01								
METALS	Barium	mg/L	2								
METALS	Beryllium	mg/L	0.004								
METALS	Cadmium	mg/L	0.005								
METALS	Calcium	mg/L									
METALS	Chromium	mg/L	0.1								
METALS	Cobalt	mg/L									
METALS	Copper	mg/L	1.3								
METALS	Iron	mg/L									
METALS	Lead	mg/L	0.015								
METALS	Magnesium	mg/L									
METALS	Manganese	mg/L									
METALS	Mercury	mg/L	0.002								
METALS	Nickel	mg/L									
METALS	Potassium	mg/L									
METALS	Selenium	mg/L	0.05								
METALS	Silver	mg/L									
METALS	Sodium	mg/L									
METALS	Strontium	mg/L									
METALS	Thallium	mg/L	0.002								
METALS	Vanadium	mg/L									
METALS	Zinc	mg/L									
METALS-DISS	Aluminum	mg/L									
METALS-DISS	Antimony	mg/L	0.006								
METALS-DISS	Arsenic	mg/L	0.01								
METALS-DISS	Barium	mg/L	2								
METALS-DISS	Beryllium	mg/L	0.004								
METALS-DISS	Cadmium	mg/L	0.005								
METALS-DISS	Calcium	mg/L									
METALS-DISS	Chromium	mg/L	0.1								
METALS-DISS	Cobalt	mg/L									
METALS-DISS	Copper	mg/L	1.3								
METALS-DISS	Iron	mg/L									
METALS-DISS	Lead	mg/L	0.015								
METALS-DISS	Magnesium	mg/L									
METALS-DISS	Manganese	mg/L									
METALS-DISS	Mercury	mg/L	0.002								
METALS-DISS	Nickel	mg/L									
METALS-DISS	Potassium	mg/L									
METALS-DISS	Selenium	mg/L	0.05								
METALS-DISS	Silver	mg/L									
METALS-DISS	Sodium	mg/L									
METALS-DISS	Thallium	mg/L	0.002								
METALS-DISS	Vanadium	mg/L									
METALS-DISS	Zinc	mg/L									

Notes:

mg/L - milligrams per liter

RC - Reason Code

Qual - data qualifier from laboratory

ValQual - data qualifier from validation process

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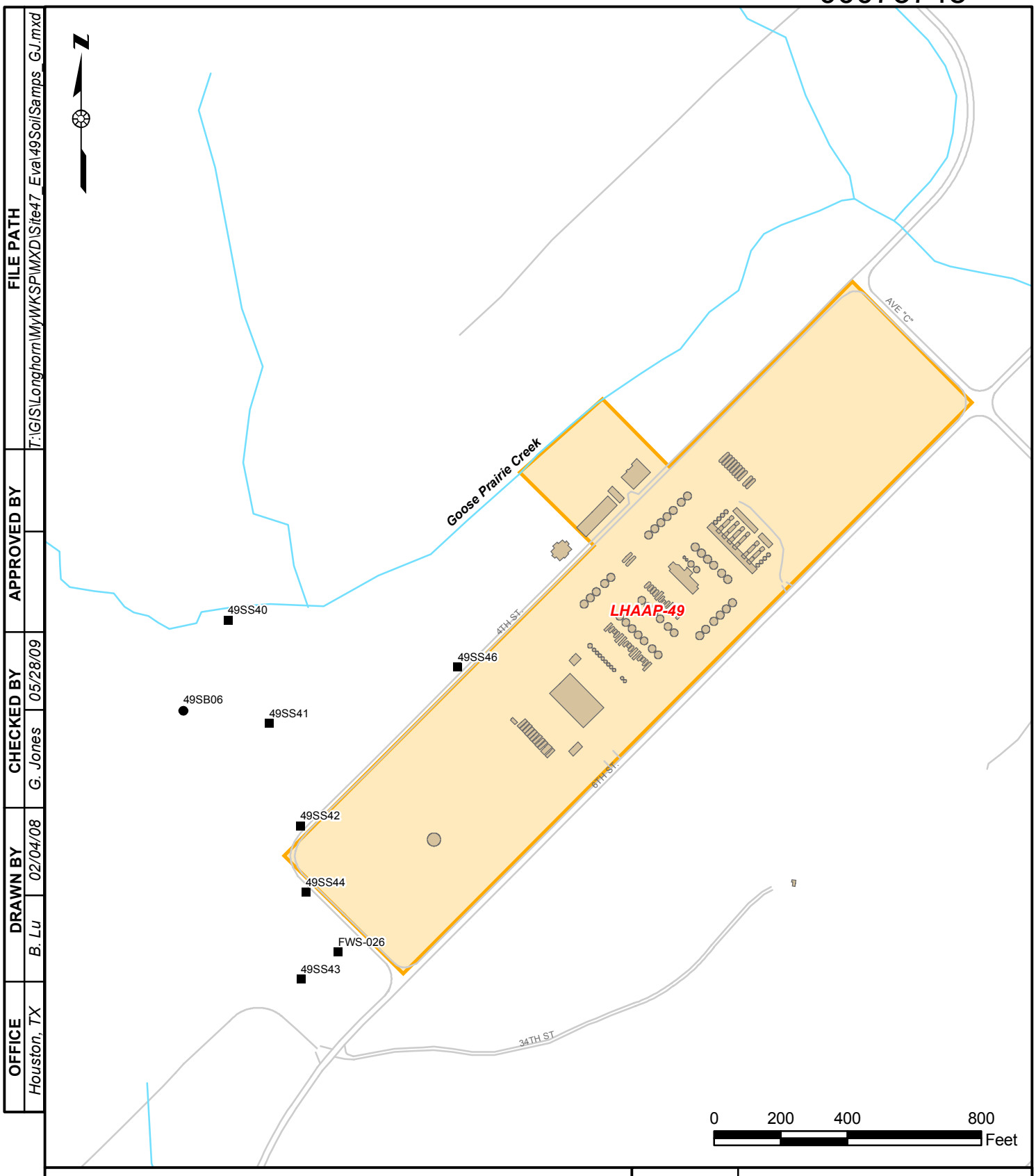

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OFFICE	DRAWN BY	CHECKED BY	APPROVED BY
Houston, TX	B. Lu 02/04/08	G. Jones 05/28/09	

Plot Date: 05/09

LEGEND

- Surface Soil Sample
- Soil Boring
- Stream
- Road
- Former Building or Tank Location
- Site

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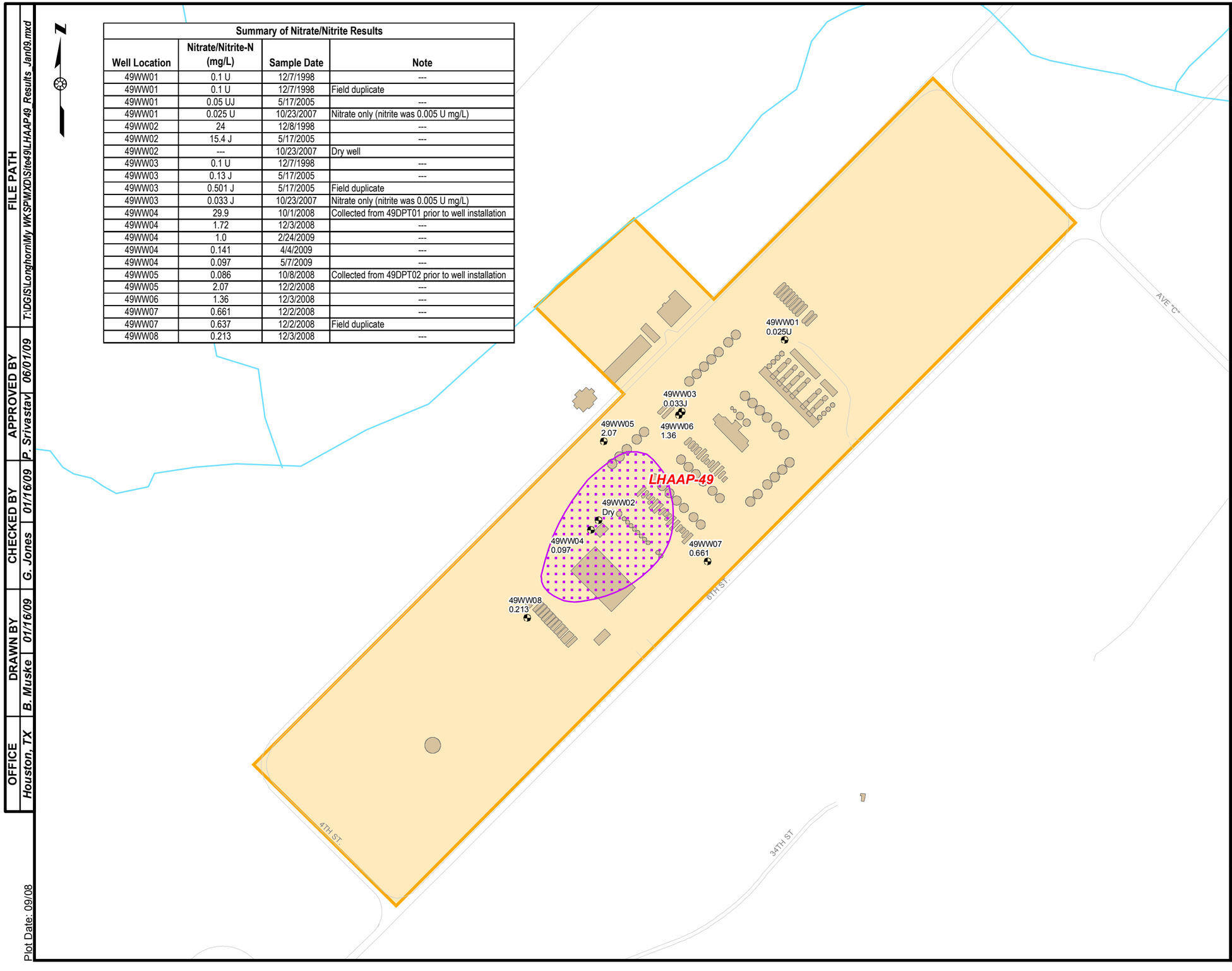
FIGURE RTC-1

SAMPLES EXCLUDED FROM DATASET
LHAAP-49

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

00073749

Summary of Nitrate/Nitrite Results			
Well Location	Nitrate/Nitrite-N (mg/L)	Sample Date	Note
49WW01	0.1 U	12/7/1998	---
49WW01	0.1 U	12/7/1998	Field duplicate
49WW01	0.05 UJ	5/17/2005	---
49WW01	0.025 U	10/23/2007	Nitrate only (nitrite was 0.005 U mg/L)
49WW02	24	12/8/1998	---
49WW02	15.4 J	5/17/2005	---
49WW02	---	10/23/2007	Dry well
49WW03	0.1 U	12/7/1998	---
49WW03	0.13 J	5/17/2005	---
49WW03	0.501 J	5/17/2005	Field duplicate
49WW03	0.033 J	10/23/2007	Nitrate only (nitrite was 0.005 U mg/L)
49WW04	29.9	10/1/2008	Collected from 49DPT01 prior to well installation
49WW04	1.72	12/3/2008	---
49WW04	1.0	2/24/2009	---
49WW04	0.141	4/4/2009	---
49WW04	0.097	5/7/2009	---
49WW05	0.086	10/8/2008	Collected from 49DPT02 prior to well installation
49WW05	2.07	12/2/2008	---
49WW06	1.36	12/3/2008	---
49WW07	0.661	12/2/2008	---
49WW07	0.637	12/2/2008	Field duplicate
49WW08	0.213	12/3/2008	---



LEGEND

- Shallow Monitoring Well
- Intermediate Monitoring Well
- Stream
- Road
- Possible Former Extent of Nitrate/Nitrite > 10 mg/L (See Note 4)
- Former Building or Concrete Slab
- Site

NOTES:
1. Values on map are most recent results in mg/L. See summary table for details

2.Four DPTs were advanced at LHAAP-49:

DPT	Associated Well	DPT Sample Date
49DPT01	49WW04	10/1/2008
49DPT02	49WW05	10/8/2008
49DPT03	49WW07	Not Sampled (Dry)
49DPT04	49WW08	Not Sampled (Dry)

3. All concentrations are nitrate/nitrite as milligrams per liter (mg/L) nitrogen.

4. Former extent was based on results at 49DPT01, but later results at 49WW04 showed nitrate/nitrite to be below 10 mg/L.

0 125 250 500 Feet

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

FIGURE RTC-2

NITRATE/NITRITE IN GROUNDWATER
LHAAP-49

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

OFFICE	DRAWN BY	CHECKED BY
Houston, TX	B. Muske 01/16/09	G. Jones 01/16/09

APPROVED BY	FILE PATH
P. Srivastav 06/01/09	T:\DG\S\Longhorn\My WKSP\MXD\Site49\LHAAP49_Results_Jan09.mxd

Plot Date: 09/08

FINAL

SITE EVALUATION REPORT
LHAAP-49, FORMER ACID STORAGE AREA
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Prepared for
U.S. Army Corps of Engineers
Tulsa District
1645 South 101st East Avenue
Tulsa, Oklahoma

Prepared by
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Houston, Texas 77042

Contract No. W12QR-04-D-0027, Task Order No. DS02
Shaw Project No. 117591

June 2009

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Acronyms and Abbreviations

µg/L	micrograms per liter
AOP	ammonia oxidation plant
BERA	baseline ecological risk assessment
bgs	below ground surface
COPC	chemical of potential concern
COPEC	chemical of potential ecological concern
DPT	direct push technology
°F	degrees Fahrenheit
HI	hazard index
GW-Ind	groundwater MSC for industrial use
GW-Res	groundwater MSC for residential use
Jacobs	Jacobs Engineering Group, Inc.
LHAAP	Longhorn Army Ammunition Plant
MARC	Multiple Award Remediation Contract
MCL	maximum contaminant level
mg/kg	milligrams per kilogram
msl	mean sea level
NAC	nitric acid concentrator
ng/kg	nanograms per kilogram
PCB	polychlorinated biphenyl
pH	potential hydrogen ion concentration
PVC	polyvinyl chloride
RI	remedial investigation
Shaw	Shaw Environmental, Inc.
SAC	sulfuric acid concentrator
SLERA	screening-level ecological risk assessment
SVOC	semivolatile organic compound
TCDD	tetrachlorodibenzo-p-dioxin
TCEQ	Texas Commission on Environmental Quality
TEF	toxicity equivalent factors
TEQ	toxicity equivalent quotient
TNT	2,4,6-trinitrotoluene
TO	Task Order
USACE	U.S. Army Corps of Engineers
USAEHA	U.S. Army Environmental Hygiene Agency
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound

1.0 Introduction

Shaw Environmental, Inc. (Shaw) was contracted by the U.S. Army Corps of Engineers (USACE) to perform remediation activities associated with Site Closure of Multiple Sites at the former Longhorn Army Ammunition Plant (LHAAP) under the Multiple Award Remediation Contract (MARC) No. W912QR-04-D-0027 issued by the Louisville District. Management of work performed under this contract is performed by the Tulsa District of USACE. Work by Shaw at the Longhorn facility is performed under Task Order (TO) No. DS02 of the above-referenced contract. As part of the remediation activities, Shaw has been tasked with evaluation of the Former Acid Storage Area designated as LHAAP-49.

1.1 Purpose

The purpose of this evaluation is to present sufficient information concerning conditions at LHAAP-49 to assess the threat, if any, posed to human health and the environment and to determine the need for additional action. The scope of the evaluation includes review of historical operations, environmental data documented in remedial investigation reports, and environmental data collected after the remedial investigation.

1.2 Facility and Site Background

LHAAP is located in central-east Texas in the northeastern corner of Harrison County. The facility occupies nearly 8,500 acres between State Highway 43 in Karnack, Texas, and the southwestern shore of Caddo Lake (**Figure 1-1**). The cities nearest to LHAAP are Marshall, Texas, approximately 14 miles to the southwest, and Shreveport, Louisiana, approximately 40 miles to the east. Caddo Lake is a large freshwater lake that bounds LHAAP to the north and east. The eastern fence of LHAAP is 3.5 miles from the Texas-Louisiana border.

LHAAP was established in 1942 to produce flake 2,4,6-trinitrotoluene (TNT). Production continued until 1945 when the facility was placed in standby mode. During the production period, the area now designated LHAAP-49 was known as the Acid Storage Area. It was an area for the formulation and storage of nitric and sulfuric acids and acid mixtures that were subsequently used elsewhere on LHAAP for the nitrification of toluene to form TNT. There are no known process releases that took place at LHAAP-49; however, spills could have occurred around tanks, lines, or buildings.

Investigations to assess environmental conditions at LHAAP began in the 1970s as part of the U.S. Department of Defense Installation Restoration Program. The U.S. Army Environmental Hygiene Agency (USAEHA) conducted the early studies. Before 1980, the U.S. Army Toxic and Hazardous Materials Agency identified 27 primary sites at LHAAP. The U.S.

Environmental Protection Agency (USEPA) Region 6 placed LHAAP on the National Priorities List in August 1990. The 27 sites were combined into 22 sites that were placed into five groups based on physical site location as well as type of site. LHAAP-49 was placed in Group 2.

Several phases of activities have been conducted at the Group 2 sites as part of the Group 2 Remedial Investigation (RI). RI activities at LHAAP-49 were initiated during the Phase III site investigations in 1998 conducted by Sverdrup Environmental, Inc. Following the RI, there have been additional field investigations focusing on metals and nitrate at the site. This report presents the cumulative results from the various investigations at LHAAP-49 and evaluates the need for future action.

1.3 Document Organization

This document consists of five sections and three appendices. **Section 1.0** discusses the purpose and organization of this site evaluation. **Section 2.0** describes site history and physical setting, and also summarizes previous studies and investigations. **Section 3.0** evaluates human and ecological risk. **Section 4.0** discusses the conclusions of the evaluation. **Section 5.0** lists the references used in this document. **Appendix A** discusses investigation procedures and corresponding results from the field investigation Shaw performed in December 2004. **Appendix B** contains tables that display the detected analytical results for LHAAP-49 for all investigations from 1998. **Appendix C** contains the baseline human health risk assessment. **Appendix D** contains the Soil Removal Report documenting the excavation of soil containing elevated mercury concentrations. **Appendix E** contains the VLEACH Modeling Report. **Appendix F** contains tables presenting results of the additional groundwater sampling conducted in October 2007, October and December 2008, and February, April, and May 2009.

Within each section, tables are provided on the page following the text in which they are first referenced. Figures are presented at the end of each section.

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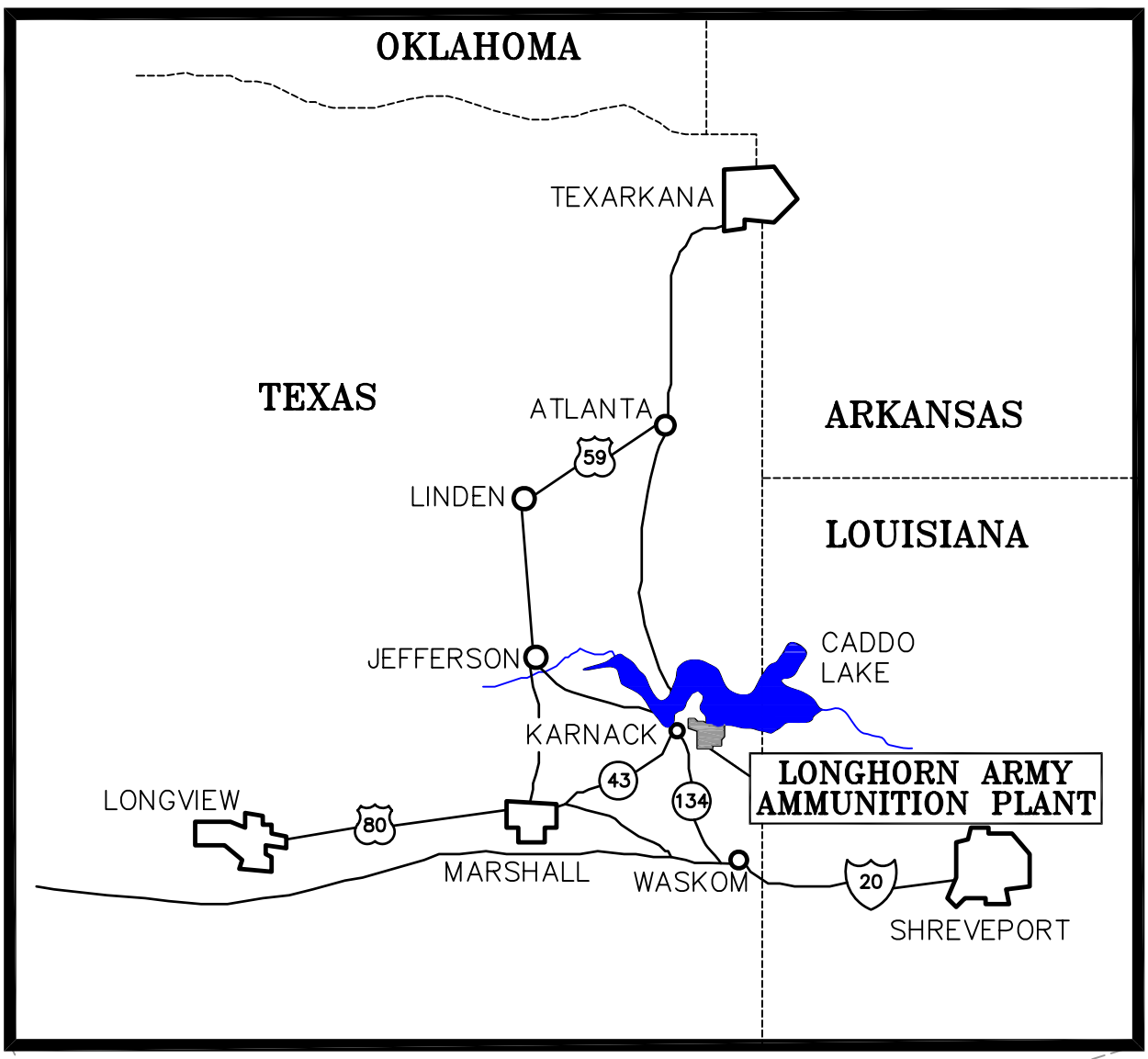

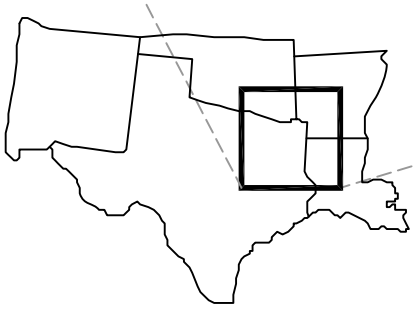

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IMAGE	X-REF	OFFICE	DRAWN BY		CHECKED BY		APPROVED BY		DRAWING NUMBER
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PLOT DATE: 7/18/07
FORMAT REVISION 3/25/99

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

FIGURE 1-1
LHAAP LOCATION MAP
LHAAP-49 SITE EVALUATION REPORT
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

2.0 Site Description and Background

LHAAP-49 is known as the former Acid Storage Area or the Acid Area, and is one of seven sites designated as the Group 2 sites at LHAAP (**Figure 2-1**). The Acid Area was used from 1942 to 1945 for formulation and storage of acids and acid mixtures in support of TNT production during World War II. Nitric acid and sulfuric acids were manufactured and handled in large quantities in this area. The site is located primarily between 4th Street to the northwest and 6th Street to the southeast in the west-central portion of LHAAP. A few buildings stood just northwest of 4th Street (**Figure 2-2**). The site is currently wooded and grassy with the exception of two concrete buildings, numerous building foundations, and several concrete saddles and platforms previously used for the support of aboveground storage tanks. There are no known process releases that took place at LHAAP-49; however, spills could have occurred around the tanks, lines, or buildings. It is likely that lead components (e.g., solder) were used during the construction of some of the vessels and piping in the area.

2.1 Operations History

LHAAP-49 was used from 1942 to 1945 for storage and formulation of acids and acid mixtures, including nitric acid, sulfuric acid, and oleum (a mixture of sulfuric acid and sulfur trioxide). **Figure 2-2** depicts building locations and provides a description of building use where known. Nitric acid manufacture at LHAAP began on October 6, 1942. The *Environmental Site Assessment, Phase I and II Report, Final, Production Areas, Longhorn Army Ammunition Plant, Karnack, Texas* (Plexus, 2005) provides the following detailed description of the acid manufacturing and storage operations at LHAAP:

> "Nitric acid was produced using an ammonia oxidation method developed by DuPont during the 1920s. Liquid ammonia was made into ammonia vapor. This vapor was burned over a platinum catalyst gauze and air that had been heated and compressed, producing nitrogen oxides. The air feeding the process was compressed, using the tail gas to drive a compressor. The nitrogen oxides were further oxidized with air to form nitrogen dioxide, than mixed with water to make 60 percent nitric acid. Nitric acid of a concentration greater than 60 percent was needed to manufacture most explosives. The major portion was concentrated to 98 percent nitric acid, commonly referred to as "strong nitric acid." The nitric acid concentration was accomplished using a nitric acid concentrator (NAC), wherein strong sulfuric acid was added to dehydrate the nitric acid. The sulfuric acid chemically bonded to the water while the nitric acid was boiled off. The removed sulfuric acid was recycled. Removal of the bonded water and sulfuric acid from the concentrated nitric acid was accomplished differently at different facilities (USAEHA, 1985; Kane, 1995).

> Wastewaters from AOP [*ammonia oxidation plant*] facilities included cooling water, leakage, and water used for cleanup. AOP effluents were usually mixed with large volumes of cooling water and frequently were combined with wastes from NAC and sulfuric acid processes. It is difficult to specify pollutant discharges solely associated with AOP. AOP process effluent contained appreciable quantities of nitrate and ammonia nitrogen (USEPA, 1977). In 1943, scale in the acid plant cooling waters was controlled with the addition of chlorine and ammonia (LOW, 1943).
>
> Two SAC [*sulfuric acid concentrators*] began manufacturing operations at LHAAP in January 1943 (LOW, 1943). Weak sulfuric acid manufacturing began by burning sulfur to produce sulfur dioxide. The sulfur dioxide was then converted into sulfur trioxide through contact with a platinum catalyst (some plants use a vanadium pentoxide catalyst). Sulfur trioxide, mixed with water, produced weak sulfuric acid. Strong sulfuric acid was manufactured by concentrating weak sulfuric acid. Concentration of sulfuric acid could be accomplished in at least two ways: a Chemico drum-type concentrator, operated by driving hot combustion gasses through the sulfuric acid; and a Mantius Concentrator, which dehydrated sulfuric acid by boiling it in a vacuum (Kane, 1995).
>
> Oleum is the corrosive oil formed by the mixture of sodium [*sic*] trioxide and sulfuric acid. The chemical is sometimes referred to as fuming sulfuric acid. It was mixed with nitric acids and used to nitrate Bi-oil and Tri-oil (Kane, 1995).
>
> Oleum is made by burning sulfur in a reducing flame to form sulfur dioxide. The sulfur dioxide was converted to sulfur trioxide by the mixture of sulfuric acid and sodium trioxide, which is dissolved in the acid. A SAC was used to concentrate spent sulfuric acid rather than reducing the acid to sulfur dioxide, and process losses were made up by burning sulfur to form sulfur dioxide. An antifreeze (nitric acid) was added to the oleum due to its high melting point. Oleum is sometimes referred to as fuming sulfuric acid or oil of vitrol. It is mixed with nitric acids and used to nitrate Bi-oil and Tri-oil (USAEHA, 1985; Kane, 1995)."

While the operations described above were performed at LHAAP, it is unclear whether all were performed at LHAAP-49. Nonetheless, the description of operations indicates that the only chemicals likely to be present at LHAAP-49 as a result of historical operations are common inorganic chemicals.

2.2 Physical Setting

LHAAP is located in an area characterized by a mild climate with an average temperature of 63.7 degrees Fahrenheit (°F). August is the warmest month with an average high temperature of 92.5°F. January is the coolest month with an average low temperature of 33.4°F. Precipitation averages approximately 52 inches per year with June being the month with greatest rainfall (National Climatic Data Center, 2002).

Most of LHAAP consists of mixed pine-hardwood forests that cover a flat to gently rolling terrain with an average slope of 3 percent or less. The topography of LHAAP-49 is relatively flat with approximately 3 to 5 feet of elevation increase from west to east. The gentle topography and mild climate of LHAAP support an abundant and diverse plant community with a diversity of habitats, which suggests the potential for a large variety of animal species to inhabit the installation. LHAAP is a part of the Cypress Bayou Basin occurring in the Piney Woods ecological region of Texas. As buildings have been demolished at LHAAP, more of the facility has been left to nature with pine trees growing among concrete remains of foundations and tank saddles. Common mammals found at LHAAP include the white-tailed deer, red and gray fox, rabbit, squirrel, opossum, skunk, armadillo, beaver, and raccoon.

Surface water at LHAAP drains to the northeast into Caddo Lake via four drainage systems: Goose Prairie Creek, Central Creek, Harrison Bayou, and Saunders Branch. Caddo Lake is a part of the Big Cypress Bayou. Surface drainage at LHAAP-49 generally flows from the southeast to the northwest, either through runoff or controlled flow via man-made drainage swales and culverts, and eventually drains into Goose Prairie Creek. Goose Prairie Creek consists of one large creek and several small tributaries to the north and northwest of LHAAP-49.

2.3 Geology/Hydrogeology

A thin veneer of Quaternary alluvium mantles the Tertiary age Wilcox and Midway Groups at the LHAAP (Jacobs, 2001). The thickness of the Wilcox Group varies from 350 feet in the northwest corner of the installation to 130 feet along the east side near Caddo Lake. The group consists of interbedded fine to medium-grained sand, silt, and clay. Underlying the Wilcox and Midway Groups are Cretaceous age formations of the Navarro and Taylor Groups. The Wilcox Group constitutes the majority of the unconsolidated sediments underlying LHAAP.

The uppermost portion of the Wilcox consists of medium plastic sandy silts and clays. The top silt and clay zone is followed by a shallow silty fine sand zone containing some silt and clay. A medium to highly plastic silty clay sand underlies the shallow sand zone. An intermediate sand zone is beneath the middle clay zone and consists of fine to medium silty sand. Beneath the intermediate sand zone is another silt to silty clay layer. This deep sand zone extends to the top of the Midway Formation, which is a thick, calcareous to non-calcareous clay containing some sand.

The Wilcox is the most important hydrogeologic unit at LHAAP. The unconsolidated sediments of the Wilcox Group are interpreted as consisting of a series of three active groundwater zones separated by silty or clayey layers. The first groundwater zone is within the shallow sand zone of the Wilcox Group. The second groundwater zone, or intermediate groundwater zone, occurs within the intermediate sand zone. The third groundwater zone, or deep groundwater zone, is in

the deep sand zone of the Wilcox Group. The clayey Midway Formation is considered the base of the active groundwater flow system at LHAAP.

2.4 Environmental Studies at LHAAP-49

Several field investigations have been conducted at LHAAP-49. A Phase III RI was initiated in 1998 with the installation of three shallow groundwater wells by Sverdrup Environmental, Inc. The wells were installed to maximum depths of 24 to 34 feet below ground surface (bgs). The wells were placed near site structures or other areas considered likely to have been impacted during past operations and in areas that were not hydraulically upgradient to process areas. The wells were sampled for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), explosive compounds, metals, and anions.

In 2000, Jacobs Engineering, Inc. (Jacobs) collected soil samples from 34 locations in and around LHAAP-49. Nine of these samples were analyzed for VOCs, SVOCs, pesticides/polychlorinated biphenyls (PCBs), explosives, dioxins/furans, metals, anions and perchlorate. The remaining samples were analyzed for metals and anions only. At this same time, Jacobs collected another round of samples from the three shallow monitoring wells, and analyzed the samples for VOCs, SVOCs, pesticides/PCBs, explosives, dioxins/furans, and metals.

The results of the 1998 and 2000 field investigations were summarized in the *Final Remedial Investigation Report Addendum for the Group 2 Sites, Remedial Investigation Report, Site 49* (Jacobs, 2002a). These data were also used to develop an industrial risk assessment (Jacobs, 2002b).

Since the issuance of the 2002 documents, three additional investigations at LHAAP-49 have focused on metals occurrence in soil. These investigations include sampling by the U.S. Fish and Wildlife Service (USFWS) (2 surface soil samples) in 2002, sampling by the USACE (13 surface soil samples) in 2004, soil sampling by Shaw (22 soil samples, 4 sediment samples, and 1 surface water sample) in 2004. The USACE and Shaw soil investigations focused on two metals: lead and mercury – that had occasional elevated concentrations among the earlier results. The procedures and results of the Shaw investigation are documented in **Appendix A**.

A few samples from the RI and USFWS investigations were designated as LHAAP-49 samples, but were actually collected outside the site. Such samples were intended to approximate background or to delineate the extent of possible contamination. When those samples were separated from the site by roadways and/or significant distances, they were removed from the data set that is considered within this report. Prior to exclusion, the results of such samples were considered to ensure that no data were excluded that could indicate possible spread of contamination beyond the currently designated boundaries of LHAAP-49.

The samples that were excluded, and their associated lead and mercury analytical results, are as follows:

Location	Depth (feet bgs)	Lead (mg/kg)	Mercury (mg/kg)
FWS-026	0-0.5	51.9	0.117
49SS40	0-0.5	6.92	0.0335
49SS41	0-0.5	10.3	0.0353
49SS42	0-0.5	58.4	0.0441
49SS43	0-0.5	9.38	0.0337
49SS44	0-0.5	7.56	0.0151
49SS46	0-0.5	27.3	0.0323
49SB06	0-0.5	65.1	0.0705
49SB06	1-2	17.9	0.081

The current boundaries of LHAAP-49 were established in the U.S. Army's report titled *Evaluations of Select Metals Detections in the West Further Investigation Area, Longhorn Army Ammunition Plant, Texas, Revision 1* (U.S. Army, 2005). That report examined the results for metals analyses of samples in and around LHAAP-49, and specifically established the boundaries of LHAAP-49 to include a 2.5-acre area north of 4th Street that had exhibited elevated mercury concentrations in soil. The remaining areas, outside LHAAP-49, were determined to be suitable for transfer to USFWS, and the USEPA concurred with the conclusion (USEPA, 2005).

Additional groundwater sampling has been conducted in response to comments from Texas Commission on Environmental Quality (TCEQ) and USEPA. Groundwater samples were collected in October 2007, October and December 2008, and February, April, and May 2009 to address concerns about metals and nitrate in groundwater. This sampling effort involved advancing four direct push technology (DPT) borings, installing five new wells, and collecting 14 groundwater samples. The results of these sampling events, including summary tables, laboratory reports, and well installation documentation, are included as **Appendix F**.

The numbers of samples collected and types of analyses performed for each investigation are presented in **Table 2-1**. **Figure 2-3** presents the locations of the samples that have been collected at LHAAP-49 and evaluated within this report. Tables listing the detected results for these locations are presented in **Appendix B** and **Appendix F**.

2.5 Soil Removal Action

Via a risk assessment (Jacobs, 2002b) and further evaluation presented in this Site Evaluation Report, the overall human health and ecological risks associated with the soil at site LHAAP-49 have been shown to be acceptable. However, two soil sample locations at LHAAP-49 had mercury concentrations that were markedly higher than mercury concentrations from samples elsewhere within LHAAP-49. The U.S. Army and the TCEQ agreed that removal of soil in the vicinity of these two sample locations would eliminate the need for evaluation of hot spot risks (TCEQ, 2008).

In October 2008, Shaw completed an excavation to a depth of 1.0 feet bgs around soil sample locations 49SB32 and 49SD65, then backfilled it with clean soil. The Soil Removal Action Report (**Appendix D**) contains the details of the field activities.

2.6 Summary of Findings

2.6.1 LHAAP-49 Geology/Hydrogeology

The three monitoring wells installed by Sverdrup (49WW01, 49WW02, and 49WW03) were completed in the first saturated zone (the shallow zone) with 10-foot screens. These wells were installed at maximum depths of 24 feet bgs (49WW02) and 34 feet bgs (49WW01 and 49WW03). The wells were constructed with stainless steel screens and risers. Based on the classification of soils during the installation of these wells, the shallow subsurface soils can typically be characterized as silty clays at the surface underlain by a silty sand layer, which appears to be continuous across the site. Jacobs (2002a) reported hydraulic conductivity values from 7.9×10^{-6} to 6.7×10^{-4} centimeters per second.

The five monitoring wells installed by Shaw (49WW04, 49WW05, 49WW06, 49WW07, and 49WW08) were also completed in the shallow zone with 10-foot screens (49WW04, 49WW05, and 49WW06) or 20-foot screens (49WW07 and 49WW08). The wells were installed to depths of 32 to 35 feet bgs. The wells were constructed with polyvinyl chloride (PVC) screens and risers. The soils encountered at the five new wells are generally consistent with those at the first three wells, silty clay underlain by silty sand. Monitoring well 49WW04 was installed near 49WW02 and deeper by 10 feet to sample the shallow zone groundwater at that location since 49WW02 had gone dry. Monitoring well 49WW06 was installed near 49WW03 to provide a check of chromium and nickel concentrations in a well constructed of PVC instead of stainless steel. In June 2009, wells 49WW02 and 49WW03 were pulled and abandoned per State of Texas requirements after successful sampling of their replacement wells.

Measured groundwater table elevations at the site ranged from 203.29 to 211.29 feet above mean sea level (msl) at monitoring wells in January 2009 (**Figure 2-4**). These elevations are 9 to 10 feet lower than those measured in December 1998 (Jacobs, 2001). In comparison, nearby Goose Prairie Creek has a centerline elevation that varies from approximately 210 to 220 feet above msl

(based on United States Geological Survey topographic maps). It is unlikely that groundwater enters Goose Prairie Creek except in very wet periods when the water table is high.

2.6.2 Media Contamination

This section discusses the source, nature, and extent of contamination at LHAAP-49. This assessment is performed by updating, where appropriate, the findings of the Phase III RI (Jacobs, 2002a), with additional information from the USFWS soil investigation from 2002, USACE field data from 2004, the December 2004 and February 2005 field work by Shaw, and the 2007, 2008, and 2009 field work by Shaw. Thus, the following sections discuss the accumulated results of all documented environmental investigations at LHAAP-49.

2.6.2.1 Sources

The original sources of contamination at LHAAP-49 probably included the buildings, piping, and tanks that were associated with on-site operations for the formulation, transfer, and storage of acids. These features may have included some components that were manufactured using lead or installed using lead-based solder. The floors of some buildings were reportedly covered with lead sheeting (Plexus, 2005). It is also possible that some of the facilities at LHAAP-49 included instrumentation (e.g., pressure gauges, thermometers) that contained mercury that was spilled during operations or demolition. The structures, tanks, piping, and equipment at LHAAP-49 have been removed with the exception of concrete foundations/saddles and two building shells. No known contaminant sources currently remain at the site.

2.6.2.2 Soil and Sediment

Soil and sediment at LHAAP-49 are evaluated together for the following reasons:

- The ditches at LHAAP-49 are shallow and covered with grass. They do not contain sediment of the type found in fully developed streams. The sediment samples were similar to surface soil samples.
- The ditches at LHAAP-49 flow only during and immediately after rain events. At other times, potential receptors would be able to access the ditches just as they would access other surface soil on site.

Therefore, soil and sediment will be grouped together throughout this document, and references to soil include ditch sediment unless otherwise specified.

Dioxins, explosives, metals/anions, PCBs, pesticides, perchlorate, SVOCs, and VOCs were analyzed in soil and sediment samples collected at LHAAP-49. Explosives, PCBs, perchlorate and SVOCs were not detected in any of the samples collected. Detected minimum and maximum results from these samples are summarized in **Table 2-2**. The analytical results for soil and sediment are discussed below:

- Twenty metals and two anions were detected in the soil samples collected during the various sampling activities at LHAAP-49. As part of the risk assessment presented in **Appendix C**, the data sets were compared to background data for LHAAP. As demonstrated in Attachment 1 of **Appendix C**, the aluminum and manganese results at LHAAP-49 were found to be consistent with background. However, lead had a maximum detected concentration (1,740 milligrams per kilogram [mg/kg] at 49SB19) while mercury had a maximum detected concentration of 778 mg/kg at 49SD65. In comparison, the maximum background values for lead and mercury in surface soil at LHAAP are 33.8 mg/kg and 0.12 mg/kg (Shaw, 2004). **Figure 2-5** shows the locations of lead and mercury results at the site. The elevated values of lead were located in the central portion of LHAAP-49 while the highest values of mercury were localized in a small area just northwest of 4th Street near former laboratory facilities. Lead exhibited elevated concentrations in several locations, making it possible to examine the change in lead concentration with depth in the upper soil zone. At locations 49SB12, 14, 18, 19, and 27, the lead concentration in the surface soil (0 to 0.5 feet bgs) varied from 659 to 1740 mg/kg. These locations also had samples at 1 to 2 feet bgs; the lead concentrations in those samples varied from 12.8 to 125 mg/kg. Thus, the vertical migration of lead in the soil appears to be limited.
- To evaluate dioxin/furan toxicity, 17 congeners were multiplied by applicable toxicity equivalent factors (TEF) (see **Table 2-3**) and then summed to convert to a 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) toxicity equivalent quotient (TEQ). Non-detects were treated as half the detection limit. **Figure 2-6** illustrates the dioxin/furan results for soil and groundwater and their corresponding sampling locations. The highest 2,3,7,8-TCDD TEQ calculated was 28 nanograms per kilogram (ng/kg) within the 0 to 0.5 foot interval of boring 49SB36 (Jacobs, 2002b). Other 2,3,7,8-TCDD TEQ calculations ranged from 0.68 ng/kg to 4.5 ng/kg.
- There were scattered low detections of a number of pesticides/PCBs as presented in **Table 2-2**.
- One VOC, methylene chloride (a common laboratory contaminant), was also detected at a low level (up to 0.00803 mg/kg) within the soil at LHAAP-49.

Modeling with VLEACH indicates that remaining mercury and lead concentrations in soil are not expected to leach into groundwater (**Appendix E**).

To address concerns expressed by TCEQ and USEPA, two locations with high concentrations of mercury were excavated in October 2008 (See **Appendix D**).

2.6.2.3 Surface Water

Due to the intermittent nature of flow in the ditches at LHAAP-49 only one surface water sample (49SW62) could be collected (**Figure 2-3**). Based on the findings from the previous soil investigations at LHAAP-49, this sample was analyzed for lead and mercury. Mercury was not detected within the sample. Lead was not detected in the primary sample, but had a result of 13.6 micrograms per liter (µg/L) in the field duplicate. In comparison, the USEPA maximum

contaminant level (MCL) for lead is 15 µg/L. The results and sampling procedures are discussed in further detail in **Appendix A**.

2.6.2.4 Groundwater

Nine rounds of sampling have been performed at the monitoring wells within LHAAP-49:

Event (Reference)	Analyses
December 1998 (Sverdrup, 2000)	VOCs, explosives, metals, anions
December 2000 (Jacobs, 2002a)	VOCs, explosives, metals, anions, SVOCs, pesticides, PCBs, perchlorate
May 2005	metals, nitrate
October 2007	metals, nitrate/nitrite
October 2008	metals
December 2008	metals, nitrate/nitrite
February 2009	metals, nitrate/nitrite
April 2009	metals, nitrate/nitrite
May 2009	metals, nitrate/nitrite

Low-flow sampling techniques were implemented during the 2005 through 2009 events. One well, 49WW02, was dry during October 2007 and subsequent sampling events.

PCBs, pesticides, perchlorate, explosives, and SVOCs were not detected in the samples. Detected results from groundwater sampling activities are provided in **Appendix B** (Table B-2) and **Appendix F** (Table F-1), and summarized in **Table 2-4**. Those results are summarized as follows:

- Twenty-two different metals/inorganics, and three anions were detected in the groundwater. Antimony, arsenic, chromium, selenium, and nitrate/nitrite were detected above their MCLs in one or more samples. The antimony MCL exceedances occurred in 1998 and were not repeated in subsequent events, including those utilizing low-flow techniques in 2005 and later. Arsenic was detected above its MCL in 49WW03 in 2007 and in 49WW06 in 2008 and 2009; these arsenic concentrations are typically associated with high results for other inorganics and are considered to be naturally occurring. Chromium exceeded the MCL in 6 of 15 groundwater samples; 5 from 49WW03 and 1 from 49WW01. The exceedance at 49WW01 in 2000 was not repeated. Installation and sampling of 49WW06 demonstrated that the chromium exceedances at 49WW03 were associated with the stainless steel material used to construct the monitoring wells. Selenium was detected above its MCL in 49WW03 in 2007 and 49WW06 in 2008; both results were below the upper threshold limit for site background concentration (Shaw, 2007a). No metal (including chromium) exceeded an MCL in a filtered sample.

Nitrate/nitrite exceeded its MCL in two samples from 49WW02 in 1998 and 2005. Although 49WW02 has been dry since 2005, additional nitrate/nitrite sampling beneath and around 49WW02 in 2007, 2008, and 2009 found nitrate/nitrite levels all less than the MCL.

- Similar to the evaluation of dioxins and furans in soil, 17 dioxin and furan congeners within the groundwater were multiplied by applicable TCEQ TEFs and then summed to convert to a 2,3,7,8-TCDD TEQ. **Figure 2-6** includes a table of dioxin/furan results for groundwater. None of the detected congeners was 2,3,7,8-TCDD itself; heptachlorodibenzofuran, octachlorodibenzofuran, octachlorodibenzo-p-dioxin, and tetrachlorodibenzofuran were detected (see **Appendix B**).
- One VOC, chloroform, was detected within the groundwater samples collected from monitoring well 49WW01 (Jacobs, 2002a). Two VOCs, chloroform and carbon tetrachloride, were detected within the groundwater samples collected from monitoring well 49WW02 (Jacobs, 2002a). The highest concentrations of chloroform and carbon tetrachloride (0.9J µg/L, and 1.54 µg/L, respectively) were detected in the groundwater sample collected from 49WW02 in December 2000. Neither VOC exceeded its corresponding MCL (80 µg/L for chloroform [as total trihalomethanes] and 5 µg/L for carbon tetrachloride) in any groundwater sample from LHAAP-49.

Table 2-1
LHAAP-49 Historical Sample Summary Table

Investigation/Medium	Analytical Suite								
	VOCs	SVOCs	Pesticides	PCBs	Explosives	Dioxins/ Furans	Metals	Anions	Perchlorate
Phase III RI Field Work in 1998 (Sverdrup, 2000)									
Groundwater	3	3	—	—	3	—	3	3	—
Phase III RI Additional Field Work in 2000 (Jacobs, 2002a)									
Soil	9	9	9	9	9	9	73	64	9
Groundwater	3	3	3	3	3	3	3	—	—
Field Investigations by USFWS in 2002									
Surface Soil Background	—	2	2	—	—	—	2	—	—
Field Investigations by USACE in 2004									
Surface Soil	—	—	—	—	—	—	14	—	—
Field Investigation by Shaw in 2004 and 2005 (see Appendix A)									
Soil	—	—	—	—	—	—	22	—	—
Sediment	—	—	—	—	—	—	4[1]	—	—
Surface Water	—	—	—	—	—	—	1[1]	—	—
Groundwater	—	—	—	—	—	—	3	3	—
Field Investigation by Shaw in 2007, 2008, and 2009 (see Appendix F)									
Groundwater	—	—	—	—	—	—	7	10	—
Total Samples	15	17	14	12	15	12	107	80	9

Notes:

[1] Only lead and mercury were analyzed.

Table 2-2
Summary of Chemicals Detected in Soil/Sediment at LHAAP-49

Chemical	Detection Frequency[a]	Range of Detected Concentrations (mg/kg)		Range of Reporting Limits (mg/kg)		95% UTL		COPC ?
		Minimum	Maximum	Minimum	Maximum	Surface	Subsurface	
Metals / Inorganics								
Aluminum	72 / 72	2,200	19,200	-	-	16,300	25,800	No
Arsenic	72 / 72	1.22	11.7	-	-	6.12	6.15	No
Barium	72 / 72	16	1,050	-	-	205	98.9	No
Chromium	72 / 72	5.02	70.2	-	-	36.7	38.6	No
Cobalt	71 / 71	0.701	18.6	-	-	8.13	6.92	No
Copper	72 / 72	4.73	55.2	-	-	7.47	11.8	No
Iron	72 / 72	4,160	66,300	-	-	23,800	41,000	No
Lead	106 / 106	5.48	1,740	-	-	27.6	12.9	YES
Magnesium	72 / 72	208	6,730	-	-	718	2,180	No
Manganese	72 / 72	8.92	1,800	-	-	1,820	344	No
Mercury	57 / 106	0.02295	778	0.038	5	0.1	0.36	YES[b]
Nickel	72 / 72	2.31	55	-	-	8.87	15.2	No
Potassium	71 / 71	181	1,340	-	-	444	495	No
Selenium	47 / 72	0.449	2.33	0.508	0.64	4.58	6.31	No
Silver	4 / 72	0.096	0.143	0.1	0.203	0.31	0.37	No
Sodium	24 / 59	61	855	52	64	107	191	No
Strontium	72 / 72	5	921	-	-	28.5	40.5	No
Thallium	2 / 71	1.21	1.37	1	1.3	0.47	-	No
Vanadium	72 / 72	8.54	75.9	-	-	40.5	50.0	YES
Zinc	72 / 72	7.17	1,310	-	-	61.6	24.8	No
General Chemistry								
Chloride	9 / 71	16	135	10.7	13.9	-	-	No
Sulfate	20 / 70	12	267	10.7	13.9	-	-	No
pH	22 / 22	4	7	-	-	-	-	No
Dioxins / Furans								
2,3,7,8-TCDD TEQ	8 / 9	6.76E-07	2.83E-05	-	-	-	1.53E-07	YES

Table 2-2 *(Continued)*
Summary of Contaminants Detected in Soil/Sediment at LHAAP-49

Chemical	Detection Frequency[a]	Range of Detected Concentrations (mg/kg)		Range of Reporting Limits (mg/kg)		95% UTL		COPC ?
		Minimum	Maximum	Minimum	Maximum	Surface	Subsurface	
Metals / Inorganics								
1,2,4,5-Tetrachlorobenzene	1 / 1	0.00309	0.00309	-	-	-	-	No
4,4'-DDD	2 / 10	0.0004	0.02485	0.0034	0.0039	-	-	No
4,4'-DDE	2 / 10	0.00546	0.6175	0.0034	0.0039	-	-	No
4,4'-DDT	2 / 10	0.000467	0.0711	0.0034	0.0039	-	-	No
alpha-Chlordane	1 / 10	0.00113	0.00113	0.0034	0.0039	-	-	No
cis-Nonachlor	1 / 1	0.000814	0.000814	-	-	-	-	No
Endosulfan II	1 / 10	0.000705	0.000705	0.0034	0.0039	-	-	No
o,p'-DDT	1 / 1	0.000343	0.000343	-	-	-	-	No
Polychlorinated Biphenyls	1 / 1	0.0275	0.0275	-	-	-	-	No
Volatile Organics								
Methylene chloride	3 / 9	0.0050275	0.00803	0.00575	0.00639	-	-	No

Notes and Abbreviations:

[a] *See Appendix B, Table B-1 for data set. Number of samples includes sediment and soil at all depth intervals.*

[b] *Mercury was of special concern to TCEQ and USEPA, and the locations with the highest mercury concentrations were excavated (see Appendix D).*

95% UTL *as noted in the July 2004 Final Background Soil Study Report*
mg/kg *milligrams per kilogram*
NA *Not applicable because the chemical is not considered to be of concern from a human health standpoint per TCEQ guidance.*
TCEQ *Texas Commission on Environmental Quality*
TEQ *toxicity equivalent quotient*

Table 2-3
Dioxin/Furan Toxicity Equivalent Factors

Dioxin/Furan Congener	Toxicity Equivalent Factor
1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.0100
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	0.0100
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.0100
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	0.1000
1,2,3,4,7,8-Hexachlorodibenzofuran	0.1000
1,2,3,6,7,8-Hexachlordibenzo-p-dioxin	0.1000
1,2,3,6,7,8-Hexachlorodibenzofuran	0.1000
1,2,3,7,8,9-Hexachlordibenzo-p-dioxin	0.1000
1,2,3,7,8,9-Hexachlorodibenzofuran	0.1000
1,2,3,7,8-Pentachlordibenzo-p-dioxin	1.0000
1,2,3,7,8-Pentachlorodibenzofuran	0.0500
2,3,4,6,7,8-Hexachlorodibenzofuran	0.1000
2,3,4,7,8-Pentachlorodibenzofuran	0.5000
2,3,7,8-TCDD	1.0000
2,3,7,8-TCDF	0.1000
Octachlorodibenzo-p-dioxin	0.0001
Octachlorodibenzofuran	0.0001

Source: Van den Berg, et al, 1998.

Table 2-4
Summary of Chemicals Detected in Groundwater at LHAAP-49

Chemical	Detection Frequency	Range of Detected Concentrations (µg/L)		Range of Reporting Limits (µg/L) [a]		MCL (µg/L)	95% UTL (µg/L)
		Minimum	Maximum	Minimum	Maximum		
Metals / Inorganics							
Aluminum	9 / 16	52.1	2,340	50	200		2680
Antimony	4 / 13	0.594	15	0.25	5	6	12.2
Arsenic	7 / 16	7.45	48.3	2	10	10	34.2
Barium	11 / 14	21.6	246	200	200	2,000	128
Beryllium	1 / 13	0.592	0.592	0.25	0.8	4	0.851
Cadmium	6 / 13	0.669	3.8	0.8	2.5	5	5.1
Calcium	14 / 14	229,000	590,000	-	-		302,000
Chromium	15 / 15	4.28	871	-	-	100	15.8
Cobalt	8 / 14	6.55	23.9	2.5	50		187
Copper	9 / 14	5.3	33	5	25	1,300	3.22
Iron	15 / 16	55.1	4,010	25	25		4,230
Lead	8 / 16	0.295	10	2.5	3	15	2.4
Magnesium	14 / 14	180,000	450,000	-	-		462,000
Manganese	14 / 14	166	3,030	-	-		7,840
Nickel	13 / 14	34.9	964	40	40		229
Potassium	13 / 14	5,300	14,200	5,000	5,000		2,980
Selenium	11 / 14	6	60.3	5	10	50	63.5
Sodium	14 / 14	340,000	610,000	-	-		-
Strontium	6 / 6	9,740	38,000	-	-		7,330
Thallium	8 / 14	0.111	1.2	0.1	5	2	-
Vanadium	1 / 14	5.2	5.2	5	100		3.99
Zinc	9 / 13	9.35	50	5	10		59.2
General Chemistry							
Chloride	3 / 3	545,000	1,670,000	-	-		-
Nitrate	1 / 2	33	33	25	25	10,000	-
Nitrate / Nitrite	11 / 14	97	24,000	50	100	10,000	-
Sulfate	3 / 3	420,000	2,200,000	-	-		-
Dioxins / Furans							
2,3,7,8-TCDD TEQ	3 / 3	1.16E-05	2.03E-05	-	-	3.00E-05	-
Volatile Organics							
Carbon tetrachloride	2 / 6	1	1.54	0.1	1	5	-
Chloroform	3 / 6	0.55	0.9	0.1	1	80 [b]	-

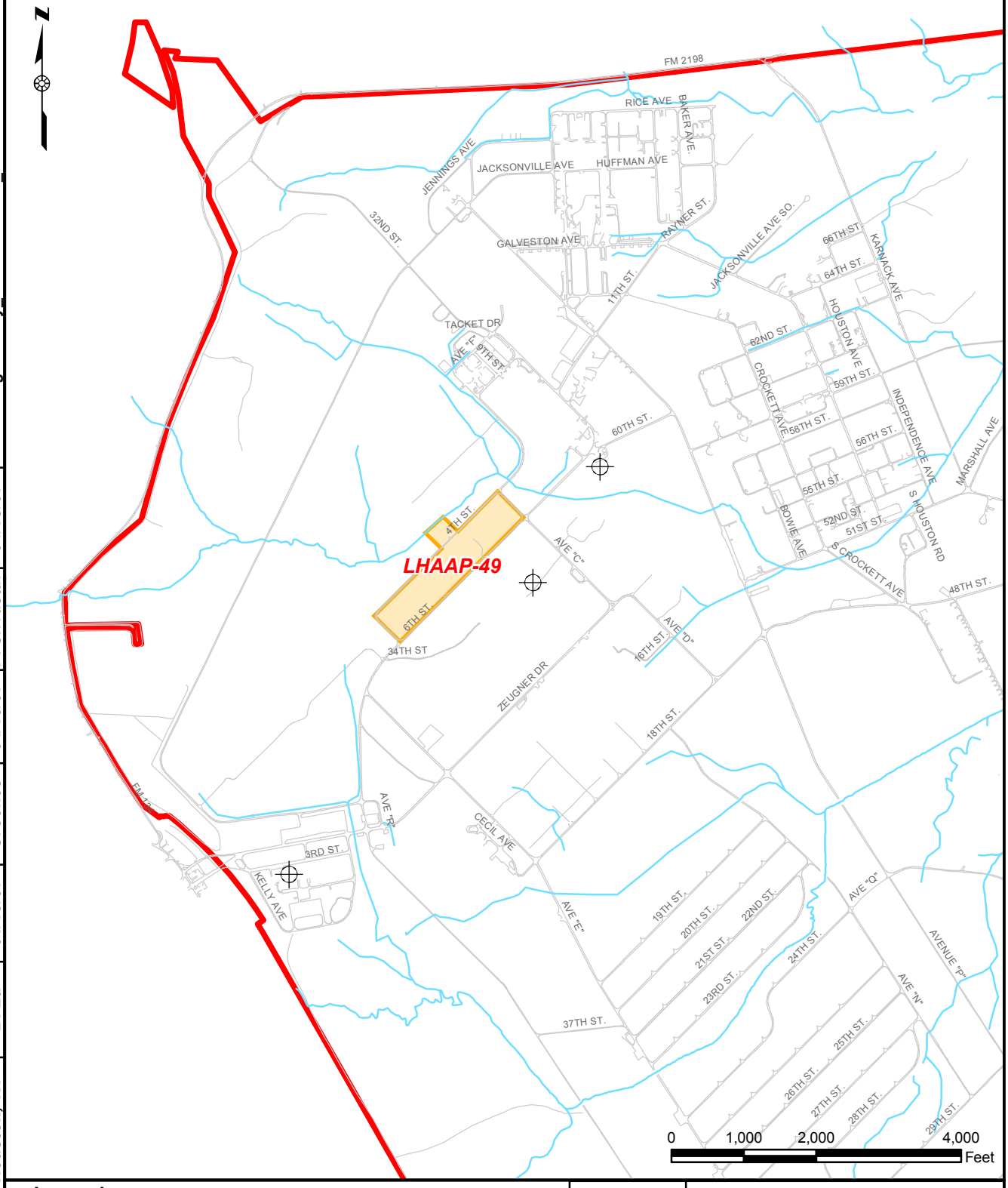
Notes and Abbreviations:

Detection and Frequency numbers do not include field duplicates

[a] *Unfiltered groundwater from monitoring wells at LHAAP-49*

[b] *The MCL for total trihalomethanes is 80 µg/L*

95% UTL *Maximum noted in the June 2007 Final Evaluation of Perimeter Well Data for Use as Groundwater Background.*
MCL *Maximum Contaminant Level for drinking water*
TEQ *toxicity equivalent quotient*
µg/L *micrograms per liter*



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Legend

- Stream
- Road
- Site
- Lake/Pond
- LHAAP Boundary
- LHAAP Water Supply Well

Plot Date: 06/07

Shaw®

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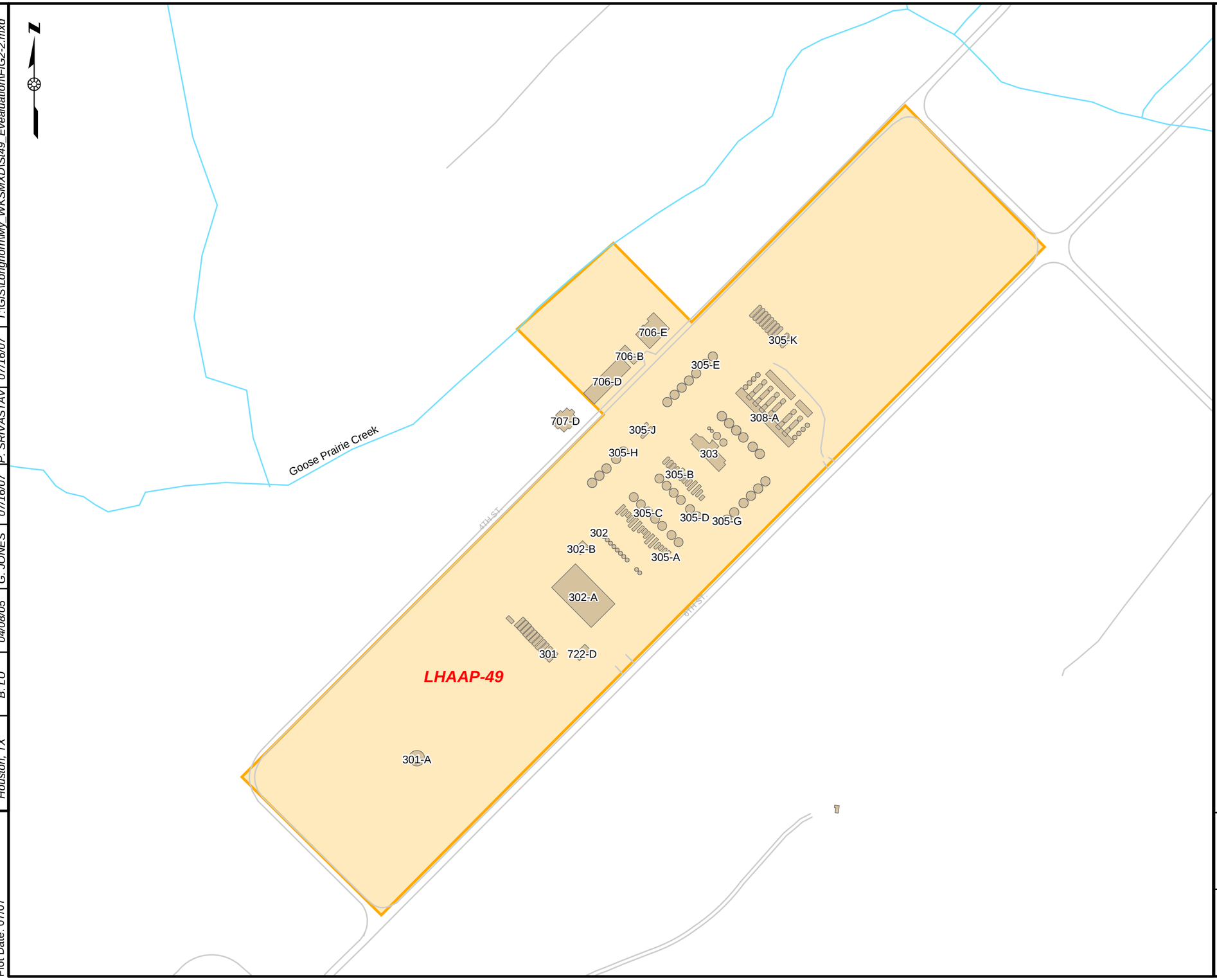
TULSA DISTRICT
TULSA, OKLAHOMA

FIGURE 2-1

SITE VICINITY MAP
LHAAP-49 SITE EVALUATION REPORT

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

00073773



Legend

- Stream
- Road
- Former Building or Tank Location
- Site

Buildings and Structures in or Adjacent to LHAAP-49

Structure or Building Number	Description of Use
301-A	Unknown
301	Unkonwn
302	62% Nitric Acid Storage
302-A	Unkonwn
302-B	Office
303	Residual H_2SO_4 Storage, Nitric Acid. Conc. Building
305-A	Conc. Mix Circulators
305-B	Residual H_2SO_4 Cooling Storage
305-C	92.3% H_2SO_4 Dark Storage
305-D	Conc. Mixing Acid Storage
305-E	H_2SO_4 Storage Clear Sales Storage
305-G	TNT Residual Acid Storage
305-H	Oleum Storage
305-J	F-83 Storage
305-K	TNT Mix Storage
308-A	H_2SO_4 Concentrators
706-B	Laboratory
706-D	Supervisor's Office and Laboratory
706-E	Unknown
707-D	Change House
722-D	Shop

References:

Plexus Scientific Corporation, 2004, *Environmental Site Assessment Phase I and II Report Draft, Production Areas, Longhorn Army Ammunition Plant, Karnack, Texas,* September.

Ford, Bacon and Davis, Inc., 1942, U.S. Engineer Area Office, *Longhorn Ordnance Finished Grading & Drainage Acid Area Layout, Karnack, Texas,* July.

0 125 250 500 Feet

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FIGURE 2-2

SITE MAP
LHAAP-49 SITE EVALUATION REPORT

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

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Houston, TX	B. LU 04/08/05	G. JONES 07/16/07	P. SRIVASTAV 07/16/07	T:\GIS\Longhorn\My_WKSMXD\St49_Evealuation\FIG2-2.mxd

Plot Date: 07/07

00073774

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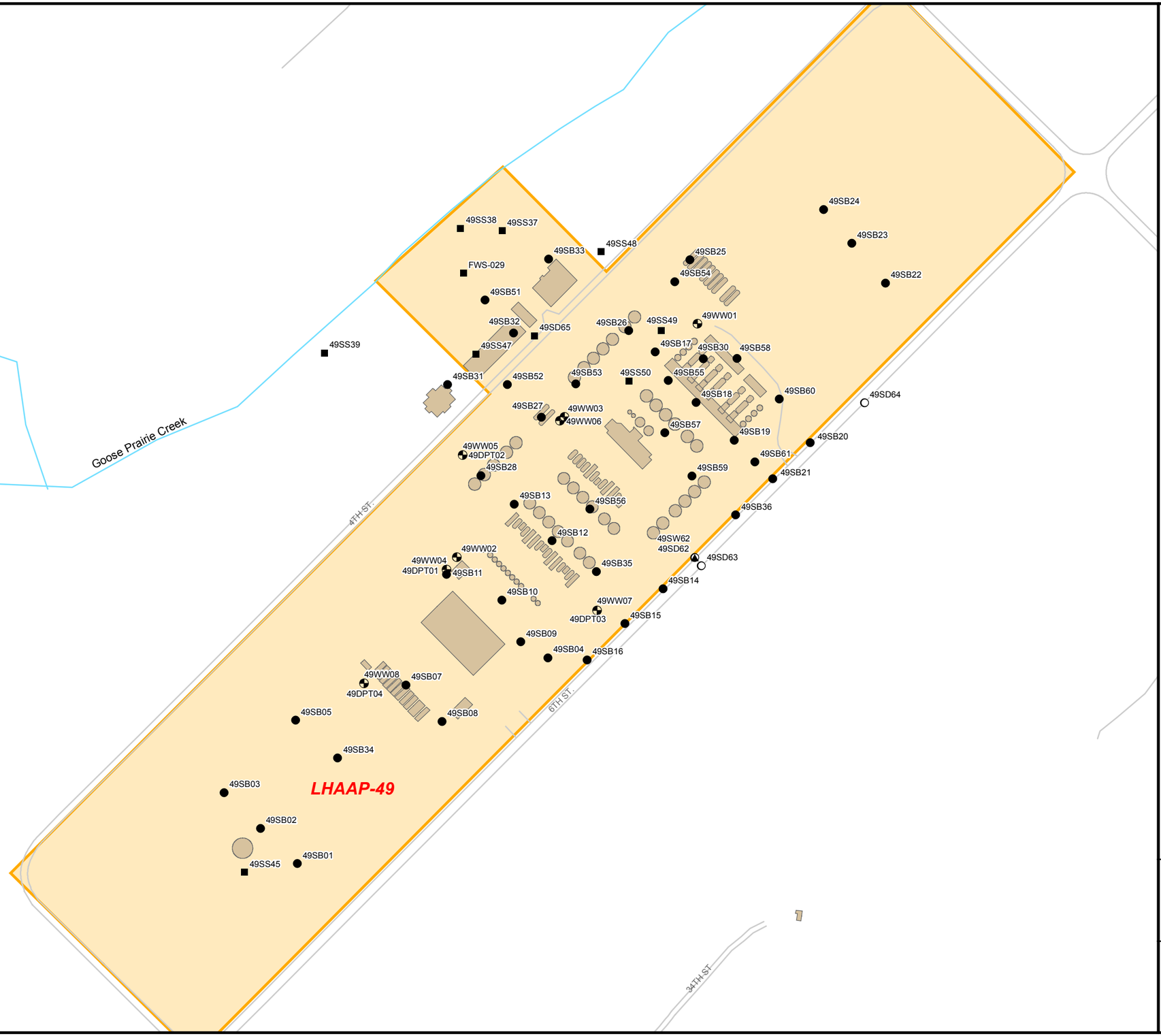
Plot Date: 05/09



Legend

- Shallow Monitoring Well
- Soil Boring
- Sediment Sample Location
- Surface Soil Sample Location
- Surface Water Sample Location
- Stream
- Road
- Former Building or Tank Location
- Site

0 100 200 400 Feet

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TULSA, OKLAHOMA

FIGURE 2-3

SAMPLE LOCATION MAP
LHAAP-49 SITE EVALUATION REPORT

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

00073775

FILE PATH	
T:\GIS\Longhorn\My_WKSMXD\S149_Evealuation\FIG2-4.mxd	

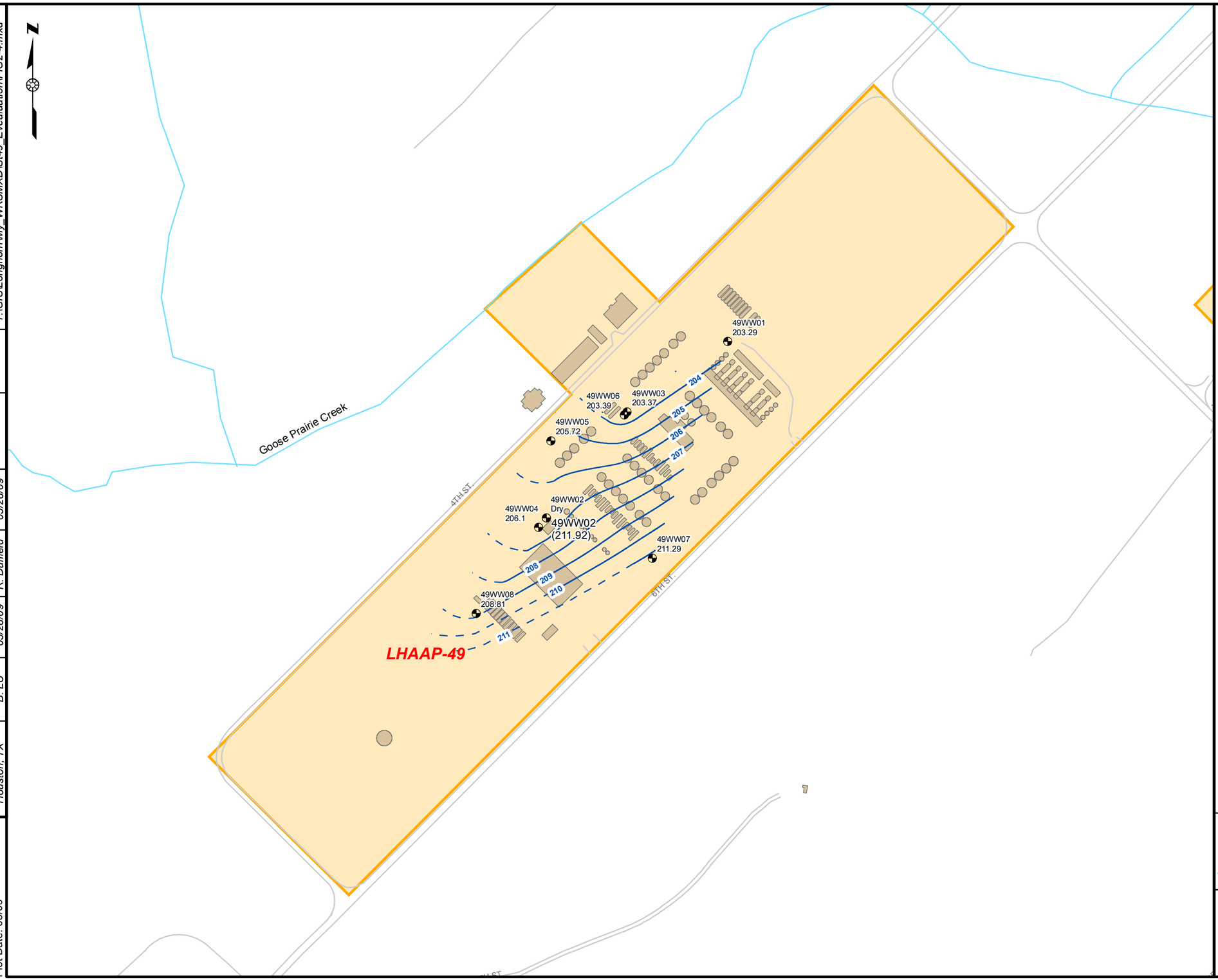
APPROVED BY	

CHECKED BY	
R. Duffield	05/28/09

DRAWN BY	
B. LU	05/28/09

OFFICE
Houston, TX

Plot Date: 05/09



Legend

- Shallow Monitoring Well
- Dry Shallow Monitoring Well
- Groundwater Elevation Contour
- Inferred Groundwater Elevation Contour
- Stream
- Road
- Former Building or Tank Location
- Site

Notes:
1. Groundwater elevations reported in feet.
2. Groundwater elevations were measured in January 20, 2009.

0 125 250 500 Feet

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TULSA, OKLAHOMA

FIGURE 2-4
GROUNDWATER ELEVATION MAP
(SHALLOW ZONE)
LHAAP-49 SITE EVALUATION REPORT
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

FILE PATH	APPROVED BY	
T:\GIS\SLonghorn\My_WKSMXD\St49_Evealuation\FIG2-5.mxd		

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Houston, TX	B. LU	04/08/05	R. DUFFIELD	05/28/09

Plot Date: 05/09

N

49SB26
COC	0'-0.5'	1'-2'
Hg	ND (0.044)	ND (0.0479)
Pb	54.4	15.9

49SS50
COC	0'-0.5'
Hg	0.127
Pb	123

49SS48
COC	0'-0.5'
Hg	0.107
Pb	39.5

49SS49
COC	0'-0.5'
Hg	0.216
Pb	1120

49SB33
COC	0'-0.5'	1'-2'
Hg	0.0631	ND (0.0477)
Pb	11.3	10.4

49SB25
COC	0'-0.5'	1'-2'
Hg	ND (0.048)	ND (0.0468)
Pb	266	15.3

49SB17
COC	0'-0.5'	1'-2'
Hg	2.12	0.16
Pb	400	39.4

49SS37
COC	0'-0.5'
Hg	0.0416
Pb	7.06

C-SS-029
COC	0'-0.5'
Hg	0.117
Pb	51.9

49SS38
COC	0'-0.5'
Hg	0.28
Pb	12.4

49SB30
COC	0'-0.5'	1'-2'
Hg	0.052	ND (0.046)
Pb	336	15.7

49SB24
COC	0'-0.5'	1'-2'
Hg	0.0525	ND (0.0448)
Pb	37	7.42

49SB32
COC	0'-0.5'	1'-2'
Hg	84.2	6.88
Pb	121	16.4

49SB23
COC	0'-0.5'	1'-2'
Hg	ND (0.049)	ND (0.048)
Pb	57.5	23.5

49SB53
COC	0'-0.5'	3'-4'
Hg	0.0580 J	<0.257
Pb	356	5.48

49SB54
COC	0'-0.5'	3'-4'
Hg	0.0475 J	0.0478 J
Pb	218	9.62

49SB55
COC	0'-0.5'	3'-4'
Hg	0.0359 BJ	0.0214 BJ
Pb	13.2	9.92

49SB22
COC	0'-0.5'	1'-2'
Hg	ND (0.0459)	ND (0.047)
Pb	13.7	12.9

49SB27
COC	0'-0.5'	1'-2'
Hg	ND (0.0438)	ND (0.047)
Pb	659	56.8

49SS47
COC	0'-0.5'
Hg	3.76
Pb	36.1

49SD65
COC	SED
Hg	778
Pb	193 J

49SB31
COC	0'-0.5'	1'-2'
Hg	0.0561	ND (0.046)
Pb	52.8	35.7

49SB51
COC	0'-0.5'	3'-4'
Hg	0.0225 J	0.0257 J
Pb	76.4	13.8

49SB18
COC	0'-0.5'	1'-2'
Hg	0.2	ND (0.045)
Pb	992	12.8

49SS39
COC	0'-0.5'
Hg	0.035
Pb	10

49SB52
COC	0'-0.5'	3'-4'
Hg	0.0335 J	0.0478 J
Pb	9.65	9.78

49SB58
COC	0'-0.5'	3'-4'
Hg	0.0752 J	0.114 J
Pb	366	8.33

49SB19
COC	0'-0.5'	1'-2'
Hg	ND (0.046)	0.0909
Pb	1740	44.9

49SB28
COC	0'-0.5'	1'-2'
Hg	ND (0.0476)	ND (0.047)
Pb	19.6	12.2

49SB60
COC	0'-0.5'	3'-4'
Hg	0.0836 J	0.0617 J
Pb	10.9	7.46

49SB13
COC	0'-0.5'	1'-2'
Hg	ND (0.04)	ND (0.044)
Pb	26.1	9.04

49SB64
COC	SED
Hg	0.0373 BJ
Pb	57.4 J

49SB20
COC	0'-0.5'	1'-2'
Hg	ND (0.0457)	0.0927
Pb	82.9	21.8

49SB57
COC	0'-0.5'	3'-4'
Hg	0.0143 BJ	0.0381 BJ
Pb	8.81	11.1

49SB61
COC	0'-0.5'	3'-4'
Hg	0.0545 BJ	0.0382 BJ
Pb	22.1 J	13.4 J

49SB21
COC	0'-0.5'	1'-2'
Hg	ND (0.046)	0.07
Pb	226	187

49SB12
COC	0'-0.5'	1'-2'
Hg	0.0502	ND (0.047)
Pb	834	41.8

49SB56
COC	0'-0.5'	3'-4'
Hg	0.0301 BJ	0.00827 BJ
Pb	46.1	10.4

49SB59
COC	0'-0.5'	3'-4'
Hg	0.0695 J	0.00976 BJ
Pb	6.53	7.24

49SB36
COC	0'-0.5'	1'-3'	3'-5'
Hg	0.0752	ND (0.047)	0.108
Pb	374	15.2	147

49SB35
COC	0'-0.5'	1'-3'	3'-5'
Hg	ND (0.048)	0.0799	0.0639
Pb	280	30	24.1

49SW62
COC	SW
Hg	ND (5 µg/L)
Pb	ND (5 µg/L) (See Note 3)

49SB14
COC	0'-0.5'	1'-2'
Hg	ND (0.045)	ND (0.044)
Pb	934	124

49SS40
COC	0'-0.5'
Hg	0.0335
Pb	6.92

49SB11
COC	0'-0.5'	1'-2'
Hg	0.0721	ND (0.0429)
Pb	31.7	6.32

49SD62
COC	SED
Hg	0.0750 J
Pb	28.2 J

49SS46
COC	0'-0.5'
Hg	0.0323
Pb	27.3

49SD63
COC	SED
Hg	0.0268 BJ
Pb	21.4 J

49SB15
COC	0'-0.5'	1'-2'
Hg	ND (0.044)	ND (0.043)
Pb	83.1	33

49SB10
COC	0'-0.5'	1'-2'
Hg	ND (0.0457)	ND (0.0426)
Pb	18.5	20.4

49SB06
COC	0'-0.5'	1'-2'
Hg	0.0705	0.081
Pb	65.1	17.9

49SB16
COC	0'-0.5'	1'-2'
Hg	0.545	ND (0.043)
Pb	182	12.7

49SS41
COC	0'-0.5'
Hg	0.0353
Pb	10.3

49SB09
COC	0'-0.5'	1'-2'
Hg	0.0734	0.0927
Pb	289	34.6

49SB04
COC	0'-0.5'	1'-2'
Hg	0.0486	0.0749
Pb	12.7	11.6

49SB08
COC	0'-0.5'	1'-2'
Hg	0.0661	0.0707
Pb	102	12.2

49SS42
COC	0'-0.5'
Hg	0.0441
Pb	58.4

49SB05
COC	0'-0.5'	1'-2'
Hg	0.0722	ND (0.051)
Pb	14.1	12.6

49SS44
COC	0'-0.5'
Hg	0.0151
Pb	7.56

49SB03
COC	0'-0.5'	1'-2'
Hg	ND (0.038)	ND (0.0458)
Pb	10.6	8.4

49SB07
COC	0'-0.5'	1'-2'
Hg	0.0838	0.0807
Pb	351	28.1

49SB34
COC	0'-0.5'	1'-3'	3'-5'
Hg	0.0533	0.0731	0.104
Pb	11.8	9.95	13

C-SS-026
COC	0'-0.5'
Hg	0.26
Pb	15.4

49SS45
COC	0'-0.5'
Hg	0.0494
Pb	12

49SB02
COC	0'-0.5'	1'-2'
Hg	0.055	6.27
Pb	13.4	48.4

49SB01
COC	0'-0.5'	1'-2'
Hg	ND (0.0487)	0.059
Pb	12.3	17.7

49SS43
COC	0'-0.5'
Hg	0.0337
Pb	9.38

LHAAP-49

49SS38 49SS37 49SB33 49SS48 49SB25 49SB54 49SB24 49SB23 C-SS-029 49SB51 49SB32 49SS47 49SD65 49SB53 49SB52 49SB26 49SS49 49WW01 49SB17 49SB30 49SB58 49SS39 49SB31 49SB52 49SB53 49SS50 49SB55 49SB18 49SB60 49SD64 49SB27 49WW03 49SB57 49SB19 49SB61 49SB20 49SB56 49SB59 49SB21 49SB35 49SB36 49SS40 49SB11 49SW62 49SD62 49SB14 49SS46 49SD63 49SB15 49SB06 49SB10 49SB16 49SS41 49SB09 49SB04 49SB08 49SS42 49SB05 49SB07 49SS44 49SB03 49SB34 C-SS-026 49SS45 49SB02 49SB01 49SS43

49SB22 49SB18 49SB19 49SB20 49SB21 49SB36 49SB14 49SB15 49SB16 49SB04 49SB08 49SB07 49SB34 49SB01

49SS40 49SS41 49SS42 49SS44 49SS43 49SS45 49SS46 49SS48 49SS49 49SS50 49SS37 49SS38 49SS39 49SB06 49SB10 49SB09 49SB05 49SB03 49SB02 49SB01 49SB04 49SB07 49SB08 49SB34 49SB36 49SB35 49SB11 49SB12 49SB13 49SB28 49SB56 49SB57 49SB59 49SB61 49SB64 49SB60 49SB58 49SB54 49SB55 49SB53 49SB52 49SB51 49SB26 49SB25 49SB24 49SB23 49SB22 49SB18 49SB19 49SB20 49SB21 49SB14 49SB15 49SB16 49SB17 49SB30 49SB33 49SB32 49SB27 49SB31 49SB12 49SB35 49SW62 49SD62 49SD63 49SD65 49WW01 49WW02 49WW03

94TH ST 95TH ST ZEDIKER DR AVE C AVE D

Legend

- Shallow Monitoring Well
- Soil Boring
- Sediment Sample Location
- Surface Water Sample Location
- Surface Soil Sample Location
- Stream
- Road
- Former Building or Tank Location
- Site
- Excavated Area

Notes:
1. Depths are reported in feet below ground surface.
2. Concentrations are reported in milligrams per kilogram (mg/kg), unless otherwise noted.
3. The field duplicate at 49SW62 had a result of 13.6 µg/L.
4. Highlighted values are those that exceed the SAI-Ind concentration -- The Texas Commission on Environmental Quality medium-specific concentration for soil for industrial use based on inhalation, ingestion, and demal contact. The SAI-Ind concentrations for lead and mercury are 1,000 and 0.15 mg/kg, respectively. SAI-Ind for mercury is based on pH of 4.9; value increases with increasing pH.

B - Concentration reported in equipment rinsate samples
COC - Contaminant of concern
J - Reported value is an estimated concentration
ND - Not detected; detection limit is in parentheses
SED - Sediment result

Groundwater Results for Lead & Mercury

Well Location	Sample Date	Sample Type	Lead (ug/L)	Mercury (ug/L)
49WW01	12/7/1998	Primary	<3	<0.2
	12/7/1998	Field Duplicate	<3	<0.2
	12/20/2000	Primary	<3	<0.2
49WW02	12/8/1998	Primary	<3	<0.2
	12/20/2000	Primary	<3	<0.2
49WW03	12/7/1998	Primary	4	<0.2
	12/20/2000	Primary	<3	<0.2
	12/20/2000	Field Duplicate	<3	<0.2

Results are for unfiltered samples of shallow groundwater.

0 150 300 600 Feet

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TULSA DISTRICT
TULSA, OKLAHOMA

FIGURE 2-5

SAMPLE LOCATIONS AND
RESULTS FOR MERCURY AND LEAD
LHAAP-49 SITE EVALUATION REPORT

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

00073777

FILE PATH: T:\GIS\Longhorn\My_WKS\MXDS\t49_Evealuation\FIG2-6.mxd

APPROVED BY

CHECKED BY: R. Duffield 05/28/09

DRAWN BY: B. LU 04/08/05

OFFICE: Houston, TX

Plot Date: 05/09

N

Goose Prairie Creek

LHAAP-49

4TH ST

6TH ST

34TH ST

AVE "C"

ZEUGNER DR

49WW01

49WW03

49WW02

49SB34

49SB35

49SB36

49SB35	
DEPTH	2,3,7,8-TCDD TEQ (ng/kg)
0'-0.5'	4.5
1'-3'	1.3
3'-5'	1.3

49SB36	
DEPTH	2,3,7,8-TCDD TEQ (ng/kg)
0'-0.5'	28
1'-3'	1.3
3'-5'	2.7

49SB34	
DEPTH	2,3,7,8-TCDD TEQ (ng/kg)
0'-0.5'	0.68
1'-3'	0.64
3'-5'	1.3

Groundwater Results for 2,3,7,8-TCDD TEQ

Well Location	Sample Date	Sample Type	2,3,7,8-TCDD TEQ (ng/L)
49WW01	12/20/2000	Primary	0.012
49WW02	12/20/2000	Primary	0.012
49WW03	12/20/2000	Primary	0.012
	12/20/2000	Field Duplicate	0.02

Results are for unfiltered samples of shallow groundwater.

Legend

- Soil Boring
- Shallow Monitoring Well
- Stream
- Road
- Former Building or Tank Location
- Site

Notes:
1. Depths are reported in feet below ground surface.
2. Results were multiplied by applicable TCEQ TEFs to convert to 2,3,7,8-TCDD equivalence and then summed for the 17 targeted dioxin and furan congeners.
3. 2,3,7,8-TCDD TEQ value of 49SB35 quality control (QC) sample at 0 - 0.5 ft. is 38.0 nanograms per kilogram (ng/kg).

COC - Contaminant of concern
ng/kg - Nanograms per kilogram
ng/L - Nanograms per liter
TCEQ - Texas Commission on Environmental Quality
TEF - Toxicity equivalent factors
TEQ - Toxicity equivalent quotient

0 150 300 600 Feet

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TULSA DISTRICT
TULSA, OKLAHOMA

FIGURE 2-6

DIOXIN/FURAN RESULTS
LHAAP-49 SITE EVALUATION REPORT

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

3.0 Evaluation

3.1 Current and Future Site Usage

LHAAP is located near the unincorporated community of Karnack, Texas. Karnack is a rural community with a population of 775 people. The incorporated community of Uncertain, Texas, population 205, is a resort area located to the northeast of LHAAP on the edge of Caddo Lake, and is an access point to Caddo Lake. The industries in the surrounding area consist of agriculture, timber, oil and natural gas production, and recreation. Current and future use of resource categories at LHAAP-49 are considered below.

3.1.1 Land

LHAAP has been an industrial facility since 1942. Significant production activities continued until the facility was determined to be in excess of the Army's needs. The plant area is now inactive and approximately two-thirds of the former plant area is now controlled by the USFWS as Caddo Lake National Wildlife Refuge. LHAAP is surrounded by a fence (except on the border with Caddo Lake), and current security measures at LHAAP preclude unlimited public access to areas within the fence, though the public is allowed to visit LHAAP in escorted groups. Approved access for hunters is very limited. It is also expected that trespassers occasionally enter the fenced area.

The facility is suitable for non-residential uses. The anticipated future use of the entire facility is as a wildlife refuge. There is no plan to develop LHAAP for industrial or residential use.

3.1.2 Surface Water

Streams on LHAAP are intermittent and may support wildlife and aquatic life during certain parts of the year. While humans may have limited access to some streams during the annual hunts, there is no routine use of any stream on LHAAP by humans. The streams do not carry adequate numbers and size of fish to support either sport or subsistence fishing. The streams discharge into Caddo Lake. Caddo Lake is a large recreational area that covers 51 square miles and has a mean depth of 6 feet. The watershed of the lake encompasses approximately 2,700 square miles. It is used extensively for fishing and boating. Caddo Lake is also a drinking water supply for multiple cities in Louisiana including Vivian, Oil City, Mooringsport, South Shore, Blanchard, Shreveport, and Bossier City.

The anticipated future uses of the streams and lake are the same as the current uses.

3.1.3 Groundwater

Groundwater in the deep zone under and near LHAAP is currently used as a drinking water source. There are currently five active water supply wells near LHAAP. One well is located in and owned by Caddo Lake State Park situated north of LHAAP. The well is completed to a depth of 315 feet and has been in use since 1935. A second well owned by the Karnack Water Supply Corporation services the town of Karnack and is located approximately 2 miles southeast of town. This well is approximately 430 feet deep and has been in use since 1942. The Caddo Lake Water Supply Corporation has three wells located approximately 4,000 to 5,000 feet north and northwest of LHAAP. These three wells are identified as Caddo Lake Water Supply Corporation Wells 1, 2, and 3, and are all hydraulically upgradient to LHAAP. Water removal from these wells is not expected to affect groundwater flow at the site because of the remote locations of these wells from LHAAP and their depth of completion. In addition, there are several livestock and domestic wells located in the vicinity of LHAAP with depths averaging 250 feet.

There are three water supply wells located on LHAAP (**Figure 2-1**), and they supply water to the buildings currently in use on the installation. One well is located 150 feet south-southeast of the Fire Station, is 128 feet deep, and has been in use since 1997. A second well is located approximately one-half mile southwest of the Fire Station/Security Office, is 195 feet deep, and has been in use since 1999. The third well is 220 feet deep, and is located immediately adjacent to the former administration building, currently used as offices for Caddo Lake Institute and the USFWS. Two additional wells previously supplied water to the installation, but these have been plugged and abandoned. None of the potable water supply wells are associated with or are in imminent danger from the localized contaminated groundwater at any of the Group 2 sites, including LHAAP-49.

Based on the anticipated future use of the facility as a wildlife refuge, the groundwater will not be used in the future as a drinking water source. However, the Army recognizes that the State of Texas considers all groundwater to be a potential future source of drinking water.

3.2 Human Health Risk Assessment

The assessment of potential risks associated with industrial use was reported by Jacobs (2002b). That assessment dealt with both a current trespasser and a hypothetical future maintenance worker. The 2002 industrial risk assessment was based on the results of sampling for the remedial investigation (Jacobs, 2002b). Since that investigation, additional samples have been collected and analyzed by USFWS, USACE, and Shaw. In support of this Site Evaluation Report, Shaw has prepared a Baseline Human Health Risk Assessment, presented in **Appendix C**, which evaluates the impact of subsequent analytical results from field

investigations in 2002 through 2004 on the data set utilized in the industrial risk assessment performed by Jacobs (2002b).

The findings documented within **Appendix C** confirm the results of the industrial risk assessment performed by Jacobs. Shaw combined the 2002 data set from the industrial risk assessment with data subsequently collected by USFWS, USACE, and Shaw, and found that the new data do not cause the exposure concentrations to increase. Therefore, the 2002 risk assessment is valid and can still be applied to the hypothetical future maintenance worker. The results for the hypothetical future maintenance worker (Jacobs, 2002b) can be summarized as follows:

- The incremental lifetime cancer risk (2.5×10^{-6}) and the non-cancer hazard index (HI) (<1) for soil are within acceptable limits established by the USEPA (1×10^{-6} to 1×10^{-4} for cancer risk and 1 for non-cancer risk).
- For groundwater, the cancer risk (1×10^{-4}) equals the upper value of the acceptable risk range (1×10^{-6} to 1×10^{-4}). The estimated non-cancer HI (2) exceeds the acceptable level (1), though no chemical of potential concern (COPC) had a hazard index greater than 1.

Dioxins through the dermal pathway are responsible for elevating the cancer risk to the upper limit of the acceptable range, even though the risk is still acceptable. The contributors to the non-cancer HI of 2 for groundwater were manganese (28%), strontium (27%), nickel (22%), antimony (16%), and thallium (7%).

The current risk evaluation (see Table 2-3 of **Appendix C**) identifies five COPCs− antimony, chromium, nickel, nitrate/nitrite, and strontium. Three of these (antimony, chromium, and nitrate/nitrite) are COPCs because they exceed their respective MCLs. The other two (nickel and strontium) exceed screening levels that are not based on MCLs. Thus nickel and strontium require further risk evaluation, which is provided by the 2002 risk assessment. The current evaluation does not identify 2,3,7,8-TCDD or thallium as COPCs because neither was detected at concentrations exceeding MCLs. Also, it does not identify manganese as a COPC because manganese results at LHAAP-49 were consistent with concentrations found in perimeter background wells at LHAAP (Shaw, 2007a). The antimony detections in groundwater at LHAAP-49 (12 and 15 µg/L) were slightly outside the range of results found in perimeter wells at LHAAP (2.79 to 11.5 µg/L).

In addition to the five COPCs identified in the risk assessment, two additional metals (arsenic and selenium) had at least one groundwater sample concentration that exceeded the MCL. Arsenic was not previously identified as a COPC because it was not included in the Baseline Human Health Risk Assessment. Selenium was not previously identified as a COPC because it was only detected above the MCL in samples from 2007 and 2008.

In contrast to the five COPCs identified in the groundwater (antimony, chromium, nickel, nitrate/nitrite, and strontium), the COPCs identified in the soil were lead, mercury, and vanadium. Since the former facilities at LHAAP-49 were operational in World War II, soil contaminants have had more than 60 years to potentially migrate from the surface soil to the groundwater; however, there are no lead, mercury, or vanadium concerns in the groundwater. The metals present in the groundwater at elevated levels do not appear to be related to past site activities. Possible explanations for those elevated metals in groundwater are as follows:

- The results for metals in groundwater may be affected by uncertainties associated with collection and analytical procedures used in groundwater sampling. As noted in **Appendix C**, since the groundwater samples were not collected using low-flow purging methods, it is probable that the samples contain chemicals adsorbed to suspended particles or in colloidal form that would tend to overestimate the concentration of dissolved chemicals and exceed the MCL values. Further, filtered metals results are not available for these samples, which normally help determine whether metals are dissolved or associated with suspended matter.
- The samples may also exhibit the effects of corrosion at the well casings and well screens. The casings and screens were constructed of stainless steel, which includes significant fractions of chromium and nickel in addition to the iron that makes up the bulk of its composition. Elevated concentrations of chromium occur at two of the wells, and elevated concentrations of nickel occur at three wells. This phenomenon has been observed at other sites at LHAAP (e.g., LHAAP-12, -48, and -53).
- Antimony (which contributes 16% of the HI) was detected in two groundwater samples in 1998 at 12 and 15 μg/L, which exceed the MCL (6 μg/L). However, antimony concentrations were less than the MCL or not detected in the subsequent rounds of sampling, including sampling with low flow procedures in 2005 through 2009.
- Total arsenic exceeded its MCL in four samples – one at well 49WW03 and three at the adjacent 49WW06. These elevated concentrations are typically associated with high results for other inorganics (i.e., iron and aluminum) and are considered to be naturally occurring.
- Total chromium exceeded the chromium MCL in six samples. One exceedance was at 49WW01 and was not repeated in subsequent low flow sampling. The remaining exceedances were at 49WW03, a stainless steel well. A PVC well, 49WW06, was installed nearby, and chromium results at 49WW06 were well below the MCL. This demonstrated that the elevated chromium at 49WW03 is associated with monitoring well corrosion.
- Nickel (which contributes 22% of the HI) is likely associated with monitoring well corrosion.
- Nitrate/nitrite exceeded its MCL in one well, 49WW02. While a shallow DPT sample also had an elevated result, a new permanent well (49WW04) adjacent to 49WW02 but deeper, and four other new wells installed and sampled, found nitrate/nitrite levels to be less than the MCL.

- Total selenium exceeded its MCL in two samples – one at well 49WW03 and one at the adjacent 49WW06. Dissolved selenium was well below the MCL. The elevated totals were due to particulates and are naturally occurring, and are below the upper threshold value representative of perimeter wells at LHAAP (Shaw, 2007a).

Risks for lead were examined separately from other parameters. Lead was not an issue in groundwater because it was below the risk screening level, which is set at the MCL (15 µg/L). Lead was not an issue in soil because the calculated exposure point concentration (the 95 percent upper confidence level on the mean) was below or within the range of remediation goals developed from the (USEPA) Integrated Exposure Uptake Biokinetic Model, Version 0.4, when using default values. The model was developed by the USEPA Office of Health and Environmental Assessment.

3.3 Ecological Risk

A screening-level ecological risk assessment (SLERA) was conducted by Jacobs on the "Group 2 Sites", which included LHAAP-49 (Jacobs, 2002b). The results of the SLERA indicated that several chemicals of potential ecological concern (COPECs) were present in LHAAP-49 soils, including aluminum, arsenic, barium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, sodium, nickel, potassium, selenium, strontium, thallium, vanadium, zinc, dioxins/furans, methylene chloride, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, chloride, and sulfate (see Table 5-7 in Jacobs, 2002b). These chemicals were selected on the basis of a benchmark screening comparison, bioaccumulation potential, and food web modeling. Because only TCEQ benchmark values were used (which resulted in a number of chemicals being selected as COPECs because they lacked TCEQ benchmark values), and model assumptions were very conservative, the information in the SLERA is of limited use for making a risk management decision.

A refinement of COPECs was recently completed as part of a baseline ecological risk assessment (BERA) for the LHAAP facility (Shaw, 2007b, Volume I). The primary goal of the refinement was to reduce the list of COPECs identified during the SLERA to include only those chemicals that may realistically pose a threat to the environment. All available soil data (including data available for LHAAP-49) were evaluated using a terrestrial sub-area organizational scheme, in which data from individual sites were assigned to one of three (Industrial, Low Impact, and Waste) sub-areas for ecological evaluation. The sub-areas were delineated based on similarities of both historical use and types of habitat. The Step 3 risk assessment used multiple lines of evidence — including comparisons to background concentrations, use of a refined food chain model, spatial analysis of detections, and professional evaluation of available toxicity data — to assess whether each detected chemical may realistically pose a significant threat to wildlife. LHAAP-49 was evaluated as part of the Industrial Sub-Area. For soil within the Industrial Sub-Area, the only chemicals that were identified as final COPECs that required further evaluation

were cadmium, chromium, zinc, and perchlorate (Shaw, 2007b, Volume I). These chemicals were evaluated further during subsequent steps of the BERA, and food chain models using site-specific data indicated that none of these chemicals exceeded ecological thresholds of concern in the Industrial sub-area (Shaw, 2007b, Volume II). Therefore, no chemicals of concern were identified in the Industrial Sub-Area, including LHAAP-49.

3.4 Summary

LHAAP-49 was used for the formulation and storage of acids and acid mixtures from 1942 through 1945. While it is possible that there may have been leaks or spills from the facilities at the site, no known releases of chemicals have been documented. With the exception of two building shells, the production and storage facilities at LHAAP-49 were removed down to the foundations and tank supports. LHAAP-49 has since been the subject of several environmental field investigations.

The results of investigations prior to 2001 were evaluated in a human health risk assessment prepared by Jacobs in 2002 (Jacobs, 2002b). Shaw evaluated the impact of subsequent field investigations on the results of that 2002 risk assessment (see **Appendix C**), and determined that the results of the earlier risk assessment are still valid for soil. For groundwater, Shaw's evaluation resulted in a smaller list of COPCs.

The reasonably anticipated future use of the site is as a wildlife refuge. Risks were calculated for a more conservative scenario - industrial use by a hypothetical future maintenance worker. Jacobs (2002b) reached the following conclusions regarding a hypothetical future maintenance worker:

- Cancer, non-cancer, and lead-related risks in soil were determined to be within acceptable ranges. Due to concerns of TCEQ and USEPA not related to the risk assessment, hot spots of lead and mercury concentrations were removed (see **Appendix D**).
- The groundwater was calculated to have cancer risk equal to the upper end of the acceptable range (incremental lifetime cancer risk = 1×10^{-4}) and non-cancer hazard that exceeds acceptable values (HI = 2).

Results for antimony, arsenic, chromium, selenium, and nitrate/nitrite in groundwater also exceeded MCLs in at least one sample. However, subsequent investigations of groundwater at LHAAP-49 found concentrations of these parameters to be below the MCLs, or related to naturally occurring particulates or well corrosion. Additionally, the parameters that cause the groundwater HI to exceed 1 and that exceed MCLs are not the same parameters that were found at elevated concentrations in the soil. Hence, the COCs in groundwater are not related to known site operations.

A baseline ecological risk assessment conducted by Shaw has evaluated the potential impacts on multiple ecological receptors that could be exposed to environmental media at LHAAP-49. The results of the BERA indicate that ecological hazard is acceptable at LHAAP-49.

4.0 Conclusions and Recommendation

For soil at LHAAP-49, investigations and the risk assessment demonstrated that the carcinogenic risk for a hypothetical future maintenance worker is within the target range and that the non-carcinogenic HI is less than the target value of 1. These risk levels do not indicate a need for action for the soil at LHAAP-49.

However, the highest concentrations of mercury and lead in soil were of concern to TCEQ and USEPA for their potential to migrate into groundwater. Accordingly, modeling was performed to evaluate the potential for transport of contaminants from soil to groundwater. For conservatism, the two COCs with the most significant soil concentrations (lead and mercury) were modeled. Using the USEPA's VLEACH Model, the concentration of each metal for the entire top 2 feet of soil was set at the highest concentration detected. The results were as follows:

- Lead – The maximum predicted leachate concentration was approximately 6 µg/L, which was below the MCL (15 µg/L) and consistent with the measured groundwater concentrations at LHAAP-49.
- Mercury – The maximum predicted leachate concentration was less than the MCL (2 µg/L) for at least 1000 years. The model predictions are slightly higher than the measured groundwater concentrations at LHAAP-49.

The results indicated no significant potential for migration to groundwater, but due to continued concern by TCEQ and USEPA, the locations with the highest mercury concentrations were removed as documented in **Appendix D**.

Evaluation of groundwater at LHAAP-49 indicated that cancer risk is within the acceptable range. Non-cancer HI for the hypothetical future maintenance worker was calculated to be 2, narrowly exceeding the target value of 1, and the major contributors to the HI were manganese, strontium, nickel, and antimony. Five parameters (antimony, arsenic, chromium, nitrate/nitrite, and selenium) were also detected in groundwater samples at concentrations that exceeded their MCLs. However, no remedial action for groundwater is recommended for the following reasons:

- The cancer risk, which is just within the acceptable range, is entirely attributable to the 2,3,7,8-TCDD TEQ. The analytical results for the 2,3,7,8-TCDD TEQ are below its MCL.
- Groundwater results for manganese, which contributes 28% of the HI, were consistent with background levels in perimeter wells at LHAAP.

- Nickel (which contributes 22% of the HI) is likely associated with monitoring well corrosion.
- Antimony (which contributes 16% of the HI) was detected in two groundwater samples in 1998 at 12 and 15 µg/L, which exceed the MCL (6 µg/L). However, antimony concentrations were less than the MCL or not detected in the subsequent rounds of sampling, including sampling with low flow procedures in 2005 through 2009.
- Total arsenic exceeded its MCL in four samples – one at well 49WW03 and three at the adjacent 49WW06. The elevated concentrations are typically associated with high results for aluminum or iron and are considered naturally occurring.
- Total chromium exceeded the chromium MCL in six samples. One exceedance was at 49WW01 and was not repeated in subsequent low flow sampling. The remaining exceedances were at 49WW03, a stainless steel well. A PVC well, 49WW06, was installed nearby, and chromium results at 49WW06 were below the MCL. This demonstrated that the elevated chromium is associated with monitoring well corrosion.
- Nitrate/nitrite exceeded its MCL in one well, 49WW02. However, that well is screened within a formation that is not a sustainable water supply, as evidenced by that fact that it was dry during the 2007 sampling event. A new well 49WW04 adjacent to 49WW02 but deeper, and four other new wells installed and sampled, found nitrate/nitrite levels to be less than the MCL.
- Total selenium exceeded its MCL in two samples – one at well 49WW03 and one at adjacent 49WW06. Dissolved selenium was well below the MCL. The elevated totals were due to particulates, are consistent with background data, and are considered naturally occurring.
- Nitrate/nitrite exceeded its MCL in one well, 49WW02. However, that well is screened within a formation that is not a sustainable water supply, as evidenced by that fact that it was dry during the 2007 sampling event. A new well 49WW04 adjacent to 49WW02 but deeper, and four other new wells installed and sampled, found nitrate/nitrite levels to be less than the MCL.

Based on the findings summarized above, no chemicals of concern were identified for the groundwater at LHAAP-49.

The results of a baseline ecological risk assessment indicates that exposure to soil at LHAAP-49 is not likely to adversely impact ecological receptors at or in the vicinity of the site. Therefore, ecological hazard is considered to be within acceptable limits, and no further action is necessary at this site for the protection of the environment.

In summary, the environmental media at LHAAP-49 do not pose an unacceptable risk to the environment and pose minimal risk to human health. The minimal issues that were found in the shallow groundwater do not appear to be related to facility operations. Therefore, no further action is recommended for LHAAP-49.

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Appendix A

December 2004 Field Investigation at LHAAP-49

December 2004 Field Investigation at LHAAP-49

1.0 Introduction

Shaw Environmental, Inc. (Shaw) performed field investigation activities at LHAAP-49 in December 2004. In December 2004, Shaw collected soil samples from 11 locations (49SB51 through 49SB61) for the purpose of delineating the horizontal and vertical extent of lead and mercury around locations where elevated concentrations of these metals had been identified in past soil investigations. Additionally, four sediment samples (49SD62 through 49SD65) and one surface water sample (49SW62) were collected to examine whether lead and mercury are impacting drainage ditches. The December 2004 results for lead and mercury in the soil, sediment, and surface water at LHAAP-49 are presented in **Tables A-1** and **A-2** and **Figure A-1**.

2.0 Sampling and Analysis

This section describes the sampling and analysis procedures applicable to water, sediment, and soil samples collected. Samples were collected and handled in accordance with TERC Standard Operating Procedure 1111, Sample Handling (IT Corporation/OHM Remediation Services Corp., 2002). Samples were analyzed on a 7-day turnaround time. Health and safety procedures, including screening methods, are described in the Site Safety and Health Plan, Appendix A of the Final Work Plan (Shaw, 2004a).

2.1 Water Sampling

Surface water was collected at location 49SW62 as shown in **Figure A-1**. The sampling site was prepared by laying plastic sheeting on the adjacent ground. Field equipment and instruments were calibrated to verify they were in proper working order, and calibration values were recorded in the field logbook. Shaw personnel recorded a description of the site and sampling locations, including coordinates of the sampling location based on a global positioning system (GPS) unit and/or site maps. Personal protective equipment (PPE) was donned as required and specified in the Site Safety and Health Plan (Shaw, 2004a). A fresh pair of non-powdered disposable gloves were donned prior to initializing sampling activities. Both water and sediment samples were collected at 49SD/SW62. The water sample was collected first. A clean/decontaminated 2-inch-diameter PVC sampler with a valve was used to collect the water. The sampling procedures were recorded on a field logbook. General water quality parameters (e.g., pH, conductivity, temperature, oxidation/reduction potential, turbidity) were measured using field instruments and recorded on the field logbook. Chain-of-custody (COC) documentation was completed and a photographic record was maintained. The sample was

placed in a 1-liter amber bottle and preserved on ice at a temperature of 4 degrees Celsius or less. Lead and mercury were analyzed using EPA methods SW 6010B and SW 7471A, respectively.

A field duplicate (QC sample) was collected at 49SW62 and analyzed to assess the precision for the field sampling and laboratory analytical process. The field duplicate was collected by filling two separate 1-liter glass amber containers in rapid succession after collecting the primary surface water sample.

2.2 Sediment Sampling

Sediment was collected at the locations identified in **Figure A-1**. A sampling site was prepared by laying plastic sheeting on the adjacent ground. Field equipment and instruments were calibrated to verify they were in proper working order and calibration values were recorded in the field logbook. A new pair of disposable non-powdered gloves was donned between samples to prevent cross-contamination. The sampling equipment was decontaminated as described in Section 4.5 in the Chemical Data Acquisition Plan (CDAP), Appendix C of the Final Work Plan (Shaw, 2004a). Information, deviations from procedures, and rationale for changes were recorded in the field logbook. Coordinates of each sampling location were determined using a GPS unit.

The sediment sampling interval was 0 to 0.5 feet below ground surface (bgs). One sediment sample was collected from each proposed location in accordance with the Addendum 3 Work Plan (Shaw, 2004b).

Sediment was placed into a clean stainless steel bowl and thoroughly mixed with a clean stainless steel spoon. An organic vapor meter was used to check for volatile organic compounds and record readings in the field logbook. The sample containers were filled directly from the bowl with the spatula or spoon. Stones, twigs, grass, etc. were removed from the sample. If the sample was water saturated, the water was carefully decanted from the container with minimal disturbance to the sample. The sample was transferred directly from the sampler to the sample container leaving no headspace. Using wide, clear tape, the label was covered and the container was placed in a sealed plastic bag, and immediately placed in an iced cooler. Location coordinates were obtained using a GPS for the sediment sample locations. The location, sample-depth, and/or field measurements were recorded in the field logbook. COC documentation was completed and a photographic record was maintained. The samples were placed in 4-ounce glass containers, preserved on ice at a temperature of 4 degrees Celsius or less, and delivered to the analytical laboratory for analysis using EPA methods SW 6010B and SW 7471A.

A field duplicate (QC sample) was collected and analyzed to assess the precision for the field sampling and laboratory analytical process. The field duplicate was collected by filling a second

sample container in rapid succession after collecting the primary sediment sample. The duplicate was collected at 49SD64.

2.3 Soil Sampling

Soil samples were collected at the locations identified in **Figure A-1**. Two soil samples were collected from each of the boring locations 49SB51 through 49SB61. Soil borings were advanced using a direct push technology (DPT) rig. The DPT method involved the use of a high-capacity hydraulic ram mounted on an all-terrain vehicle to advance a drive sampler attached to steel push rods. Soil samples were collected continuously during drilling using a 24- to 36-inch-long sampler with a disposable liner. The total depths of the borings were based on the Addendum 3 Work Plan (Shaw, 2004b).

Boring locations were marked with a stake, where practical, and a GPS device was used to obtain location coordinates. Site personnel covered the tailgate of a pick-up truck with plastic sheeting and used it as a sample preparation area. Field analytical and health and safety instruments were calibrated and recorded within the field logbook. A new pair of disposable sample gloves was donned between sampling intervals to prevent cross-contamination. The sampling equipment was decontaminated as described in Section 4.5 in the CDAP, Appendix C of the Final Work Plan (Shaw, 2004a). The drilling operations were performed in accordance with proper safety, sampling, and drilling methods. When a soil sample was received from the driller, the soil-filled sampler was opened, the sample liner was removed from the barrel, the liner was cut open, and the soil-filled sample liner was placed on the plastic sheeting. The entire length of material from the barrel was described according to American Society for Testing and Materials (ASTM) D2488-93, Standard Practice for Description and Identification of Soils (Visual-Manual Procedure) (ASTM International, 2004), and the description was recorded on a standard Drilling Log Form. After verifying the appropriate sampling intervals, soil samples were placed in a container. Each sample container was labeled as described in Section 4.6.2 of Appendix C of the Final Work Plan (Shaw, 2004a), enclosed in a sealable plastic bag, and placed in a cooler containing ice. This procedure was repeated for each interval to the total boring depth. Drilling activities and sampling procedures were recorded on a Field Sampling Report or logbook. COC documentation was completed and a photographic record of sample locations was maintained. Cuttings were disposed in the borehole from which they originated, and any remaining open hole was grouted to surface. Decontamination fluids were disposed at the LHAAP-18/24 groundwater treatment plant. The samples were placed in 4-ounce wide-mouth glass containers, preserved on ice at a temperature of 4 degrees Celsius or less, and delivered to the analytical laboratory for analysis using EPA methods SW 6010B and SW 7471A.

Field duplicates (QC samples) were collected and analyzed to assess the precision for the field sampling and laboratory analytical process. Each field duplicate was collected by filling a

second sample container in rapid succession after collecting the primary soil sample. Duplicates were collected at 49SB51 and 49SB61.

3.0 Results

The December 2004 results for lead and mercury in the soil, sediment, and surface water at LHAAP-49 are presented in **Tables A-1, A-2** and **Figure A-1**. The associated data evaluation reports are included as **Attachment 1** of this document.

3.1 Lead Results

Lead was detected in various locations throughout the sampling area (see **Table A-1** and **Figure A-1**). The highest concentration of lead detected from these samples was 366 mg/kg within the surface soil (0 to 5 feet bgs) sample collected from soil boring 49SB58, which is located on the northeast portion of LHAAP-49, east of a series of former concrete tank cradles. Lead was also detected at a concentration of 356 mg/kg surface soil at 49SB53 located on the central portion of LHAAP-49, immediately southwest of another series of former concrete tank cradles. Other notable surface soil concentrations of lead include 218 mg/kg and 76.4 mg/kg, detected at boring locations 49SB54 and 49SB51, respectively. Results for the remaining seven surface soil samples ranged from 6.53 to 56.6 mg/kg. Lead did not exceed a concentration of 13.8 mg/kg in the subsurface soil (3 to 4 feet bgs). This concentration was detected in the subsurface soil at boring 49SB51, located on the central portion of the segment of land located north of 4th Street.

Lead was detected in all four sediment samples collected from LHAAP-49. The highest reported concentration was 193J in the sediment sample 49SD65 located on the southeast portion of the segment of land located north of 4th Street. Lead also was detected at concentrations of 57.4 mg/kg, 28.2J mg/kg, and 21.4J mg/kg in sediment samples 49SD64, 49SD63, and 49SD62, respectively. One surface water sample and a field duplicate were collected from 49SW62, located within the ditch that runs along the southeast boundary of the site parallel to 6th Street. The sample result was a non-detect (< 5 µg/L) while the field duplicate had a result of 13.6 mg/L. Due to dry conditions within the ditches, this was the only location where a surface water sample for lead was obtained.

3.2 Mercury Results

With one exception, mercury was detected in the soil and sediment at LHAAP-49 at concentrations ranging from 0.00827 BJ to 0.114 J mg/kg. The exception was a concentration of 778 mg/kg at 49SD65 as shown on **Table A-2** and **Figure A-1**. One surface water sample,

49SW62, was collected from LHAAP-49; however, mercury was not detected within this sample.

4.0 References

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Table A-1
December 2004 Lead Results

	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SB51	49SB51	49SB51	49SB51	49SB52	49SB52
	Sample Date:	12/16/2004	12/16/2004	12/16/2004	12/16/2004	12/16/2004	12/16/2004
	Sample Number:	49SB51-001-QC	49SB51-001	49SB51-002-QC	49SB51-002	49SB52-001	49SB52-002
	Start Depth:	0	0	3	3	0	3
	End Depth:	0.5	0.5	4	4	0.5	4
	Sample Type:	FD	REG	FD	REG	REG	REG
PARAMETER	UNITS	RESULT	RESULT	RESULT	RESULT	RESULT	RESULT
Lead	mg/kg	56.6	76.4	14.5	13.8	9.65	9.78

	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SB53	49SB53	49SB54	49SB54	49SB55	49SB55
	Sample Date:	12/16/2004	12/16/2004	12/16/2004	12/16/2004	12/16/2004	12/16/2004
	Sample Number:	49SB53-001	49SB53-002	49SB54-001	49SB54-002	49SB55-001	49SB55-002
	Start Depth:	0	3	0	3	0	3
	End Depth:	0.5	4	0.5	4	0.5	4
	Sample Type:	REG	REG	REG	REG	REG	REG
PARAMETER	UNITS	RESULT	RESULT	RESULT	RESULT	RESULT	RESULT
Lead	mg/kg	356	5.48	218	9.62	13.2	9.92

	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SB56	49SB56	49SB57	49SB57	49SB58	49SB58
	Sample Date:	12/17/2004	12/17/2004	12/17/2004	12/17/2004	12/17/2004	12/17/2004
	Sample Number:	49SB56-001	49SB56-002	49SB57-001	49SB57-002	49SB58-001	49SB58-002
	Start Depth:	0	3	0	3	0	3
	End Depth:	0.5	4	0.5	4	0.5	4
	Sample Type:	REG	REG	REG	REG	REG	REG
PARAMETER	UNITS	RESULT	RESULT	RESULT	RESULT	RESULT	RESULT
Lead	mg/kg	46.1	10.4	8.81	11.1	366	8.33

	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SB59	49SB59	49SB60	49SB60	49SB61	49SB61
	Sample Date:	12/17/2004	12/17/2004	12/17/2004	12/17/2004	12/17/2004	12/17/2004
	Sample Number:	49SB59-001	49SB59-002	49SB60-001	49SB60-002	49SB61-001-QC	49SB61-001
	Start Depth:	0	3	0	3	0	0
	End Depth:	0.5	4	0.5	4	0.5	0.5
	Sample Type:	REG	REG	REG	REG	FD	REG
PARAMETER	UNITS	RESULT	RESULT	RESULT	RESULT	RESULT	RESULT
Lead	mg/kg	6.53	7.24	10.9	7.46	10.2 J	22.1 J

Table A-1
December 2004 Lead Results

	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SB61	49SD62	49SD63	49SD64	49SD64	49SD65
	Sample Date:	12/17/2004	12/19/2004	12/19/2004	12/19/2004	12/19/2004	12/19/2004
	Sample Number:	49SB61-002	49SD62	49SD63	49SD64-QC	49SD64	49SD65
	Start Depth:	3	0	0	0	0	0
	End Depth:	4	0.5	0.5	0.5	0.5	0.5
	Sample Type:	REG	REG	REG	FD	REG	REG
PARAMETER	UNITS	RESULT	RESULT	RESULT	RESULT	RESULT	RESULT
Lead	mg/kg	13.4 J	28.2 J	21.4 J	16.5 J	57.4 J	193 J

	Associated Site:	AREA 49	AREA 49
	Location Code:	49SW62	49SW62
	Sample Date:	12/19/2004	12/19/2004
	Sample Number:	49SW62	49SW62-QC
	Start Depth:	N/A	N/A
	End Depth:	N/A	N/A
	Sample Type:	REG	FD
PARAMETER	UNITS	RESULT	RESULT
Lead	µg/L	<5	13.6

Notes:

Units for start depth and end depth are feet below ground surface.

FD Field Duplicate
J Estimated Value
mg/kg milligrams per kilogram
Reg Regular
µg/L micrograms per liter

Table A-2

December 2004 Mercury Results

	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SB51	49SB51	49SB51	49SB51	49SB52	49SB52
	Sample Date:	12/16/2004	12/16/2004	12/16/2004	12/16/2004	12/16/2004	12/16/2004
	Sample Number:	49SB51-001-QC	49SB51-001	49SB51-002-QC	49SB51-002	49SB52-001	49SB52-002
	Start Depth:	0	0	3	3	0	3
	End Depth:	0.5	0.5	4	4	0.5	4
	Sample Type:	FD	REG	FD	REG	REG	REG
PARAMETER	UNITS	RESULT	RESULT	RESULT	RESULT	RESULT	RESULT
Mercury	mg/kg	0.0234 J	0.0225 J	0.0531 J	0.0257 J	0.0335 J	0.0478 J

	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SB53	49SB53	49SB54	49SB54	49SB55	49SB55
	Sample Date:	12/16/2004	12/16/2004	12/16/2004	12/16/2004	12/16/2004	12/16/2004
	Sample Number:	49SB53-001	49SB53-002	49SB54-001	49SB54-002	49SB55-001	49SB55-002
	Start Depth:	0	3	0	3	0	3
	End Depth:	0.5	4	0.5	4	0.5	4
	Sample Type:	REG	REG	REG	REG	REG	REG
PARAMETER	UNITS	RESULT	RESULT	RESULT	RESULT	RESULT	RESULT
Mercury	mg/kg	0.0580 J	<0.257	0.0475 J	0.0478 J	0.0359 BJ	0.0214 BJ

	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SB56	49SB56	49SB57	49SB57	49SB58	49SB58
	Sample Date:	12/17/2004	12/17/2004	12/17/2004	12/17/2004	12/17/2004	12/17/2004
	Sample Number:	49SB56-001	49SB56-002	49SB57-001	49SB57-002	49SB58-001	49SB58-002
	Start Depth:	0	3	0	3	0	3
	End Depth:	0.5	4	0.5	4	0.5	4
	Sample Type:	REG	REG	REG	REG	REG	REG
PARAMETER	UNITS	RESULT	RESULT	RESULT	RESULT	RESULT	RESULT
Mercury	mg/kg	0.0301 BJ	0.00827 BJ	0.0143 BJ	0.0381 BJ	0.0752 J	0.114 J

	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SB59	49SB59	49SB60	49SB60	49SB61	49SB61
	Sample Date:	12/17/2004	12/17/2004	12/17/2004	12/17/2004	12/17/2004	12/17/2004
	Sample Number:	49SB59-001	49SB59-002	49SB60-001	49SB60-002	49SB61-001-QC	49SB61-001
	Start Depth:	0	3	0	3	0	0
	End Depth:	0.5	4	0.5	4	0.5	0.5
	Sample Type:	REG	REG	REG	REG	FD	REG
PARAMETER	UNITS	RESULT	RESULT	RESULT	RESULT	RESULT	RESULT
Mercury	mg/kg	0.0695 J	0.00976 BJ	0.0836 J	0.0617 J	0.0463 BJ	0.0545 BJ

Table A-2
December 2004 Mercury Results

	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SB61	49SD62	49SD63	49SD64	49SD64	49SD65
	Sample Date:	12/17/2004	12/19/2004	12/19/2004	12/19/2004	12/19/2004	12/19/2004
	Sample Number:	49SB61-002	49SD62	49SD63	49SD64-QC	49SD64	49SD65
	Start Depth:	3	0	0	0	0	0
	End Depth:	4	0.5	0.5	0.5	0.5	0.5
	Sample Type:	REG	REG	REG	FD	REG	REG
PARAMETER	UNITS	RESULT	RESULT	RESULT	RESULT	RESULT	RESULT
Mercury	mg/kg	0.0382 BJ	0.0750 J	0.0268 BJ	0.0679 BJ	0.0373 BJ	778

	Associated Site:	AREA 49	AREA 49
	Location Code:	49SW62	49SW62
	Sample Date:	12/19/2004	12/19/2004
	Sample Number:	49SW62	49SW62-QC
	Start Depth:	N/A	N/A
	End Depth:	N/A	N/A
	Sample Type:	REG	FD
PARAMETER	UNITS	RESULT	RESULT
Mercury	µg/L	<0.2	<0.2

Notes:

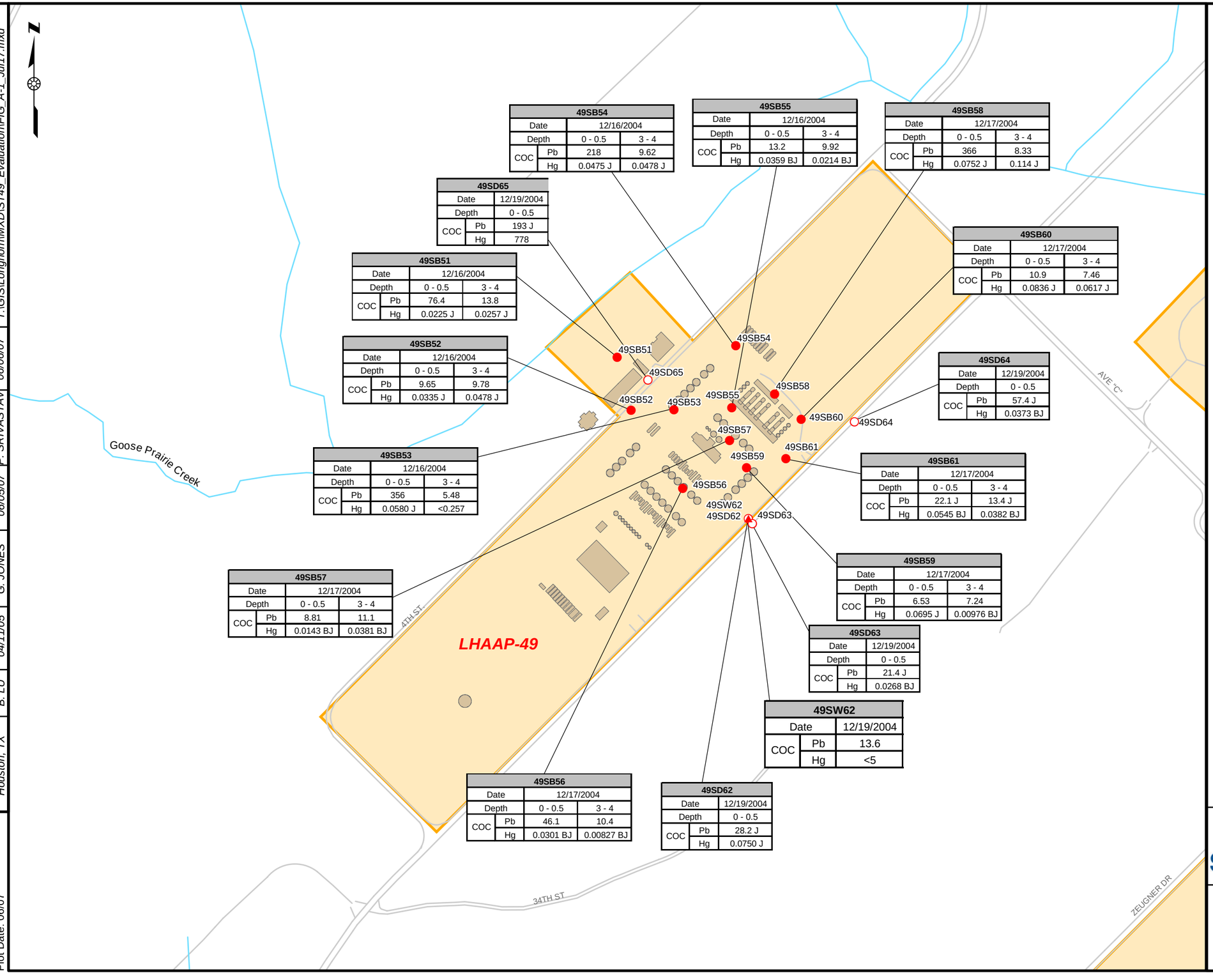
Units for Start Depth and End Depth are feet below ground surface.

B	Detected in associated blank
FD	Field Duplicate
J	Estimated Value
mg/kg	milligrams per kilogram
N/A	not applicable
Reg	Regular
µg/L	micrograms per liter

00073799

FILE PATH	T:\GIS\Longhorn\MXD\IST49_Evaluation\FIG_A-1_Jul17.mxd
APPROVED BY	P. SRIVASTAV 06/06/07
CHECKED BY	G. JONES 06/05/07
DRAWN BY	B. LU 04/11/05
OFFICE	Houston, TX

Plot Date: 06/07



49SB54			
Date		12/16/2004	
Depth		0 - 0.5	3 - 4
COC	Pb	218	9.62
	Hg	0.0475 J	0.0478 J

49SB55			
Date		12/16/2004	
Depth		0 - 0.5	3 - 4
COC	Pb	13.2	9.92
	Hg	0.0359 BJ	0.0214 BJ

49SB58			
Date		12/17/2004	
Depth		0 - 0.5	3 - 4
COC	Pb	366	8.33
	Hg	0.0752 J	0.114 J

49SD65		
Date		12/19/2004
Depth		0 - 0.5
COC	Pb	193 J
	Hg	778

49SB51			
Date		12/16/2004	
Depth		0 - 0.5	3 - 4
COC	Pb	76.4	13.8
	Hg	0.0225 J	0.0257 J

49SB60			
Date		12/17/2004	
Depth		0 - 0.5	3 - 4
COC	Pb	10.9	7.46
	Hg	0.0836 J	0.0617 J

49SB52			
Date		12/16/2004	
Depth		0 - 0.5	3 - 4
COC	Pb	9.65	9.78
	Hg	0.0335 J	0.0478 J

49SD64		
Date		12/19/2004
Depth		0 - 0.5
COC	Pb	57.4 J
	Hg	0.0373 BJ

49SB53			
Date		12/16/2004	
Depth		0 - 0.5	3 - 4
COC	Pb	356	5.48
	Hg	0.0580 J	<0.257

49SB61			
Date		12/17/2004	
Depth		0 - 0.5	3 - 4
COC	Pb	22.1 J	13.4 J
	Hg	0.0545 BJ	0.0382 BJ

49SB57			
Date		12/17/2004	
Depth		0 - 0.5	3 - 4
COC	Pb	8.81	11.1
	Hg	0.0143 BJ	0.0381 BJ

49SB59			
Date		12/17/2004	
Depth		0 - 0.5	3 - 4
COC	Pb	6.53	7.24
	Hg	0.0695 J	0.00976 BJ

49SD63		
Date		12/19/2004
Depth		0 - 0.5
COC	Pb	21.4 J
	Hg	0.0268 BJ

49SW62		
Date		12/19/2004
COC	Pb	13.6
	Hg	<5

49SB56			
Date		12/17/2004	
Depth		0 - 0.5	3 - 4
COC	Pb	46.1	10.4
	Hg	0.0301 BJ	0.00827 BJ

49SD62		
Date		12/19/2004
Depth		0 - 0.5
COC	Pb	28.2 J
	Hg	0.0750 J

Legend

Sample Location

- Soil Boring
- Sediment
- Surface Water
- Stream
- Road
- Former Building or Tank Location
- Site

Notes:
1. Depths are reported in feet below ground surface.
2. Soil and sediment sample concentrations are reported in milligrams per kilogram (mg/kg).
3. Water sample concentrations are reported in micrograms per liter (µg/L).

B - Detected in blank
COC - Contaminant of concern
Hg - Mercury
J - Estimated concentration
Pb - Lead
SB - Soil boring
SD - Sediment
SW - Surface water

0 150 300 600 Feet

Shaw®

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

FIGURE A-1
SAMPLE LOCATIONS AND RESULTS
LEAD AND MERCURY, DECEMBER 2004
LHAAP-49
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Attachment 1

Data Evaluation Reports

DATA EVALUATION REPORT

OF KEMRON REPORT NUMBER L0412444

DATA GAPS INVESTIGATION SITE 49

LONGHORN ARMY AMMUNTION PLANT
KARNACK, TEXAS

SHAW PROJECT NUMBER 845714

Prepared by

Shaw Environmental, Inc.
1430 Enclave Parkway
Houston, Texas 77077

January 5, 2005

DATA EVALUATION REPORT
KEMRON REPORT NUMBER L0412444
DATA GAPS INVESTIGATION SITE 49 AND SITE 32
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

January 5, 2005

Approved by: Diane Meyer Date: 1/5/05

Diane Meyer, Program Chemist

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Acronyms and Abbreviations

%D	percent deviation
%RSD	percent relative standard deviation
COC	chain of custody
LCS	laboratory control sample
LHAPP	Longhorn Army Ammunition Plant
IDL	instrument detection limit
MDL	method detection limit
MS	matrix spike
MSD	matrix spike duplicate
NFG	National Functional Guidelines
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
RL	reporting limit
RPD	relative percent difference
TERC	Total Environmental Restoration Contract
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency

1.0 Introduction

Shaw Environmental, Inc. has performed a review of the laboratory data associated with soil, sediment and surface water sampling at Site 49 and Site 32 at Longhorn Army Ammunition Plant (LHAPP), Karnack, Texas. This was part of a Data Gaps Investigation, Addendum 3. **Table 1-1** provides a list of the samples collected, a sample identification number and laboratory sample number cross-references, sample matrix, chain of custody (COC) number, date collected, sample location, and analytical method performed for each sample.

The work was performed under the Total Environmental Restoration Contract (TERC), Number DACA56-94-D-0020, and Task Order 109. This Data Evaluation Report is a summary of the analytical data generated by Kemron Environmental Services, Marietta, Ohio.

The purpose of the analytical data review is to assess the effect of the overall analytical process on the usability of the data. The review involved comparing the analytical data summary forms, as submitted by the laboratory, to method requirements set forth in methods found in SW-846, 3rd Edition, Update III, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (USEPA, 1997) and project-imposed requirements specified in the task order. Additionally, surrogate spike recoveries, if applicable, matrix spike recoveries, and duplicate sample results were reviewed to determine any matrix interference. The data packages were reviewed by the Project Chemist using the process outlined in Standard Operating Procedure 1141, Analytical Data Quality Evaluation and Reporting (Shaw, revised 2002).

This data evaluation report discusses accuracy, precision, and representativeness for each type of analysis. **Section 2.0** contains a discussion of precision, accuracy, and representativeness for each method. **Section 3.0** of this report is a technical summary of the data review for the data group as a whole, including completeness. **Section 4.0** lists references.

Data qualifiers and reason codes were added to the applicable results in the data package. A list of validation qualifiers and validation reason code definitions is included in **Attachment A.**

Table 1-1
Chain-of-Custody Summary

Sample I.D.	Lab Sample Number	Matrix	Chain of Custody Number	Date Collected	Methods SW-846
49SD62	L0412444-01	Sediment	NA	12/19/04	Lead- 6010B; Mercury – 7471A
49SW62	L0412444-02	Water	NA	12/19/04	Lead- 6010B; Mercury – 7470A
49SW62-QC	L0412444-03	Water	NA	12/19/04	Lead- 6010B; Mercury – 7470A
49SD63	L0412444-04	Sediment	NA	12/19/04	Lead- 6010B; Mercury – 7471A
49SD64	L0412444-05	Sediment	NA	12/19/04	Lead- 6010B; Mercury – 7471A
49SD4-QC	L0412444-06	Sediment	NA	12/19/04	Lead- 6010B; Mercury – 7471A
32SB24-001	L0412444-07	Soil	NA	12/17/04	Lead- 6010B
32SB24-002	L0412444-08	Soil	NA	12/17/04	Lead- 6010B
32SB24-003	L0412444-09	Soil	NA	12/17/04	Lead- 6010B
32SB24-001-QC	L0412444-10	Soil	NA	12/17/04	Lead- 6010B
32SB24-002-QC	L0412444-11	Soil	NA	12/17/04	Lead- 6010B
32SB24-003-QC	L0412444-12	Soil	NA	12/17/04	Lead- 6010B
32SB25-001	L0412444-13	Soil	NA	12/17/04	Lead- 6010B
32SB25-002	L0412444-14	Soil	NA	12/17/04	Lead- 6010B
32SB25-003	L0412444-15	Soil	NA	12/17/04	Lead- 6010B
32SS05	L0412444-16	Soil	NA	12/19/04	Lead –6010B
32SS06	L0412444-17	Soil	NA	12/19/04	Mercury –7471A
49SD65	L0412444-18	Sediment	NA	12/17904	Lead- 6010B; Mercury – 7471A

2.0 Metals

The soil, sediment, and water samples were collected and analyzed for lead by SW-846 method 6010B and mercury by methods 7471A (soil) and 7470A (water).

2.1 Initial and Continuing Calibration

The initial and continuing calibrations were within established limits (per case narrative).

2.2 Accuracy

The laboratory control sample (LCS), matrix spike (MS), and matrix spike duplicate (MSD) were within quality control limits.

2.3 Precision

The MS/MSD relative percent difference (RPD) was within quality control limits.

2.4 Representativeness

The method blanks were free of contamination for lead. The soil method blank for mercury contained mercury at 0.0138 mg/kg (J flag between reporting limit and method detection limit). Mercury data up to five times the method blank concentration (0.069 J mg/kg) were qualified "B" with validation code 06A.

Five QC replicate samples were submitted with this data package – one water sample (49SW62 and QC) for mercury and lead: one sediment sample (49SD64 and QC) for mercury and lead; and 3 soil samples (32SB24-001, 002, 003 and QC) for lead only. The water sample field duplicates were non-detects for mercury and one results for lead was non-detect and the other was within five times the reporting limit, where comparison is not applicable. The three soil field duplicate samples for lead agreed within an RPD of 50%. The mercury data for the sediment QC set were both less than the reporting limit and hence are considered to be in agreement. The lead data for the sediment field duplicate set had an RPD of 111% and all sediment data for lead was qualified "J" with a reason code of 17.

3.0 Technical Summary

The following summarizes the data review for the sampling at LHAPP.

3.1 Documentation

The COC were complete and contained the required information. Any omissions were corrected and an amended COC was submitted to the laboratory. The actual methods used for sample analysis were based upon the COC.

Upon receipt at the laboratory, cooler receipt forms were completed and are included as part of the laboratory data package. All holding times for extraction and analyses were met.

3.2 Completeness

The 90% completeness goal was met as set forth in the USACE Engineering Manual 200-1-3 (February, 2001). None of the data were rejected, although some data were qualified as estimated.

- Soil and sediment samples for mercury up to 0.069J mg/kg were B qualified (code 06A) due to method blank contamination.
- The lead data for the sediment field duplicate set had an RPD of 111% and all sediment data for lead was qualified "J" with a reason code of 17.
- Data reported between the method detection limit (MDL) and reporting limit (RL) were "J" flagged with reason code 15 (quantitation estimated).

3.3 Conclusion

An overall review of the samples collected indicates that the chain of custody procedures and laboratory analyses have been conducted in an acceptable manner according to the USEPA Contract Laboratory Program, National Functional Guidelines for Organic Data Review, Office of Emergency and Remedial Response, U.S. Environmental Protection Agency, Washington, D.C. (October 1999).

4.0 References

Shaw Environmental, Inc, (revised 2002), *Standard Operating Procedure Manual,* Houston, Texas.

United States Environmental Protection Agency (USEPA), 1997, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, Update III,* Washington, D.C.

Department of the Army, U.S. Army Corps of Engineers, Requirements for the Preparation of Sampling and Analysis Plans USACE Engineering Manual 200-1-3 (February 2001).

USEPA Contract Laboratory Program, National Functional Guidelines for Inorganic Data Review, Office of Emergency and Remedial Response, U.S. Environmental Protection Agency, Washington, D.C., October 1999.

ATTACHMENT A

VALIDATION QUALIFIERS AND VALIDATION REASON CODE DEFINITIONS

VALIDATION QUALIFIER DEFINITIONS

Qualifier	Definition
U	Not detected. The analyte was analyzed for, but not detected above the associated reporting limit,
J	The analyte was positively identified; the reported value is the estimated concentration of the constituent detected in the sample analyzed.
B	The concentration reported was detected in the associated method blank, trip blank, or equipment blank within 5X/10X the blank concentration.
R	The reported results are rejected due to 1. Severe deficiencies in the supporting quality control data; 2. Anomalies noted in the sampling or analysis process. 3. the presence or absence of the constituent cannot be verified based on the data provided. $. To indicate not to use a particular result in the event of a reanalysis.
UJ	The analyte was analyzed for, but not detected above the established reporting limit. However, review and evaluation of supporting QC data have indicated that the "non-detect" may be inaccurate or imprecise. The non-detect result should be estimated.
L	Result may be biased low. Details are provided in the validation report.
H	Result may be biased high. Details are provided in the validation report.

VALIDATION REASON CODE DEFINITIONS

Reason Code	Description
01	Sample received outside of 4 +/-2 degrees Celsius
01A	Improper sample preservation
02	Holding time exceeded
02A	Extraction
02B	Analysis
03	Instrument performance outside criteria
03A	BFB tune for GC/MS volatiles
03B	DFTPP tune for GC/MS semivolatiles
03C	DDT and/or endrin % breakdown exceeds criteria
03D	Retention time windows
03E	Resolution
04	Initial calibration results outside specified criteria
04A	Compound mean RRF QC criteria not met
04B	Individual % RSD criteria not met
04C	Correlation coefficient < 0.995
05	Continuing calibration results outsides specified criteria
05A	Compound mean RRF QC criteria not met
05B	Compound %deviation QC criteria not met
06	Result qualified as a results of the 5X/10X blank correction
06A	Method or preparation blank
06B	Initial calibration blank (ICB) or continuing calibration blank (CCB)
06C	Equipment rinsate
06D	Trip blank
06E	Field blank
07	Surrogate recoveries outside control limits
07A	Sample
07B	Associated method blank or LCS
08	MS/MSD/duplicate results outside criteria
08A	MS and/or MSD recovery not within control limits (accuracy)
08B	% RPD outside acceptance criteria (precision)

VALIDATION REASON CODE DEFINITIONS (continued)

Reason Code	Description
09	Post digestion spike outside criteria (GFAA)
10	Internal standards outside specified control limits
10A	Recovery
10B	Retention time
11	Laboratory control sample recoveries outside specified control limits
11A	Recovery
11B	% RPD (if run in duplicate)
12	Interference check standard
13	Serial dilution
14	Tentatively identified compounds
15	Quantitation
16	Multiple results available; alternate analysis preferred
17	Field duplicate RPD criteria is exceeded
18	Percent difference between original and second column exceeds QC criteria
19	Professional judgment was used to qualify the data
20	Pesticide clean-up checks
21	Target compound identification
22	Radiological calibration
23	Radiological quantitation
24	Reported result and/or lab qualifier revised to reflect validation findings

SHAW ENVIRONMENTAL, INC.
TECHNICAL SERVICE GROUP
ANALYTICAL DATA EVALUATION

The Project Chemist reviewed the attached Data Package. Detailed comments concerning specific analyses (i.e. GC/MS Semivolatiles) are provided in the attached review sheets. Any additional comments concerning the data package as a whole are listed below

Site/Location: Longhorn
Project No.: 845714
Laboratory: Kemron
Report No.: L0412444

COMMENTS:

Data Reviewed by: Diane Meyer Date: 1/5/05
Diane Meyer
Project Chemist

DATA COMPLETENESS

	REQUIREMENTS	Y	N	NA
Cooler Receipt Form	Cooler receipt form present?	✓		
	Documentation of broken bottles, bubbles in VOA vials, missing labels, seals, etc.?	✓		
	Was the cooler temperature upon receipt at the laboratory between 2° and 6° F?	✓		
	Was the pH of the sample acceptable?	✓		✓
Chain of Custody	Original chain of custody/analytical request form present and complete?	✓		
	Signature, dates, and times complete?	✓		
	Comparison of the reported parameters to the request on the chain of custody?	✓		
	Each sample number transcribed by the laboratory?	✓		
	Cross reference of field sample number, laboratory number and analytical batch?	✓		
	Correct sample collection date given for each sample?	✓		
Laboratory Reports	Date of preparation / extraction for each sample?	✓		
	Date analyzed for each sample?	✓		
	Dilution factors for samples?	✓		
	Detection / Quantitation limits reported as specified?	✓		
	Sample analytical results?	✓		
	Results reported for method blanks?	✓		
	Results reported for trip blanks (VOCs only)?			✓
	Results reported for laboratory duplicates (inorganic and radiological only)?			✓
QC Reports	Matrix Spike (MS) /Matrix Spike Duplicates (MSD) % recoveries and RPDs reported?	✓		
	Laboratory Control Samples (LCS) / LCS Duplicates (LCSD) % recoveries and RPDs reported?	✓		
	Surrogate values provided (organic samples only)?			✓
	Raw data provided for analysis, if applicable?			✓

If "NO," then List all samples on attached sheets

00073815

TIER 1 DATA REVIEW – INORGANIC ANALYSIS

ND 412444

ANALYSIS: lead and mercury MATRIX: LIQUID X

EPA METHOD: 6010B; 7470A, [redacted] SOLID/SOIL [redacted] TCLP

BY: GF OR (ICP)

Hold Times were met

REQUIREMENTS		Y	N	NA
Method / Preparation Blank	Every Batch or 20 Sample All Compounds <IDL / (MDL) / RL	✓ ✓		
Equipment Rinsate Sample	All Compounds <IDL / MDL / RL			✓
Matrix Spike Recovery Values	75-125% Recovery or Lab Limits	✓		
Matrix Spike Duplicate Recovery Values	75-125% Recovery or Lab Limits	✓		
Matrix Spike / Matrix Spike Duplicate	<20%	✓		
Laboratory Control Sample (LCS) Analysis	80-120% Recovery	✓		
ICP Serial Dilutions	<10% difference when the amount is greater than 50 X IDL (results < 50 x IDL)	✓		
Field Duplicate Evaluation 495W62 + QC Pb: ND vs 0.0136	Ratio <2.0 for Water Pb w/in 5x RL + ND - comparison not applicable	✓		
	Ratio <5.0 for Soil			✓

Hg: ND vs ND

If "NO," then list post digestion spike - OK

Method Blank or Equipment Rinsate

Blank ID	Sample ID	Date Collected	Type of Analysis	Analyte	Concentration (units)

Matrix Spike / Matrix Spike Duplicate Results and Field Duplicate

Sample Type	Sample ID	Analyte	MS Recovery	MSD Recovery	Result -1	Result - 2	RPD%

Laboratory Control Sample Analysis and Duplicate Sample Analysis

Analysis Type / Element	Recovery %

ICP Serial Dilutions

Analysis Type / Element	Concentration True	Concentration Found	Percent Recovery

per case narrative - initial & continuing calibrations w/in control limits

00073816

TIER 1 DATA REVIEW – INORGANIC ANALYSIS

ANALYSIS: lead, mercury MATRIX: LIQUID _____

EPA METHOD: 6010B, 7471A SOLID/SOIL X TCLP _____

BY: GF OR ICP

REQUIREMENTS Holding Times were met		Y	N	NA
Method / Preparation Blank	Every Batch or 20 Samples All Compounds <IDL / MDL / RL (Pb / Hg)	✓ ✓	 ✓ Hg - See below	
Equipment Rinsate Sample	All Compounds <IDL / MDL / RL			✓
Matrix Spike Recovery Values	75-125% Recovery or Lab Limits	✓		
Matrix Spike Duplicate Recovery Values	75-125% Recovery or Lab Limits	✓		
Matrix Spike / Matrix Spike Duplicate	<20%	✓		
Laboratory Control Sample (LCS) Analysis	80-120% Recovery	✓		
ICP Serial Dilutions	<10% difference when the amount is greater than 50 X IDL ~~(results < 50x IDL)~~ on	✓		
Field Duplicate Evaluation ① 495064 + QC Pb: 57.4 vs 16.5 RPD = 111% Hg: 0.0378 J vs 0.0679 J - OK <RL	Ratio <2.0 for Water			✓
	Ratio <5.0 for Soil	✓ soil	✓ sed	

If "NO," then list Qualify Sediments for lead J code 17

Method Blank or Equipment Rinsate

Blank ID	Sample ID	Date Collected	Type of Analysis	Analyte	Concentration (units)
Soil method blank	Hg = 0.0138 J mg/kg				
Qualify mercury results up to 5 times (0.069 J mg/kg) B with code 06A					

Matrix Spike / Matrix Spike Duplicate Results and Field Duplicate

Sample Type	Sample ID	Analyte	MS Recovery	MSD Recovery	Result -1	Result - 2	RPD%

Laboratory Control Sample Analysis and Duplicate Sample Analysis

Analysis Type / Element	Recovery %

② Field DUPS 325824-001 + QC
Pb: 12.4 vs 9.88 RPD = 23.2%

③ 325824-002 + QC
Pb: 6.78 vs 7.99 RPD = 16.4%

④ 325824-003 + QC
Pb: 10.0 vs 11.8 RPD = 16.5%

Soil borings - OK

ICP Serial Dilutions

Analysis Type / Element	Concentration True	Concentration Found	Percent Recovery

per case narrative - initial & continuing calibration w/in control limits

DATA EVALUATION REPORT
OF KEMRON REPORT NUMBER L0412448
DATA GAPS INVESTIGATION SITE 49
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

SHAW PROJECT NUMBER 845714

Prepared by

Shaw Environmental, Inc.
1430 Enclave Parkway
Houston, Texas 77077

January 5, 2005

DATA EVALUATION REPORT
KEMRON REPORT NUMBER L0412448
DATA GAPS INVESTIGATION SITE 49
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

January 5, 2005

Approved by: Diane Meyer Date: 1/5/05

Diane Meyer, Program Chemist

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List of Tables

Attachments

Acronyms and Abbreviations

%D	percent deviation
%RSD	percent relative standard deviation
COC	chain of custody
LCS	laboratory control sample
LHAPP	Longhorn Army Ammunition Plant
IDL	instrument detection limit
MDL	method detection limit
MS	matrix spike
MSD	matrix spike duplicate
NFG	National Functional Guidelines
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
RPD	relative percent difference
RL	reporting limit
TERC	Total Environmental Restoration Contract
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency

1.0 Introduction

Shaw Environmental, Inc. has performed a review of the laboratory data associated with soil boring sampling at Site 49 at Longhorn Army Ammunition Plant (LHAPP), Karnack, Texas. This was part of a Data Gaps Investigation, Addendum 3. **Table 1-1** provides a list of the samples collected, a sample identification number and laboratory sample number cross-references, sample matrix, chain of custody (COC) number, date collected, sample location, and analytical method performed for each sample.

The work was performed under the Total Environmental Restoration Contract (TERC), Number DACA56-94-D-0020, and Task Order 109. This Data Evaluation Report is a summary of the analytical data generated by Kemron Environmental Services, Marietta, Ohio.

The purpose of the analytical data review is to assess the effect of the overall analytical process on the usability of the data. The review involved comparing the analytical data summary forms, as submitted by the laboratory, to method requirements set forth in methods found in SW-846, 3rd Edition, Update III, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (USEPA, 1997) and project-imposed requirements specified in the task order. Additionally, surrogate spike recoveries, if applicable, matrix spike recoveries, and duplicate sample results were reviewed to determine any matrix interference. The data packages were reviewed by the Project Chemist using the process outlined in Standard Operating Procedure 1141, Analytical Data Quality Evaluation and Reporting (Shaw, revised 2002).

This data evaluation report discusses accuracy, precision, and representativeness for each type of analysis. **Section 2.0** contains a discussion of precision, accuracy, and representativeness for each method. **Section 3.0** of this report is a technical summary of the data review for the data group as a whole, including completeness. **Section 4.0** lists references.

Data qualifiers and reason codes were added to the applicable results in the data package. A list of validation qualifiers and validation reason code definitions is included in **Attachment A**.

Table 1-1
Chain-of-Custody Summary

Sample I.D.	Lab Sample Number	Matrix	Chain of Custody Number	Date Collected	Methods SW-846
49SB55-001	L0412448-01	Soil	NA	12/16/04	Lead- 6010B; Mercury--7471A; pH-9045
49SB55-002	L0412448-02	Soil	NA	12/16/04	Lead- 6010B; Mercury--7471A; pH-9045
49SB61-001	L0412448-03	Soil	NA	12/17/04	Lead- 6010B; Mercury--7471A; pH-9045
49SSB61-001-QC	L0412448-04	Soil	NA	12/17/04	Lead- 6010B; Mercury--7471A; pH-9045
49SB61-002	L0412448-05	Soil	NA	12/17/04	Lead- 6010B; Mercury--7471A; pH-9045
49SB56-001	L0412448-06	Soil	NA	12/17/04	Lead- 6010B; Mercury--7471A; pH-9045
32SB56-002	L0412448-07	Soil	NA	12/17/04	Lead- 6010B; Mercury--7471A; pH-9045
32SB57-001	L0412448-08	Soil	NA	12/17/04	Lead- 6010B; Mercury--7471A; pH-9045
32SB57-002	L0412448-09	Soil	NA	12/17/04	Lead- 6010B; Mercury--7471A; pH-9045
32SB58-001	L0412448-10	Soil	NA	12/17/04	Lead- 6010B; Mercury--7471A; pH-9045
32SB58-002	L0412448-11	Soil	NA	12/17/04	Lead- 6010B; Mercury--7471A; pH-9045
32SB59-001	L0412448-12	Soil	NA	12/17/04	Lead- 6010B; Mercury--7471A; pH-9045
32SB59-002	L0412448-13	Soil	NA	12/17/04	Lead- 6010B; Mercury--7471A; pH-9045
32SB60-001	L0412448-14	Soil	NA	12/17/04	Lead- 6010B; Mercury--7471A; pH-9045
32SB60-002	L0412448-15	Soil	NA	12/17/04	Lead- 6010B; Mercury--7471A; pH-9045
32SB51-001	L0412448-16	Soil	NA	12/17/04	Lead- 6010B; Mercury--7471A; pH-9045
32SB51-001-QC	L0412448-17	Soil	NA	12/17/04	Lead- 6010B; Mercury--7471A; pH-9045
49SB51-002	L0412448-18	SOIL	NA	12/17904	Lead- 6010B; Mercury--7471A; pH-9045

Table 1-2
Chain-of-Custody Summary (continued)

Sample I.D.	Lab Sample Number	Matrix	Chain of Custody Number	Date Collected	Methods SW-846
49SB51-002-QC	L0412448-19	Soil	NA	12/17/04	Lead- 6010B; Mercury–7471A; pH-9045
49SB52-001	L0412448-20	Soil	NA	12/17/04	Lead- 6010B; Mercury–7471A; pH-9045
49SB52-002	L0412448-21	Soil	NA	12/17/04	Lead- 6010B; Mercury–7471A; pH-9045
49SB53-001	L0412448-22	Soil	NA	12/17/04	Lead- 6010B; Mercury–7471A; pH-9045
49SB53-002	L0412448-23	Soil	NA	12/17/04	Lead- 6010B; Mercury–7471A; pH-9045
49SB54-001	L0412448-24	Soil	NA	12/17/04	Lead- 6010B; Mercury–7471A; pH-9045
49SB54-002	L0412448-25	Soil	NA	12/17904	Lead- 6010B; Mercury–7471A; pH-9045

2.0 Metals

The soil samples were collected and analyzed for lead by SW-846 method 6010B and mercury by method 7471A.

2.1 Initial and Continuing Calibration

The initial and continuing calibrations were within established limits (per case narrative).

2.2 Accuracy

The laboratory control sample (LCS), matrix spike (MS), and matrix spike duplicate (MSD) were within quality control limits.

2.3 Precision

The MS/MSD relative percent difference (RPD) was within quality control limits.

2.4 Representativeness

The method blanks were free of contamination for lead. One of two mercury method blanks contained mercury at 0.0138 J mg/kg. The associated samples (L0412448-01 through 14) with mercury concentration up to 0.069 J mg/kg were qualified "B" with validation code 06A.

Three QC replicate samples were submitted with this data package. The mercury concentration for all three field duplicates were less than the reporting limit and are considered to be in agreement. The lead RPD for sample 49SB51-001 and QC was 29.8%. The lead RPD for sample 49SB51-002 and QC was 4.9%. The lead RPD for sample 49SB61-001 and QC was 73.7%. An RPD $\leq$ 50% is considered good agreement. Since two of three lead field duplicates were in agreement and it is difficult to associate a field duplicate with the other soil borings, only lead data from 49SB61-001, 49SB61-001QC, and 49SB61-002 were qualified estimated ("J") with a qualifier code of 17.

3.0 Technical Summary

The following summarizes the data review for the sampling at LHAPP.

3.1 Documentation

The COC were complete and contained the required information. Any omissions were corrected and an amended COC was submitted to the laboratory. The actual methods used for sample analysis were based upon the COC.

Upon receipt at the laboratory, cooler receipt forms were completed and are included as part of the laboratory data package. All holding times for extraction and analyses were met.

3.2 Completeness

The 90% completeness goal was met as set forth in the USACE Engineering Manual 200-1-3 (February, 2001). None of the data were rejected, although some data was qualified estimated. Valid data are non-qualified data and estimated data.

- Samples L0412448-01 through 14 with lead values equal to or less than 0.069 J mg/kg were B qualified (code 06A) due to method blank contamination.
- Sample results for lead in 49SB61-001, 49SB61-001QC, and 49SB61-002 were qualified estimated ("J") with validation code 17 as the field duplicate RPD exceeded 50%.
- Data reported between the MDL and reporting limit (RL) were "J" flagged with reason code 15 (quantitation estimated).

3.3 Conclusion

An overall review of the samples collected indicates that the chain of custody procedures and laboratory analyses have been conducted in an acceptable manner according to the USEPA Contract Laboratory Program, National Functional Guidelines for Organic Data Review, Office of Emergency and Remedial Response, U.S. Environmental Protection Agency, Washington, D.C. (October 1999).

4.0 References

Shaw Environmental, Inc, (revised 2002), *Standard Operating Procedure Manual,* Houston, Texas.

United States Environmental Protection Agency (USEPA), 1997, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, Update III,* Washington, D.C.

Department of the Army, U.S. Army Corps of Engineers, Requirements for the Preparation of Sampling and Analysis Plans USACE Engineering Manual 200-1-3 (February 2001).

USEPA Contract Laboratory Program, National Functional Guidelines for Inorganic Data Review, Office of Emergency and Remedial Response, U.S. Environmental Protection Agency, Washington, D.C., October 1999.

ATTACHMENT A

VALIDATION QUALIFIERS AND VALIDATION REASON CODE DEFINITIONS

VALIDATION QUALIFIER DEFINITIONS

Qualifier	Definition
U	Not detected. The analyte was analyzed for, but not detected above the associated reporting limit,
J	The analyte was positively identified; the reported value is the estimated concentration of the constituent detected in the sample analyzed.
B	The concentration reported was detected in the associated method blank, trip blank, or equipment blank within 5X/10X the blank concentration.
R	The reported results are rejected due to 1. Severe deficiencies in the supporting quality control data; 2. Anomalies noted in the sampling or analysis process. 3. the presence or absence of the constituent cannot be verified based on the data provided. $. To indicate not to use a particular result in the event of a reanalysis.
UJ	The analyte was analyzed for, but not detected above the established reporting limit. However, review and evaluation of supporting QC data have indicated that the "non-detect" may be inaccurate or imprecise. The non-detect result should be estimated.
L	Result may be biased low. Details are provided in the validation report.
H	Result may be biased high. Details are provided in the validation report.

VALIDATION REASON CODE DEFINITIONS

Reason Code	Description
01	Sample received outside of 4 +/-2 degrees Celsius
01A	Improper sample preservation
02	Holding time exceeded
02A	Extraction
02B	Analysis
03	Instrument performance outside criteria
03A	BFB tune for GC/MS volatiles
03B	DFTPP tune for GC/MS semivolatiles
03C	DDT and/or endrin % breakdown exceeds criteria
03D	Retention time windows
03E	Resolution
04	Initial calibration results outside specified criteria
04A	Compound mean RRF QC criteria not met
04B	Individual % RSD criteria not met
04C	Correlation coefficient < 0.995
05	Continuing calibration results outsides specified criteria
05A	Compound mean RRF QC criteria not met
05B	Compound %deviation QC criteria not met
06	Result qualified as a results of the 5X/10X blank correction
06A	Method or preparation blank
06B	Initial calibration blank (ICB) or continuing calibration blank (CCB)
06C	Equipment rinsate
06D	Trip blank
06E	Field blank
07	Surrogate recoveries outside control limits
07A	Sample
07B	Associated method blank or LCS
08	MS/MSD/duplicate results outside criteria
08A	MS and/or MSD recovery not within control limits (accuracy)
08B	% RPD outside acceptance criteria (precision)

VALIDATION REASON CODE DEFINITIONS (continued)

Reason Code	Description
09	Post digestion spike outside criteria (GFAA)
10	Internal standards outside specified control limits
10A	Recovery
10B	Retention time
11	Laboratory control sample recoveries outside specified control limits
11A	Recovery
11B	% RPD (if run in duplicate)
12	Interference check standard
13	Serial dilution
14	Tentatively identified compounds
15	Quantitation
16	Multiple results available; alternate analysis preferred
17	Field duplicate RPD criteria is exceeded
18	Percent difference between original and second column exceeds QC criteria
19	Professional judgment was used to qualify the data
20	Pesticide clean-up checks
21	Target compound identification
22	Radiological calibration
23	Radiological quantitation
24	Reported result and/or lab qualifier revised to reflect validation findings

SHAW ENVIRONMENTAL, INC.
TECHNICAL SERVICE GROUP
ANALYTICAL DATA EVALUATION

The Project Chemist reviewed the attached Data Package. Detailed comments concerning specific analyses (i.e. GC/MS Semivolatiles) are provided in the attached review sheets. Any additional comments concerning the data package as a whole are listed below

Site/Location: Longhorn
Project No.: 84574
Laboratory: Kemron
Report No.: L04 12448

COMMENTS:

Data Reviewed by: Diane Meyer Date: 1/5/05
Diane Meyer
Project Chemist

DATA COMPLETENESS

	REQUIREMENTS	Y	N	NA
Cooler Receipt Form	Cooler receipt form present?	✓		
	Documentation of broken bottles, bubbles in VOA vials, missing labels, seals, etc.?	✓		
	Was the cooler temperature upon receipt at the laboratory between 2° and 6° F? 1°C	✓		
	Was the pH of the sample acceptable?			✓
Chain of Custody	Original chain of custody/analytical request form present and complete?	✓		
	Signature, dates, and times complete?	✓		
	Comparison of the reported parameters to the request on the chain of custody?	✓		
	Each sample number transcribed by the laboratory?	✓		
	Cross reference of field sample number, laboratory number and analytical batch?	✓		
	Correct sample collection date given for each sample?	✓		
Laboratory Reports	Date of preparation / extraction for each sample?	✓		
	Date analyzed for each sample?	✓		
	Dilution factors for samples?	✓		
	Detection / Quantitation limits reported as specified?	✓		
	Sample analytical results?	✓		
	Results reported for method blanks?	✓		
	Results reported for trip blanks (VOCs only)?			✓
	Results reported for laboratory duplicates (inorganic and radiological only)?			✓
QC Reports	Matrix Spike (MS) /Matrix Spike Duplicates (MSD) % recoveries and RPDs reported?	✓		
	Laboratory Control Samples (LCS) / LCS Duplicates (LCSD) % recoveries and RPDs reported?	✓		
	Surrogate values provided (organic samples only)?			✓
	Raw data provided for analysis, if applicable?			✓

If "NO," then List all samples on attached sheets

TIER 1 DATA REVIEW – INORGANIC ANALYSIS

ANALYSIS: lead, mercury MATRIX: LIQUID ____

EPA METHOD: 6010B, 7471A SOLID/SOIL X TCLP ____

BY: GF OR (ICP)

Hold Times were met

REQUIREMENTS		Y	N	NA
Method / Preparation Blank	Every Batch or 20 Sample All Compounds <IDL (MDL) / RL	✓ ✓ Pb Hg	✓Hg	
Equipment Rinsate Sample	All Compounds <IDL / MDL / RL			✓
Matrix Spike Recovery Values	75-125% Recovery or Lab Limits	✓		
Matrix Spike Duplicate Recovery Values	75-125% Recovery or Lab Limits	✓		
Matrix Spike / Matrix Spike Duplicate	<20%	✓		
Laboratory Control Sample (LCS) Analysis	80-120% Recovery	✓		
ICP Serial Dilutions	<10% difference when the amount is greater than 50 X IDL for project samples	✓		
Field Duplicate Evaluation	Ratio <2.0 for Water			✓
	Ratio <5.0 for Soil RPD ≤ 50%		✓	

① 495061-001 + QC
Pb: 22.1 vs 10.2 RPD = 73.7%
Hg: 0.0545 vs 0.0463J - OK
Quality lead at SB01 - J code 17

If "NO," then list

② 495851-001 + QC
Pb: 76.4 vs 56.6 RPD = 29.8%
Hg: 0.0225J vs 0.0234J - OK

Method Blank or Equipment Rinsate

Blank ID	Sample ID	Date Collected	Type of Analysis	Analyte	Concentration (units)
method blank - mercury	WG180138		Hg = 0.0138J	mg/kg	
associated samples: 01 - 14. Qualify result to up to 0.069J mg/kg "B"-code 06A					

Matrix Spike / Matrix Spike Duplicate Results and Field Duplicate

Sample Type	Sample ID	Analyte	MS Recovery	MSD Recovery	Result -1	Result - 2	RPD%

Laboratory Control Sample Analysis and Duplicate Sample Analysis

Analysis Type / Element	Recovery %

field duplicates

③ 495851-002 + QC
Pb: 13.8 vs 14.5 RPD = 4.9%
Hg: 0.0254J vs 0.0531J - ok

ICP Serial Dilutions

Analysis Type / Element	Concentration True	Concentration Found	Percent Recovery

per case narrative initial & continuing calibration w/in QC limits
post digestion spike w/in QC limits.

DATA EVALUATION REPORT
OF KEMRON REPORT NUMBER L0502501
DATA GAPS INVESTIGATION SITE 49
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

SHAW PROJECT NUMBER 845714

Prepared by

Shaw Environmental, Inc.
1430 Enclave Parkway
Houston, Texas 77077

March 10, 2005

DATA EVALUATION REPORT
KEMRON REPORT NUMBER L0502501
DATA GAPS INVESTIGATION SITE 49
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

March 10, 2005

Approved by: Diane Meyer Date: 3/10/05

Diane Meyer, Program Chemist

Table of Contents

List of Tables

Attachments

Acronyms and Abbreviations

%D	percent deviation
%RSD	percent relative standard deviation
COC	chain of custody
LCS	laboratory control sample
LHAPP	Longhorn Army Ammunition Plant
IDL	instrument detection limit
MDL	method detection limit
MS	matrix spike
MSD	matrix spike duplicate
NFG	National Functional Guidelines
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
RPD	relative percent difference
RL	reporting limit
TERC	Total Environmental Restoration Contract
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency

1.0 Introduction

Shaw Environmental, Inc. has performed a review of the laboratory data associated with sampling at Site 49 at Longhorn Army Ammunition Plant (LHAPP), Karnack, Texas. **Table 1-1** provides a list of the samples collected, a sample identification number and laboratory sample number cross-references, sample matrix, chain of custody (COC) number, date collected, sample location, and analytical method performed for each sample.

The work was performed under the Total Environmental Restoration Contract (TERC), Number DACA56-94-D-0020, and Task Order 109. This Data Evaluation Report is a summary of the analytical data generated by Kemron Environmental Services, Marietta, Ohio.

The purpose of the analytical data review is to assess the effect of the overall analytical process on the usability of the data. The review involved comparing the analytical data summary forms, as submitted by the laboratory, to method requirements set forth in methods found in SW-846, 3rd Edition, Update III, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (USEPA, 1997) and project-imposed requirements specified in the task order. Additionally, surrogate spike recoveries, if applicable, matrix spike recoveries, and duplicate sample results were reviewed to determine any matrix interference. The data packages were reviewed by the Project Chemist using the process outlined in Standard Operating Procedure 1141, Analytical Data Quality Evaluation and Reporting (Shaw, revised 2002).

This data evaluation report discusses accuracy, precision, and representativeness for each type of analysis. **Section 2.0** contains a discussion of precision, accuracy, and representativeness for each method. **Section 3.0** of this report is a technical summary of the data review for the data group as a whole, including completeness. **Section 4.0** lists references.

Data qualifiers and reason codes were added to the applicable results in the data package. A list of validation qualifiers and validation reason code definitions is included in **Attachment A**.

Table 1-1
Chain-of-Custody Summary

Sample I.D.	Lab Sample Number	Matrix	Chain of Custody No.	Date Collected	Methods SW-846
49TCLP-01	L0502501-01	Soil	02-KEMM-FEB05	2/24/05	TCLP lead - 1311/6010B
49TCLP-02	L0502501-02	Soil	02-KEMM-FEB05	2/24/05	TCLP mercury – 1311/74070A

)

2.0 Metals

The soil samples were collected and analyzed for toxicity characteristic leaching procedure (TCLP) lead by SW-846 methods 1311/6010B and TCLP mercury by methods 1311/7470A.

2.1 Initial and Continuing Calibration

The initial and continuing calibrations were within established limits.

2.2 Accuracy

The laboratory control sample (LCS), matrix spike (MS), and matrix spike duplicate (MSD) were within quality control limits. The serial dilutions and interference check standards were within quality control limits,

2.3 Precision

The MS/MSD relative percent difference (RPD) was within quality control limits.

2.4 Representativeness

The method blanks and continuing calibration blanks were free of contamination for lead and mercury. No QC replicate samples were submitted with this data package. The samples were analyzed within six months and mercury within 28 days.

3.0 Technical Summary

The following summarizes the data review for the sampling at LHAPP.

3.1 Documentation

The COC were complete and contained the required information. Any omissions were corrected and an amended COC was submitted to the laboratory. The actual methods used for sample analysis were based upon the COC.

Upon receipt at the laboratory, cooler receipt forms were completed and are included as part of the laboratory data package. All holding times for extraction and analyses were met.

3.2 Completeness

The 90% completeness goal was met as set forth in the USACE Engineering Manual 200-1-3 (February, 2001). None of the data were rejected, although some data was qualified estimated. Valid data are non-qualified data and estimated data.

- Data reported between the MDL and reporting limit (RL) were "J" flagged with reason code 15 (quantitation estimated).

3.3 Conclusion

An overall review of the samples collected indicates that the chain of custody procedures and laboratory analyses have been conducted in an acceptable manner according to the USEPA Contract Laboratory Program, National Functional Guidelines for Organic Data Review, Office of Emergency and Remedial Response, U.S. Environmental Protection Agency, Washington, D.C. (October 1999).

4.0 References

Shaw Environmental, Inc, (revised 2002), *Standard Operating Procedure Manual,* Houston, Texas.

United States Environmental Protection Agency (USEPA), 1997, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, Update III,* Washington, D.C.

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ATTACHMENT A

VALIDATION QUALIFIERS AND VALIDATION REASON CODE DEFINITIONS

VALIDATION QUALIFIER DEFINITIONS

Qualifier	Definition
U	Not detected. The analyte was analyzed for, but not detected above the associated reporting limit,
J	The analyte was positively identified; the reported value is the estimated concentration of the constituent detected in the sample analyzed.
B	The concentration reported was detected in the associated method blank, trip blank, or equipment blank within 5X/10X the blank concentration.
R	The reported results are rejected due to 1. Severe deficiencies in the supporting quality control data; 2. Anomalies noted in the sampling or analysis process. 3. the presence or absence of the constituent cannot be verified based on the data provided. $. To indicate not to use a particular result in the event of a reanalysis.
UJ	The analyte was analyzed for, but not detected above the established reporting limit. However, review and evaluation of supporting QC data have indicated that the "non-detect" may be inaccurate or imprecise. The non-detect result should be estimated.
L	Result may be biased low. Details are provided in the validation report.
H	Result may be biased high. Details are provided in the validation report.

VALIDATION REASON CODE DEFINITIONS

Reason Code	Description
01	Sample received outside of 4 +/-2 degrees Celsius
01A	Improper sample preservation
02	Holding time exceeded
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03A	BFB tune for GC/MS volatiles
03B	DFTPP tune for GC/MS semivolatiles
03C	DDT and/or endrin % breakdown exceeds criteria
03D	Retention time windows
03E	Resolution
04	Initial calibration results outside specified criteria
04A	Compound mean RRF QC criteria not met
04B	Individual % RSD criteria not met
04C	Correlation coefficient < 0.995
05	Continuing calibration results outsides specified criteria
05A	Compound mean RRF QC criteria not met
05B	Compound %deviation QC criteria not met
06	Result qualified as a results of the 5X/10X blank correction
06A	Method or preparation blank
06B	Initial calibration blank (ICB) or continuing calibration blank (CCB)
06C	Equipment rinsate
06D	Trip blank
06E	Field blank
07	Surrogate recoveries outside control limits
07A	Sample
07B	Associated method blank or LCS
08	MS/MSD/duplicate results outside criteria
08A	MS and/or MSD recovery not within control limits (accuracy)
08B	% RPD outside acceptance criteria (precision)

VALIDATION REASON CODE DEFINITIONS (continued)

Reason Code	Description
09	Post digestion spike outside criteria (GFAA)
10	Internal standards outside specified control limits
10A	Recovery
10B	Retention time
11	Laboratory control sample recoveries outside specified control limits
11A	Recovery
11B	% RPD (if run in duplicate)
12	Interference check standard
13	Serial dilution
14	Tentatively identified compounds
15	Quantitation
16	Multiple results available; alternate analysis preferred
17	Field duplicate RPD criteria is exceeded
18	Percent difference between original and second column exceeds QC criteria
19	Professional judgment was used to qualify the data
20	Pesticide clean-up checks
21	Target compound identification
22	Radiological calibration
23	Radiological quantitation
24	Reported result and/or lab qualifier revised to reflect validation findings

SHAW ENVIRONMENTAL, INC.
TECHNICAL SERVICE GROUP
ANALYTICAL DATA EVALUATION

The Project Chemist reviewed the attached Data Package. Detailed comments concerning specific analyses (i.e. GC/MS Semivolatiles) are provided in the attached review sheets. Any additional comments concerning the data package as a whole are listed below

Site/Location: Longhorn
Project No.: 843714
Laboratory: Kemron
Report No.: 40502501

COMMENTS:

Diane Meyer

Data Reviewed by: March 9, 2005 Date: _____

Diane Meyer
Project Chemist

TIER 1 DATA REVIEW

DATA COMPLETENESS				
	REQUIREMENTS	**Y**	**N**	**NA**
Cooler Receipt Form	Cooler receipt form present?	✓		
	Documentation of broken bottles, bubbles in VOA vials, missing labels, seals, etc.?	✓		
	Was the cooler temperature upon receipt at the laboratory between 2° and 6° F?	✓		
	Was the pH of the sample acceptable?	✓		
Chain of Custody	Original chain of custody/analytical request form present and complete?	✓		
	Signature, dates, and times complete?	✓		
	Comparison of the reported parameters to the request on the chain of custody?	✓		
	Each sample number transcribed by the laboratory?	✓		
	Cross reference of field sample number, laboratory number and analytical batch?	✓		
	Correct sample collection date given for each sample?	✓		
Laboratory Reports	Date of preparation / extraction for each sample?	✓		
	Date analyzed for each sample?	✓		
	Dilution factors for samples?	✓		
	Detection / Quantitation limits reported as specified?	✓		
	Sample analytical results?	✓		
	Results reported for method blanks?	✓		
	Results reported for trip blanks (VOCs only)?			✓
	Results reported for laboratory duplicates (inorganic and radiological only)?			✓
QC Reports	Matrix Spike (MS) /Matrix Spike Duplicates (MSD) % recoveries and RPDs reported?	✓		
	Laboratory Control Samples (LCS) / LCS Duplicates (LCSD) % recoveries and RPDs reported?	✓		
	Surrogate values provided (organic samples only)?			✓
	Raw data provided for analysis, if applicable?			✓

If "NO," then List all samples on attached sheets

TIER 1 DATA REVIEW – INORGANIC ANALYSIS

ANALYSIS: Lead, Mercury MATRIX: LIQUID

EPA METHOD: 6010B; 7470A SOLID/SOIL TCLP X

BY: GF OR (ICP)

Hold Times were met

REQUIREMENTS		Y	N	NA
Method / Preparation Blank	Every Batch or 20 Sample All Compounds <IDL / (MDL) / RL	✓		
Equipment Rinsate Sample	All Compounds <IDL / MDL / RL			✓
Matrix Spike Recovery Values	75-125% Recovery or Lab Limits	✓		
Matrix Spike Duplicate Recovery Values	75-125% Recovery or Lab Limits	✓		
Matrix Spike / Matrix Spike Duplicate	<20%	✓		
Laboratory Control Sample (LCS) Analysis	80-120% Recovery	✓		
ICP Serial Dilutions	<10% difference when the amount is greater than 50 X IDL per case narrative	✓		
Field Duplicate Evaluation	Ratio <2.0 for Water			✓
	Ratio <5.0 for Soil			✓

If "NO," then list

Method Blank or Equipment Rinsate

Blank ID	Sample ID	Date Collected	Type of Analysis	Analyte	Concentration (units)

Matrix Spike / Matrix Spike Duplicate Results and Field Duplicate

Sample Type	Sample ID	Analyte	MS Recovery	MSD Recovery	Result -1	Result - 2	RPD%

Laboratory Control Sample Analysis and Duplicate Sample Analysis

Analysis Type / Element	Recovery %

ICP Serial Dilutions

Analysis Type / Element	Concentration True	Concentration Found	Percent Recovery

ANALYSIS: METALS | MATRIX: | LIQUID_____

METHOD: 6010B, 7470A | SOLID / SOIL_____ | TCLP X

BY: _____

REQUIREMENT		Y	N	NA
Initial Calibration Verification (ICV)	Beginning and every 10 samples	✓		
	ICV % Recovery (90-110%) except HG (80-120%) and	✓		
	Cn- (85-115%)			✓
RSD of Initial Calibration	Correlation coefficient must be > 0.995	✓		
Initial Calibration Blank (ICB)	Initial calibration present for every analysis date, element, and instrument	✓ ✓		
ICP Interference Check Sample (ICSA / ICSB)	Beginning and end of sample batch	✓		
	80-100% Recovery	✓		
Continuing Calibration Verification (CCV)	Every 10 samples	✓		
	CCV % Recovery (90-110%) except Hg (80-120%)	✓		
	and Cn- (85-115%)			✓
Continuing Calibration Blank (CCB)	Every 10 samples	✓		

If "NO," list all samples below

Standard / Blank Check and RSD of Initial Calibration

Calibration Date	Instrument ID	Run No.	Analyte	Standard Levels	Correlation Coefficient

ICV / CCV and ICP Interference Check Sample

Analysis Type / Element	Instrument ID	Run No.	ICV /CCV	Run Date	Concentration True	Concentration Found	Percent Recovery

ICP Interference Check Sample

File Name	Analysis Type / Element	Instrument ID	Concentration True	Concentration Found	Percent Recovery

DATA EVALUATION REPORT
OF KEMRON REPORT NUMBER L0503144
DATA GAPS INVESTIGATION SITE 49
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

SHAW PROJECT NUMBER 845714

Prepared by

Shaw Environmental, Inc.
1430 Enclave Parkway
Houston, Texas 77077

March 16, 2005

DATA EVALUATION REPORT
KEMRON REPORT NUMBER L0503144
DATA GAPS INVESTIGATION SITE 49
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

March 16, 2005

Approved by: Diane Meyer
Diane Meyer, Program Chemist

Date: 3/16/05

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Attachments

Acronyms and Abbreviations

%D	percent deviation
%RSD	percent relative standard deviation
COC	chain of custody
LCS	laboratory control sample
LHAPP	Longhorn Army Ammunition Plant
IDL	instrument detection limit
MDL	method detection limit
MS	matrix spike
MSD	matrix spike duplicate
NFG	National Functional Guidelines
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
RPD	relative percent difference
RL	reporting limit
TERC	Total Environmental Restoration Contract
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency

1.0 Introduction

Shaw Environmental, Inc. has performed a review of the laboratory data associated with sampling at Site 49 at Longhorn Army Ammunition Plant (LHAPP), Karnack, Texas. **Table 1-1** provides a list of the samples collected, a sample identification number and laboratory sample number cross-references, sample matrix, chain of custody (COC) number, date collected, sample location, and analytical method performed for each sample.

The work was performed under the Total Environmental Restoration Contract (TERC), Number DACA56-94-D-0020, and Task Order 109. This Data Evaluation Report is a summary of the analytical data generated by Kemron Environmental Services, Marietta, Ohio.

The purpose of the analytical data review is to assess the effect of the overall analytical process on the usability of the data. The review involved comparing the analytical data summary forms, as submitted by the laboratory, to method requirements set forth in methods found in SW-846, 3rd Edition, Update III, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (USEPA, 1997) and project-imposed requirements specified in the task order. Additionally, surrogate spike recoveries, if applicable, matrix spike recoveries, and duplicate sample results were reviewed to determine any matrix interference. The data packages were reviewed by the Project Chemist using the process outlined in Standard Operating Procedure 1141, Analytical Data Quality Evaluation and Reporting (Shaw, revised 2002).

This data evaluation report discusses accuracy, precision, and representativeness for each type of analysis. **Section 2.0** contains a discussion of precision, accuracy, and representativeness for each method. **Section 3.0** of this report is a technical summary of the data review for the data group as a whole, including completeness. **Section 4.0** lists references.

Data qualifiers and reason codes were added to the applicable results in the data package. A list of validation qualifiers and validation reason code definitions is included in **Attachment A**.

Table 1-1
Chain-of-Custody Summary

Sample I.D.	Lab Sample Number	Matrix	Chain of Custody No.	Date Collected	Methods SW-846
49TCLP-01	L0503144-01	Soil	02-KEMM-FEB05	2/24/05	Total lead - 6010B
49TCLP-02	L0503144-02	Soil	02-KEMM-FEB05	2/24/05	mercury – 7471A

2.0 Metals

The soil samples were collected and analyzed for total lead by SW-846 method 6010B and total mercury by method 7471A.

2.1 Accuracy

The laboratory control sample (LCS), matrix spike (MS), and matrix spike duplicate (MSD) were within quality control limits. The serial dilution for lead exceeded the 10% RPD quality control limit. The total lead value was qualified "J" with a validation qualifier code 13 (serial dilution criterion exceeded).

2.2 Precision

The MS/MSD relative percent difference (RPD) was within quality control limits.

2.3 Representativeness

The method blanks were free of contamination for lead and mercury. No QC replicate samples were submitted with this data package. The samples were analyzed within six months and mercury within 28 days.

3.0 Technical Summary

The following summarizes the data review for the sampling at LHAPP.

3.1 Documentation

The COC were complete and contained the required information. Any omissions were corrected and an amended COC was submitted to the laboratory. The actual methods used for sample analysis were based upon the COC.

Upon receipt at the laboratory, cooler receipt forms were completed and are included as part of the laboratory data package. All holding times for extraction and analyses were met.

3.2 Completeness

The 90% completeness goal was met as set forth in the USACE Engineering Manual 200-1-3 (February, 2001). None of the data were rejected, although some data was qualified estimated. Valid data are non-qualified data and estimated data.

- Data reported between the MDL and reporting limit (RL) were "J" flagged with reason code 15 (quantitation estimated).
- The total lead value was qualified "J" with a validation qualifier code 13 (serial dilution criterion exceeded

3.3 Conclusion

An overall review of the samples collected indicates that the chain of custody procedures and laboratory analyses have been conducted in an acceptable manner according to the USEPA Contract Laboratory Program, National Functional Guidelines for Organic Data Review, Office of Emergency and Remedial Response, U.S. Environmental Protection Agency, Washington, D.C. (October 1999).

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ATTACHMENT A

VALIDATION QUALIFIERS AND VALIDATION REASON CODE DEFINITIONS

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03B	DFTPP tune for GC/MS semivolatiles
03C	DDT and/or endrin % breakdown exceeds criteria
03D	Retention time windows
03E	Resolution
04	Initial calibration results outside specified criteria
04A	Compound mean RRF QC criteria not met
04B	Individual % RSD criteria not met
04C	Correlation coefficient < 0.995
05	Continuing calibration results outsides specified criteria
05A	Compound mean RRF QC criteria not met
05B	Compound %deviation QC criteria not met
06	Result qualified as a results of the 5X/10X blank correction
06A	Method or preparation blank
06B	Initial calibration blank (ICB) or continuing calibration blank (CCB)
06C	Equipment rinsate
06D	Trip blank
06E	Field blank
07	Surrogate recoveries outside control limits
07A	Sample
07B	Associated method blank or LCS
08	MS/MSD/duplicate results outside criteria
08A	MS and/or MSD recovery not within control limits (accuracy)
08B	% RPD outside acceptance criteria (precision)

VALIDATION REASON CODE DEFINITIONS (continued)

Reason Code	Description
09	Post digestion spike outside criteria (GFAA)
10	Internal standards outside specified control limits
10A	Recovery
10B	Retention time
11	Laboratory control sample recoveries outside specified control limits
11A	Recovery
11B	% RPD (if run in duplicate)
12	Interference check standard
13	Serial dilution
14	Tentatively identified compounds
15	Quantitation
16	Multiple results available; alternate analysis preferred
17	Field duplicate RPD criteria is exceeded
18	Percent difference between original and second column exceeds QC criteria
19	Professional judgment was used to qualify the data
20	Pesticide clean-up checks
21	Target compound identification
22	Radiological calibration
23	Radiological quantitation
24	Reported result and/or lab qualifier revised to reflect validation findings

SHAW ENVIRONMENTAL, INC.
TECHNICAL SERVICE GROUP
ANALYTICAL DATA EVALUATION

The Project Chemist reviewed the attached Data Package. Detailed comments concerning specific analyses (i.e. GC/MS Semivolatiles) are provided in the attached review sheets. Any additional comments concerning the data package as a whole are listed below

Site/Location: Longhorn
Project No.: 845774
Laboratory: Kemron on
Report No.: ~~L050250~~ L0503144

COMMENTS:

Total lead & Mercury

Data Reviewed by: Diane Meyer Date: 3/10/05
Diane Meyer
Project Chemist

00073862

DATA COMPLETENESS				
	REQUIREMENTS	**Y**	**N**	**NA**
Cooler Receipt Form	Cooler receipt form present?	✓		
	Documentation of broken bottles, bubbles in VOA vials, missing labels, seals, etc.?	✓		
	Was the cooler temperature upon receipt at the laboratory between 2° and 6° F?	✓		
	Was the pH of the sample acceptable?			✓
Chain of Custody	Original chain of custody/analytical request form present and complete?	✓		
	Signature, dates, and times complete?	✓		
	Comparison of the reported parameters to the request on the chain of custody?	✓		
	Each sample number transcribed by the laboratory?	✓		
	Cross reference of field sample number, laboratory number and analytical batch?	✓		
	Correct sample collection date given for each sample?	✓		
Laboratory Reports	Date of preparation / extraction for each sample?	✓		
	Date analyzed for each sample?	✓		
	Dilution factors for samples?	✓		
	Detection / Quantitation limits reported as specified?	✓		
	Sample analytical results?	✓		
	Results reported for method blanks?	✓		
	Results reported for trip blanks (VOCs only)?			✓
	Results reported for laboratory duplicates (inorganic and radiological only)?			✓
QC Reports	Matrix Spike (MS) /Matrix Spike Duplicates (MSD) % recoveries and RPDs reported?			
	Laboratory Control Samples (LCS) / LCS Duplicates (LCSD) % recoveries and RPDs reported?			
	Surrogate values provided (organic samples only)?			✓
	Raw data provided for analysis, if applicable?			✓

If "NO," then List all samples on attached sheets

Relog of L05 02503 for total lead and mercury

00073863

TIER 1 DATA REVIEW – INORGANIC ANALYSIS

ANALYSIS: lead - 6010B MATRIX: LIQUID _____

EPA METHOD: Mercury - 7471A SOLID/SOIL X TCLP _____

BY: GF OR (ICP)

REQUIREMENTS		Y	N	NA
Method / Preparation Blank	Every Batch or 20 Sample All Compounds <IDL / (MDL) / RL	✓ ✓		
Equipment Rinsate Sample	All Compounds <IDL / MDL / RL			✓
Matrix Spike Recovery Values	75-125% Recovery or Lab Limits	✓		
Matrix Spike Duplicate Recovery Values	75-125% Recovery or Lab Limits	✓		
Matrix Spike / Matrix Spike Duplicate	<20%	✓		
Laboratory Control Sample (LCS) Analysis	80-120% Recovery	✓		
ICP Serial Dilutions	<10% difference when the amount is greater than 50 X IDL		✓	✓ RM
Field Duplicate Evaluation	Ratio <2.0 for Water			✓
	Ratio <5.0 for Soil			✓

post digestion spike ok

If "NO," then list

Method Blank or Equipment Rinsate

Blank ID	Sample ID	Date Collected	Type of Analysis	Analyte	Concentration (units)

Matrix Spike / Matrix Spike Duplicate Results and Field Duplicate

Sample Type	Sample ID	Analyte	MS Recovery	MSD Recovery	Result -1	Result - 2	RPD%

Laboratory Control Sample Analysis and Duplicate Sample Analysis

Analysis Type / Element	Recovery %

ICP Serial Dilutions

Analysis Type / Element	Concentration True	Concentration Found	Percent Recovery
ICP/Pb : 11.7% - Qualify Pb result J - code 13			

No case narrative, or ~~Calibration~~ Calibration data provided

Appendix B

Soil and Groundwater Results through 2004

Table B-1
Detected Parameters in Soil and Sediment
LHAAP-49

	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SB01	49SB01	49SB01	49SB02	49SB02	49SB03	49SB03	49SB04
	Sample Date:	12/3/2000	12/3/2000	12/3/2000	12/3/2000	12/3/2000	12/3/2000	12/3/2000	12/3/2000
	Sample ID:	49SB01(0-0_5)	49SB01(1-2)	49SB01(1-2)QC	49SB02(0-0_5)	49SB02(1-2)	49SB03(0-0_5)	49SB03(1-2)	49SB04(0-0_5)
	Start Depth:	0	1	1	0	1	0	1	0
	End Depth:	0.5	2	2	0.5	2	0.5	2	0.5
	Sample Type:	REG	REG	FD	REG	REG	REG	REG	REG
PARAMETER	UNITS								
Metals									
Aluminum	mg/kg	10100 J	15500 J	17200 J	13000 J	16200 J	9560 J	13000 J	8890 J
Arsenic	mg/kg	3.36	4.61	2.81	6.89	2.61	3.05	2.07	3.48
Barium	mg/kg	88.9	153	132	49.5	168	89.2	49.6	118
Beryllium	mg/kg	0.724 J	1.05 J	0.926 J	0.661 J	0.915 J	0.869 J	0.357 J	1.5 J
Cadmium	mg/kg	0.162 J	0.203 J	0.248 J	<0.12	0.248 J	<0.11	<0.12	0.521
Calcium	mg/kg	918 J	2960 J	2610 J	848 J	4610 J	667 J	259 J	1230 J
Chromium	mg/kg	17.2	27.2	24	24.6	20.6	12.9	12.3	19.9
Cobalt	mg/kg	9.78	11.8	7.78	2.97	11.3	5.61	1.77 J	11.2
Copper	mg/kg	9.87	22.2	22	7.76	18.8	4.95	5.58	13.7
Iron	mg/kg	17900	27400	20000	27100	19200	11700	11800	48000
Lead	mg/kg	12.3	17.7	15.8	13.4	48.4	10.6	8.4	12.7
Magnesium	mg/kg	1900 J	5300 J	5100 J	993 J	2680 J	556 J	886 J	2030 J
Manganese	mg/kg	281 J	254 J	136 J	77.2 J	121 J	245 J	18.6 J	1800 J
Mercury	mg/kg	<0.0487	0.059	0.0587	0.055	6.27	<0.038	<0.0458	0.0486
Nickel	mg/kg	13.3	30.9	26.9	6.85	23.2	4.37	3.79	29.6
Potassium	mg/kg	667 J	1190 J	1160 J	606 J	661 J	394 J	453 J	548 J
Selenium	mg/kg	1.42	0.824 J	<0.62	1.18 J	0.759 J	<0.56	1.09 J	0.672 J
Silver	mg/kg	<0.13	<0.13	0.127 J	<0.12	<0.12	<0.11	<0.12	<0.12
Sodium	mg/kg	<64	79.3 J	67.9 J	<59	<59	<56	81.6 J	<58
Strontium	mg/kg	20.7	63.2	55.7	15	59.1	10.2	11.9	25.8
Thallium	mg/kg	1.37 J	<1.3	<1.2	<1.2	<1.2	<1.1	1.21 J	<1.2
Vanadium	mg/kg	26.6	34.3	31.2	38.4	24.3	22.7	19	31.4
Zinc	mg/kg	37.7	89.1	96.6	29	153	17.6	17.4	53.9
Pesticides									
1,2,4,5-Tetrachloro-benzene	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDD	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
cis-nonachlor	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
o,p'-DDD	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
o,p'-DDT	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Polychlorinated biphenyls	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA

Table B-1
Detected Parameters in Soil and Sediment
LHAAP-49

	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SB01	49SB01	49SB01	49SB02	49SB02	49SB03	49SB03	49SB04
	Sample Date:	12/3/2000	12/3/2000	12/3/2000	12/3/2000	12/3/2000	12/3/2000	12/3/2000	12/3/2000
	Sample ID:	49SB01(0-0_5)	49SB01(1-2)	49SB01(1-2)QC	49SB02(0-0_5)	49SB02(1-2)	49SB03(0-0_5)	49SB03(1-2)	49SB04(0-0_5)
	Start Depth:	0	1	1	0	1	0	1	0
	End Depth:	0.5	2	2	0.5	2	0.5	2	0.5
	Sample Type:	REG	REG	FD	REG	REG	REG	REG	REG
PARAMETER	UNITS								
Dioxins/Furans									
1,2,3,4,6,7,8-Heptachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,6,7,8-HpCDD	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8,9-Heptachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,6,7,8-Hexachlordibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-Hexachlordibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8-Pentachlordibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,6,7,8-Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,7,8-Pentachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
2,3,7,8-TCDD	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Hexachloridibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Octachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Octachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachlorodibenzofuran, Total	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
General Chemistry									
Chloride	mg/kg	<12	<13.9	<12.6	<11	<11	<11.8	<11.9	<11.9
Sulfate	mg/kg	<12	<13.9	<12.6	<11	<11	<11.8	17.3	<11.9
Volatiles									
Methylene chloride	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA

Table B-1
Detected Parameters in Soil and Sediment
LHAAP-49

	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SB04	49SB05	49SB05	49SB07	49SB07	49SB07	49SB08	49SB08
	Sample Date:	12/3/2000	12/3/2000	12/3/2000	12/3/2000	12/3/2000	12/3/2000	12/3/2000	12/3/2000
	Sample ID:	49SB04(1-2)	49SB05(0-0_5)	49SB05(1-2)	49SB07(0-0_5)	49SB07(0-0_5)QC	49SB07(1-2)	49SB08(0-0_5)	49SB08(1-2)
	Start Depth:	1	0	1	0	0	1	0	1
	End Depth:	2	0.5	2	0.5	0.5	2	0.5	2
	Sample Type:	REG	REG	REG	REG	FD	REG	REG	REG
PARAMETER	UNITS								
Metals									
Aluminum	mg/kg	13200 J	18000 J	19200 J	14300 J	11800 J	8340 J	10100 J	10600
Arsenic	mg/kg	3.08	4.7	3.62	4.6	4.81	1.86	4.6	2.68
Barium	mg/kg	119	48.6	37.8	190	165	85.1	99	137 J
Beryllium	mg/kg	0.839 J	0.51 J	0.476 J	1.19 J	1.68 J	0.919 J	0.596 J	0.383
Cadmium	mg/kg	0.346	<0.13	<0.13	0.577	1.13	0.292 J	0.469	0.272 J
Calcium	mg/kg	2720 J	955 J	1390 J	4760 J	3740 J	2240 J	21000 J	3210
Chromium	mg/kg	23.2	24	21.5	31.6	25.5	21.9	24.5	21.5
Cobalt	mg/kg	16.7	3.2	3.84	12.9	17.6	6.5	11	12.1
Copper	mg/kg	22.9	12.4	16.5	46.9	52.8	18.9	17.7	23
Iron	mg/kg	27000	19400	21500	25200	58500	8420	24700	15000
Lead	mg/kg	11.6	14.1	12.6	351	439	28.1	102	12.2
Magnesium	mg/kg	5650 J	1670 J	2470 J	6560 J	5180 J	3640 J	4390 J	4870
Manganese	mg/kg	573 J	43.6 J	21.5 J	382 J	1320 J	114 J	373 J	106
Mercury	mg/kg	0.0749	0.0722	<0.051	0.0838	0.0853	0.0807	0.0661	0.0707
Nickel	mg/kg	44.4	10.8	15.9	43.3	66	29.4	33	34.6
Potassium	mg/kg	1020 J	566 J	487 J	1430 J	991 J	896 J	1000 J	845 J
Selenium	mg/kg	<0.64	0.986 J	0.709 J	0.975 J	0.888 J	<0.62	0.903 J	<0.59
Silver	mg/kg	<0.13	<0.13	<0.13	<0.12	<0.12	<0.12	<0.13	0.138 J
Sodium	mg/kg	290 J	78.6 J	298 J	<62	<60	<62	<63	<59
Strontium	mg/kg	64	23.8	37.6	73.4	59.5	61.8	78.3	47.2
Thallium	mg/kg	<1.3	<1.3	<1.3	<1.2	<1.2	<1.2	<1.3	<1.2
Vanadium	mg/kg	27.2	44.1	36.8	36.3	41.7	25.5	29	26.8
Zinc	mg/kg	83.7	25.9	29.7	695	424	79.2	214	87.8
Pesticides									
1,2,4,5-Tetrachloro-benzene	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDD	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
cis-nonachlor	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
o,p'-DDD	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
o,p'-DDT	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Polychlorinated biphenyls	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA

Table B-1
Detected Parameters in Soil and Sediment
LHAAP-49

	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SB04	49SB05	49SB05	49SB07	49SB07	49SB07	49SB08	49SB08
	Sample Date:	12/3/2000	12/3/2000	12/3/2000	12/3/2000	12/3/2000	12/3/2000	12/3/2000	12/3/2000
	Sample ID:	49SB04(1-2)	49SB05(0-0_5)	49SB05(1-2)	49SB07(0-0_5)	49SB07(0-0_5)QC	49SB07(1-2)	49SB08(0-0_5)	49SB08(1-2)
	Start Depth:	1	0	1	0	0	1	0	1
	End Depth:	2	0.5	2	0.5	0.5	2	0.5	2
	Sample Type:	REG	REG	REG	REG	FD	REG	REG	REG
PARAMETER	UNITS								
Dioxins/Furans									
1,2,3,4,6,7,8-Heptachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,6,7,8-HpCDD	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8,9-Heptachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,6,7,8-Hexachlordibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-Hexachlordibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8-Pentachlordibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,6,7,8-Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,7,8-Pentachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
2,3,7,8-TCDD	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Hexachloridibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Octachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Octachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachlorodibenzofuran, Total	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
General Chemistry									
Chloride	mg/kg	<12.9	<12.8	25.7	<13	<12.7	<11.6	<12.7	<12
Sulfate	mg/kg	<12.9	<12.8	45.1	<13	<12.7	<11.6	<12.7	13.1
Volatiles									
Methylene chloride	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA

Table B-1
Detected Parameters in Soil and Sediment
LHAAP-49

	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SB09	49SB09	49SB09	49SB10	49SB10	49SB11	49SB11	49SB12	49SB12
	Sample Date:	12/3/2000	12/3/2000	12/3/2000	12/3/2000	12/3/2000	12/3/2000	12/3/2000	12/2/2000	12/2/2000
	Sample ID:	49SB09(0-0_5)	49SB09(1-2)	49SB09(1-2)QC	49SB10(0-0_5)	49SB10(1-2)	49SB11(0-0_5)	49SB11(1-2)	49SB12(0-0_5)	49SB12(1-2)
	Start Depth:	0	1	1	0	1	0	1	0	1
	End Depth:	0.5	2	2	0.5	2	0.5	2	0.5	2
	Sample Type:	REG	REG	FD	REG	REG	REG	REG	REG	REG
PARAMETER	UNITS									
Metals										
Aluminum	mg/kg	6610	12300	11700	9360	10100	12200	8210	4650	8280
Arsenic	mg/kg	6.16	3.79	2.69	3.87	3.52	4.23	1.49	2.58	2.35
Barium	mg/kg	101 J	369 J	193 J	102 J	51.8 J	127 J	16 J	32.4	39.5
Beryllium	mg/kg	0.435	0.754	1.02	0.656	0.747	0.702	0.143 J	0.241 J	0.192 J
Cadmium	mg/kg	0.408	0.379	0.523	<0.11	<0.11	0.203 J	<0.11	0.15 J	<0.11
Calcium	mg/kg	2670	4010	4190	1230	1050	2670	510	10800 J	70100 J
Chromium	mg/kg	24.2	23.5	21.8	17.2	15.8	21.5	8.84	9.42	12.5
Cobalt	mg/kg	7.07	12.1	14.3	8.39	10.6	10.4	0.874 J	1.31 J	1.25 J
Copper	mg/kg	19.6	23.4	29	11.9	15	20.2	5.16	5.55	5.8
Iron	mg/kg	20100	21600	19300	19100	20300	23600	7720	12800	13100
Lead	mg/kg	289	34.6	24.3	18.5	20.4	31.7	6.32	834	41.8
Magnesium	mg/kg	2220	5370	5400	1210	1630	3960	733	297 J	547 J
Manganese	mg/kg	290	287	404	137	112	262	8.92	58.9 J	37.1 J
Mercury	mg/kg	0.0734	0.0927	0.0713	<0.0457	<0.0426	0.0721	<0.0429	0.0502	<0.047
Nickel	mg/kg	19.5	34.3	37.9	12.5	18.6	28.3	3.59	4.9	4.38
Potassium	mg/kg	725 J	1190 J	1130 J	432 J	498 J	847 J	348 J	466 J	364 J
Selenium	mg/kg	0.659 J	1.03 J	1 J	0.84 J	0.819 J	0.888 J	<0.57	<0.54	0.725 J
Silver	mg/kg	<0.12	<0.12	<0.12	<0.11	<0.11	<0.12	<0.11	<0.11	<0.11
Sodium	mg/kg	<59	<58	<60	72.3 J	241 J	72.9 J	90.8 J	<54	<55
Strontium	mg/kg	35.1	83.2	90.1	28.6	35.3	41.5	14.5	28.8 J	112 J
Thallium	mg/kg	<1.2	<1.2	<1.2	<1.1	<1.1	<1.2	<1.1	<1.1	<1.1
Vanadium	mg/kg	27	32.9	29.6	24.7	27.3	33.7	13.7	14.4	24.2
Zinc	mg/kg	82.9	85.9	87.6	30.4	36.2	66.7	10.9	44.8	11.4
Pesticides										
1,2,4,5-Tetrachloro-benzene	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDD	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-nonachlor	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
o,p'-DDD	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
o,p'-DDT	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Polychlorinated biphenyls	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table B-1
Detected Parameters in Soil and Sediment
LHAAP-49

	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SB09	49SB09	49SB09	49SB10	49SB10	49SB11	49SB11	49SB12	49SB12
	Sample Date:	12/3/2000	12/3/2000	12/3/2000	12/3/2000	12/3/2000	12/3/2000	12/3/2000	12/2/2000	12/2/2000
	Sample ID:	49SB09(0-0_5)	49SB09(1-2)	49SB09(1-2)QC	49SB10(0-0_5)	49SB10(1-2)	49SB11(0-0_5)	49SB11(1-2)	49SB12(0-0_5)	49SB12(1-2)
	Start Depth:	0	1	1	0	1	0	1	0	1
	End Depth:	0.5	2	2	0.5	2	0.5	2	0.5	2
	Sample Type:	REG	REG	FD	REG	REG	REG	REG	REG	REG
PARAMETER	UNITS									
Dioxins/Furans										
1,2,3,4,6,7,8-Heptachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,6,7,8-HpCDD	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8,9-Heptachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,6,7,8-Hexachlordibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-Hexachlordibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8-Pentachlordibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,6,7,8-Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,7,8-Pentachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,7,8-TCDD	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachloridibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Octachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Octachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachlorodibenzofuran, Total	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
General Chemistry										
Chloride	mg/kg	<12.7	<11.7	<11	<11	17.4	<11	<11	<11	<11.8
Sulfate	mg/kg	<12.7	<11.7	<11	<11	170	<11	16.9	<11	<11.8
Volatiles										
Methylene chloride	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table B-1
Detected Parameters in Soil and Sediment
LHAAP-49

	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SB13	49SB13	49SB14	49SB14	49SB15	49SB15	49SB16	49SB16	49SB16
	Sample Date:	12/2/2000	12/2/2000	12/2/2000	12/2/2000	12/2/2000	12/2/2000	12/2/2000	12/2/2000	12/2/2000
	Sample ID:	49SB13(0-0_5)	49SB13(1-2)	49SB14(0-0_5)	49SB14(1-2)	49SB15(0-0_5)	49SB15(1-2)	49SB16(0-0_5)	49SB16(1-2)	49SB16(1-2)QC
	Start Depth:	0	1	0	1	0	1	0	1	1
	End Depth:	0.5	2	0.5	2	0.5	2	0.5	2	2
	Sample Type:	REG	REG	REG	REG	REG	REG	REG	REG	FD
PARAMETER	UNITS									
Metals										
Aluminum	mg/kg	2280	13000	3480	12700	2200	7010	7290	9970	11600
Arsenic	mg/kg	3.2	2.81	2.87	2.58	1.22	2.63	11.7	2.35	3.4
Barium	mg/kg	21.6	73.9	271	99.5	36.7	68.7	63.7	83.5	89.8
Beryllium	mg/kg	0.281	0.44	0.147 J	0.552	0.171 J	0.401	1.05	0.602	0.595
Cadmium	mg/kg	0.479	<0.11	<0.11	0.151 J	0.222 J	0.123 J	0.376	<0.11	<0.12
Calcium	mg/kg	295000 J	2780	272	1570 J	1060 J	15500 J	3540	1910 J	2290 J
Chromium	mg/kg	11	13.3	8.34	21.5	5.02	13.2	39	14.2	17.8
Cobalt	mg/kg	1.7 J	2.56 J	0.701 J	10.5	1.12 J	3.45	4.06	7.76	5.63
Copper	mg/kg	6.04	6.26	4.93	22.6	9.42	7.48	7.79	8.76	9.19
Iron	mg/kg	5010	13800	14600	18900	4160	8600	61700	14800	17500
Lead	mg/kg	26.1	9.04	934	124	83.1	33	182	12.7	17.3
Magnesium	mg/kg	1640 J	612 J	208 J	3830 J	230 J	706 J	364 J	1300 J	1190 J
Manganese	mg/kg	151 J	25.7 J	27.2 J	110 J	183 J	239 J	246 J	220 J	165 J
Mercury	mg/kg	<0.04	<0.044	<0.045	<0.044	<0.044	<0.043	0.545	<0.043	<0.047
Nickel	mg/kg	13.8	5.64	2.38 J	23.8	2.31 J	6.64	7.01	13.7	12.2
Potassium	mg/kg	412 J	592 J	480 J	1010 J	181 J	401 J	296 J	531 J	537 J
Selenium	mg/kg	2.33	0.732 J	<0.57	<0.58	<0.52	<0.56	<0.53	<0.56	<0.59
Silver	mg/kg	<0.11	<0.11	<0.11	<0.12	<0.1	<0.11	<0.11	<0.11	<0.12
Sodium	mg/kg	<53	<53	541	67.1 J	<52	<56	<53	<56	<59
Strontium	mg/kg	921 J	12.7 J	17.1 J	19.5 J	5.22 J	50.5 J	13.7 J	17.5 J	19.7 J
Thallium	mg/kg	<1.1	<1.1	<1.1	<1.2	<1	<1.1	<1.1	<1.1	<1.2
Vanadium	mg/kg	14.4	26	17	26.7	8.54	21.6	75.9	22.8	29
Zinc	mg/kg	15	14.6	7.17	74.8	23.3	22.3	60.1	27.4	25.9
Pesticides										
1,2,4,5-Tetrachloro-benzene	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDD	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-nonachlor	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
o,p'-DDD	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
o,p'-DDT	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Polychlorinated biphenyls	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table B-1
Detected Parameters in Soil and Sediment
LHAAP-49

	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SB13	49SB13	49SB14	49SB14	49SB15	49SB15	49SB16	49SB16	49SB16
	Sample Date:	12/2/2000	12/2/2000	12/2/2000	12/2/2000	12/2/2000	12/2/2000	12/2/2000	12/2/2000	12/2/2000
	Sample ID:	49SB13(0-0_5)	49SB13(1-2)	49SB14(0-0_5)	49SB14(1-2)	49SB15(0-0_5)	49SB15(1-2)	49SB16(0-0_5)	49SB16(1-2)	49SB16(1-2)QC
	Start Depth:	0	1	0	1	0	1	0	1	1
	End Depth:	0.5	2	0.5	2	0.5	2	0.5	2	2
	Sample Type:	REG	REG	REG	REG	REG	REG	REG	REG	FD
PARAMETER	UNITS									
Dioxins/Furans										
1,2,3,4,6,7,8-Heptachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,6,7,8-HpCDD	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8,9-Heptachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,6,7,8-Hexachlordibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-Hexachlordibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8-Pentachlordibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,6,7,8-Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,7,8-Pentachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,7,8-TCDD	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachloridibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Octachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Octachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachlorodibenzofuran, Total	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
General Chemistry										
Chloride	mg/kg	<10.7	<11	20.5	<12	<11	<11	<11	<11	<12
Sulfate	mg/kg	<10.7	<11	46.8	34.7	<11	<11	<11	<11	<12
Volatiles										
Methylene chloride	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table B-1
Detected Parameters in Soil and Sediment
LHAAP-49

	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SB17	49SB17	49SB18	49SB18	49SB19	49SB19	49SB20	49SB20	49SB21
	Sample Date:	12/2/2000	12/2/2000	12/2/2000	12/2/2000	12/2/2000	12/2/2000	12/2/2000	12/2/2000	12/2/2000
	Sample ID:	49SB17(0-0_5)	49SB17(1-2)	49SB18(0-0_5)	49SB18(1-2)	49SB19(0-0_5)	49SB19(1-2)	49SB20(0-0_5)	49SB20(1-2)	49SB21(0-0_5)
	Start Depth:	0	1	0	1	0	1	0	1	0
	End Depth:	0.5	2	0.5	2	0.5	2	0.5	2	0.5
	Sample Type:	REG	REG	REG	REG	REG	REG	REG	REG	REG
PARAMETER	UNITS									
Metals										
Aluminum	mg/kg	11600	13300	9120	9410	8400	13300	11500	13900	11700
Arsenic	mg/kg	3.42	3.53	4.54	2.26	8.1	5.97	3.16	4.25	3.71
Barium	mg/kg	133	180	74.6	51	42.6	82	110	129	124
Beryllium	mg/kg	0.644	2.15	0.534	0.335	1.51	0.807	0.75	1.1	0.816
Cadmium	mg/kg	0.518	0.795	0.789	<0.12	0.434	0.151 J	0.167 J	0.44	0.198 J
Calcium	mg/kg	4190	5800	2350 J	1200 J	1390 J	2910	1940 J	3640	1820 J
Chromium	mg/kg	21.1	25.5	21.8	11	27.5	23.1	19.3	24.4	20.5
Cobalt	mg/kg	10.6	16.7	8.05	2.33 J	6.06	8.01	10.5	10.7	8.97
Copper	mg/kg	21.7	55.2	17.5	5.1	12.3	14.4	19.8	27.8	20.5
Iron	mg/kg	25600	18300	21300	9510	57400	33900	20600	23200	21100
Lead	mg/kg	400	39.4	992	12.8	1740	44.9	82.9	21.8	226
Magnesium	mg/kg	3910 J	5890 J	1040 J	511 J	804 J	1530 J	3840 J	5870 J	3480 J
Manganese	mg/kg	480 J	460 J	179 J	46.7 J	176 J	240 J	193 J	244 J	179 J
Mercury	mg/kg	2.12	0.16	0.2	<0.045	<0.046	0.0909	<0.0457	0.0927	<0.046
Nickel	mg/kg	27.7	46.3	15.8	7.43	11.3	15.3	21.7	32.6	22.1
Potassium	mg/kg	1070 J	1340 J	545 J	405 J	346 J	566 J	754 J	1060 J	856 J
Selenium	mg/kg	0.662 J	0.664 J	<0.57	<0.58	0.68 J	0.788 J	0.689 J	0.863 J	0.822 J
Silver	mg/kg	<0.12	0.143 J	<0.11	<0.12	<0.12	<0.11	<0.12	<0.12	<0.12
Sodium	mg/kg	<59	<62	<57	<58	<58	<57	62 J	545	<59
Strontium	mg/kg	36.3 J	92.9 J	13.9 J	11.5 J	12.2 J	30.8 J	41.8 J	85.5 J	36.8 J
Thallium	mg/kg	<1.2	<1.2	<1.1	<1.2	<1.2	<1.1	<1.2	<1.2	<1.2
Vanadium	mg/kg	29.5	29.8	27.7	20.6	72.8	47.6	27.7	32.7	29.5
Zinc	mg/kg	67	74.9	71	13.2	54.3	42.4	55.5	74.5	57.7
Pesticides										
1,2,4,5-Tetrachloro-benzene	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDD	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-nonachlor	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
o,p'-DDD	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
o,p'-DDT	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Polychlorinated biphenyls	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table B-1
Detected Parameters in Soil and Sediment
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	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SB17	49SB17	49SB18	49SB18	49SB19	49SB19	49SB20	49SB20	49SB21
	Sample Date:	12/2/2000	12/2/2000	12/2/2000	12/2/2000	12/2/2000	12/2/2000	12/2/2000	12/2/2000	12/2/2000
	Sample ID:	49SB17(0-0_5)	49SB17(1-2)	49SB18(0-0_5)	49SB18(1-2)	49SB19(0-0_5)	49SB19(1-2)	49SB20(0-0_5)	49SB20(1-2)	49SB21(0-0_5)
	Start Depth:	0	1	0	1	0	1	0	1	0
	End Depth:	0.5	2	0.5	2	0.5	2	0.5	2	0.5
	Sample Type:	REG	REG	REG	REG	REG	REG	REG	REG	REG
PARAMETER	UNITS									
Dioxins/Furans										
1,2,3,4,6,7,8-Heptachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,6,7,8-HpCDD	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8,9-Heptachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,6,7,8-Hexachlordibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-Hexachlordibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8-Pentachlordibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,6,7,8-Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,7,8-Pentachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,7,8-TCDD	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachloridibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Octachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Octachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachlorodibenzofuran, Total	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
General Chemistry										
Chloride	mg/kg	<12	<13	<12	<11.9	<11.9	<11.8	<11.9	36.9	<11.9
Sulfate	mg/kg	<12	<13	<12	<11.9	<11.9	12	<11.9	267	<11.9
Volatiles										
Methylene chloride	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table B-1
Detected Parameters in Soil and Sediment
LHAAP-49

	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SB21	49SB22	49SB22	49SB22	49SB23	49SB23	49SB24	49SB24
	Sample Date:	12/2/2000	12/2/2000	12/2/2000	12/2/2000	12/2/2000	12/2/2000	12/2/2000	12/2/2000
	Sample ID:	49SB21(1-2)	49SB22(0-0_5)	49SB22(0-0_5)QC	49SB22(1-2)	49SB23(0-0_5)	49SB23(1-2)	49SB24(0-0_5)	49SB24(1-2)
	Start Depth:	1	0	0	1	0	1	0	1
	End Depth:	2	0.5	0.5	2	0.5	2	0.5	2
	Sample Type:	REG	REG	FD	REG	REG	REG	REG	REG
PARAMETER	UNITS								
Metals									
Aluminum	mg/kg	13000	12100	11100	12700	10900	10700	14100	7500
Arsenic	mg/kg	3.83	3.34	3.29	3.26	4.1	6.03	3.53	1.85
Barium	mg/kg	114 J	96.7 J	105 J	149 J	98.2 J	184 J	127 J	41.7 J
Beryllium	mg/kg	0.857	0.71	0.776	0.991	0.912	1.72	0.816	0.358
Cadmium	mg/kg	0.321	0.15 J	0.165 J	0.349	0.155 J	0.216 J	0.495	<0.11
Calcium	mg/kg	3200 J	1150 J	1020 J	2660 J	1480 J	1500 J	3540 J	809 J
Chromium	mg/kg	24.2	16.4	18.4	21.4	21.4	70.2	22.8	10.7
Cobalt	mg/kg	14.4	6.85	8.72	16.1	5.85	14.6	15.8	2.74
Copper	mg/kg	25.8	9.95	9.52	19.8	15.6	21.5	22.4	4.73
Iron	mg/kg	25000	18300	18600	24900	24000	51900	23300	10400
Lead	mg/kg	187	13.7	14.2	12.9	57.5	23.5	37	7.42
Magnesium	mg/kg	6400	1730	1700	5740	2420	4050	6730	783
Manganese	mg/kg	422	242	358	784	142	275	591	54.1
Mercury	mg/kg	0.07	<0.0459	<0.0449	<0.047	<0.049	<0.048	0.0525	<0.0448
Nickel	mg/kg	34.7	14	15.7	32.8	21.7	27.3	34.1	5.89
Potassium	mg/kg	1110 J	608 J	631 J	969 J	724 J	624 J	1250 J	379 J
Selenium	mg/kg	0.622 J	<0.58	<0.59	0.762 J	0.681 J	0.755 J	1.03 J	<0.54
Silver	mg/kg	<0.12	<0.12	<0.12	<0.12	<0.12	<0.11	<0.13	<0.11
Sodium	mg/kg	60 R	58 R	69.2 J	362 J	83.1 J	279 J	63 R	54 R
Strontium	mg/kg	61.6	23.4	23.1	59.7	28.9	45	49.1	15.3
Thallium	mg/kg	<1.2	<1.2	<1.2	<1.2	<1.2	<1.1	<1.3	<1.1
Vanadium	mg/kg	32.1	27.1	27.6	28.4	30	51	30.9	18.6
Zinc	mg/kg	85.9 J	28.9 J	30.1 J	77.3 J	53 J	59.5 J	76.5 J	12.7 J
Pesticides									
1,2,4,5-Tetrachloro-benzene	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDD	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
cis-nonachlor	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
o,p'-DDD	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
o,p'-DDT	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Polychlorinated biphenyls	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA

Table B-1
Detected Parameters in Soil and Sediment
LHAAP-49

	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SB21	49SB22	49SB22	49SB22	49SB23	49SB23	49SB24	49SB24
	Sample Date:	12/2/2000	12/2/2000	12/2/2000	12/2/2000	12/2/2000	12/2/2000	12/2/2000	12/2/2000
	Sample ID:	49SB21(1-2)	49SB22(0-0_5)	49SB22(0-0_5)QC	49SB22(1-2)	49SB23(0-0_5)	49SB23(1-2)	49SB24(0-0_5)	49SB24(1-2)
	Start Depth:	1	0	0	1	0	1	0	1
	End Depth:	2	0.5	0.5	2	0.5	2	0.5	2
	Sample Type:	REG	REG	FD	REG	REG	REG	REG	REG
PARAMETER	UNITS								
Dioxins/Furans									
1,2,3,4,6,7,8-Heptachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,6,7,8-HpCDD	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8,9-Heptachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,6,7,8-Hexachlordibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-Hexachlordibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8-Pentachlordibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,6,7,8-Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,7,8-Pentachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
2,3,7,8-TCDD	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Hexachloridibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Octachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Octachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachlorodibenzofuran, Total	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
General Chemistry									
Chloride	mg/kg	<12.6	<11.8	<12	17.2	<12	33.6	<12.8	<11
Sulfate	mg/kg	<12.6	<11.8	<12	50.2	<12	212	<12.8	<11
Volatiles									
Methylene chloride	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA

Table B-1
Detected Parameters in Soil and Sediment
LHAAP-49

	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SB25	49SB25	49SB26	49SB26	49SB27	49SB27	49SB28	49SB28
	Sample Date:	12/2/2000	12/2/2000	12/2/2000	12/2/2000	12/2/2000	12/2/2000	12/2/2000	12/2/2000
	Sample ID:	49SB25(0-0_5)	49SB25(1-2)	49SB26(0-0_5)	49SB26(1-2)	49SB27(0-0_5)	49SB27(1-2)	49SB28(0-0_5)	49SB28(1-2)
	Start Depth:	0	1	0	1	0	1	0	1
	End Depth:	0.5	2	0.5	2	0.5	2	0.5	2
	Sample Type:	REG	REG	REG	REG	REG	REG	REG	REG
PARAMETER	UNITS								
Metals									
Aluminum	mg/kg	11000	13300	7450	10500	5780	9370	10300	12600
Arsenic	mg/kg	2.43	2.81	3.52	3.72	5.99	2.84	3.87	2.6
Barium	mg/kg	133 J	215 J	80 J	137 J	77.6 J	70.2 J	82.6 J	533 J
Beryllium	mg/kg	0.815	0.843	0.366	0.545	0.548	0.403	0.753	0.701
Cadmium	mg/kg	0.235 J	0.188 J	0.127 J	0.174 J	0.364	<0.11	0.215 J	<0.11
Calcium	mg/kg	2890 J	2190 J	1140 J	860 J	64300 J	2690 J	2680 J	2830 J
Chromium	mg/kg	20.1	20.8	15.9	21.8	31.6	12.9	19	17.3
Cobalt	mg/kg	15.7	11.1	4.6	7.35	5.29	11.6	7.68	5.72
Copper	mg/kg	24.2	19.9	12.7	20.1	18.6	7.2	15.8	14.8
Iron	mg/kg	15700	20500	15900	18700	30500	12200	21700	14700
Lead	mg/kg	266	15.3	54.4	15.9	659	56.8	19.6	12.2
Magnesium	mg/kg	4070	4740	1400	2610	1730	1010	2680	1800
Manganese	mg/kg	294	174	107	86.6	305	131	156	39.3
Mercury	mg/kg	<0.048	<0.0468	<0.044	<0.0479	<0.0438	<0.047	<0.0476	<0.047
Nickel	mg/kg	25.4	26.1	12	22.5	16.2	8.24	19.8	14
Potassium	mg/kg	1080 J	918 J	838 J	922 J	573 J	548 J	864 J	577 J
Selenium	mg/kg	0.798 J	0.686 J	<0.58	<0.56	1.06 J	<0.57	<0.56	0.628 J
Silver	mg/kg	<0.12	<0.12	<0.12	<0.11	<0.12	<0.11	<0.11	<0.11
Sodium	mg/kg	61 R	70.9 J	58 R	381 J	60 R	57 R	56 R	56 R
Strontium	mg/kg	47.9	54.9	17.2	33.1	238	16.6	26.5	56.5
Thallium	mg/kg	<1.2	<1.2	<1.2	<1.1	<1.2	<1.1	<1.1	<1.1
Vanadium	mg/kg	25	28.1	23.6	29.7	31.2	23.7	30.4	27.5
Zinc	mg/kg	69.6 J	60.5 J	39.3 J	66.2 J	1310 J	81.4 J	48.4 J	46 J
Pesticides									
1,2,4,5-Tetrachloro-benzene	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDD	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
cis-nonachlor	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
o,p'-DDD	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
o,p'-DDT	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Polychlorinated biphenyls	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA

Table B-1
Detected Parameters in Soil and Sediment
LHAAP-49

	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SB25	49SB25	49SB26	49SB26	49SB27	49SB27	49SB28	49SB28
	Sample Date:	12/2/2000	12/2/2000	12/2/2000	12/2/2000	12/2/2000	12/2/2000	12/2/2000	12/2/2000
	Sample ID:	49SB25(0-0_5)	49SB25(1-2)	49SB26(0-0_5)	49SB26(1-2)	49SB27(0-0_5)	49SB27(1-2)	49SB28(0-0_5)	49SB28(1-2)
	Start Depth:	0	1	0	1	0	1	0	1
	End Depth:	0.5	2	0.5	2	0.5	2	0.5	2
	Sample Type:	REG	REG	REG	REG	REG	REG	REG	REG
PARAMETER	UNITS								
Dioxins/Furans									
1,2,3,4,6,7,8-Heptachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,6,7,8-HpCDD	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8,9-Heptachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,6,7,8-Hexachlordibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-Hexachlordibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8-Pentachlordibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,6,7,8-Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,7,8-Pentachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
2,3,7,8-TCDD	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Hexachloridibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Octachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Octachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachlorodibenzofuran, Total	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
General Chemistry									
Chloride	mg/kg	<12.5	<12	<12	<12	<12	<12	<12	<12
Sulfate	mg/kg	<12.5	<12	<12	17	<12	<12	<12	107
Volatiles									
Methylene chloride	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA

Table B-1
Detected Parameters in Soil and Sediment
LHAAP-49

	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SB30	49SB30	49SB30	49SB31	49SB31	49SB32	49SB32	49SB32
	Sample Date:	12/2/2000	12/2/2000	12/2/2000	12/3/2000	12/3/2000	12/3/2000	12/3/2000	12/3/2000
	Sample ID:	49SB30(0-0_5)	49SB30(0-0_5)QC	49SB30(1-2)	49SB31(0-0_5)	49SB31(1-2)	49SB32(0-0_5)	49SB32(0-0_5)QC	49SB32(1-2)
	Start Depth:	0	0	1	0	1	0	0	1
	End Depth:	0.5	0.5	2	0.5	2	0.5	0.5	2
	Sample Type:	REG	FD	REG	REG	REG	REG	FD	REG
PARAMETER	UNITS								
Metals									
Aluminum	mg/kg	14000	12000	13100	7330	12100	9220	8740	11100
Arsenic	mg/kg	4.05	2.72	3.25	2.48	4.9	2.58	2.57	3.57
Barium	mg/kg	124 J	79.2 J	99.4 J	65.6 J	99 J	92.8 J	85.4 J	42 J
Beryllium	mg/kg	0.97	0.615	0.792	0.373	0.844	0.522	0.421	0.429
Cadmium	mg/kg	0.415	0.22 J	0.307	0.288	0.203 J	0.469	0.504	<0.11
Calcium	mg/kg	4720 J	3570 J	4230 J	1990	2130	1520	1370	725
Chromium	mg/kg	22.7	18	21.8	12	24.1	38.4	31.7	16
Cobalt	mg/kg	9.31	6.49	10.4	5.15	9.29	5.8	5.34	2.4 J
Copper	mg/kg	22	18.4	23.2	5.44	11.4	15.5	12.4	7.33
Iron	mg/kg	22500	16000	20400	10400	26000	14900	13000	14700
Lead	mg/kg	336	288	15.7	52.8	35.7	121	94.7	16.4
Magnesium	mg/kg	3890	3120	5130	716	1710	1640	1370	968
Manganese	mg/kg	200	131	233	219	247	228	166	34
Mercury	mg/kg	0.052	<0.046	<0.046	0.0561	<0.046	84.2	125	6.88
Nickel	mg/kg	27.8	18.5	27.1	8.27	16.9	15.4	13.4	7.16
Potassium	mg/kg	1110 J	913 J	977 J	422 J	557 J	517 J	473 J	415 J
Selenium	mg/kg	1.05 J	0.691 J	0.772 J	<0.56	0.761 J	<0.61	0.593 J	<0.57
Silver	mg/kg	<0.13	<0.12	<0.11	<0.11	<0.12	<0.12	<0.11	<0.11
Sodium	mg/kg	63 R	59 R	56 R	<56	88.9 J	<61	<56	78.3 J
Strontium	mg/kg	45.7	36	52.5	11.6	21.7	17.6	15.5	14
Thallium	mg/kg	<1.3	<1.2	<1.1	<1.1	<1.2	<1.2	<1.1	<1.1
Vanadium	mg/kg	32.3	25.9	28.9	18.7	33	21.5	20	24.9
Zinc	mg/kg	64.9 J	51 J	65.7 J	72.2	144	49.3	41.4	20
Pesticides									
1,2,4,5-Tetrachloro-benzene	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDD	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
cis-nonachlor	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
o,p'-DDD	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
o,p'-DDT	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Polychlorinated biphenyls	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA

Table B-1
Detected Parameters in Soil and Sediment
LHAAP-49

	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SB30	49SB30	49SB30	49SB31	49SB31	49SB32	49SB32	49SB32
	Sample Date:	12/2/2000	12/2/2000	12/2/2000	12/3/2000	12/3/2000	12/3/2000	12/3/2000	12/3/2000
	Sample ID:	49SB30(0-0_5)	49SB30(0-0_5)QC	49SB30(1-2)	49SB31(0-0_5)	49SB31(1-2)	49SB32(0-0_5)	49SB32(0-0_5)QC	49SB32(1-2)
	Start Depth:	0	0	1	0	1	0	0	1
	End Depth:	0.5	0.5	2	0.5	2	0.5	0.5	2
	Sample Type:	REG	FD	REG	REG	REG	REG	FD	REG
PARAMETER	UNITS								
Dioxins/Furans									
1,2,3,4,6,7,8-Heptachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,6,7,8-HpCDD	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8,9-Heptachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,6,7,8-Hexachlordibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-Hexachlordibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8-Pentachlordibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,6,7,8-Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,7,8-Pentachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
2,3,7,8-TCDD	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Hexachloridibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Octachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Octachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachlorodibenzofuran, Total	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA
General Chemistry									
Chloride	mg/kg	<12.9	<12	<12	<11	<12	<12	<12	31.1
Sulfate	mg/kg	<12.9	<12	13	<11	<12	<12	<12	24.5
Volatiles									
Methylene chloride	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA

Table B-1
Detected Parameters in Soil and Sediment
LHAAP-49

	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SB33	49SB33	49SB34	49SB34	49SB34	49SB35	49SB35	49SB35
	Sample Date:	12/3/2000	12/3/2000	12/7/2000	12/7/2000	12/7/2000	12/7/2000	12/7/2000	12/7/2000
	Sample ID:	49SB33(0-0_5)	49SB33(1-2)	49SB34(0-0_5)	49SB34(1-3)	49SB34(3-5)	49SB35(0-0_5)	49SB35(0-0_5)QC	49SB35(1-3)
	Start Depth:	0	1	0	1	3	0	0	1
	End Depth:	0.5	2	0.5	3	5	0.5	0.5	3
	Sample Type:	REG	REG	REG	REG	REG	REG	FD	REG
PARAMETER	UNITS								
Metals									
Aluminum	mg/kg	10400	11500	10400 J	12300 J	11800 J	5040 J	5730 J	13000 J
Arsenic	mg/kg	3.48	4.84	2.68	2.58	3.42	4.84	4.38	4.49
Barium	mg/kg	96.4 J	92.5 J	196 J	92.4 J	109 J	91.7 J	90.2 J	152 J
Beryllium	mg/kg	0.641	0.732	0.974	0.898	0.832	0.353	0.339	1.05
Cadmium	mg/kg	0.114 J	<0.11	0.205 J	0.41	0.245 J	0.136 J	0.141 J	0.21 J
Calcium	mg/kg	1430	1300	1910	2270	3590	2070	2150	1600
Chromium	mg/kg	16.2	17.9	18.2	20	23.1	13.8	13.4	25.2
Cobalt	mg/kg	6.24	12.9	10.1	10.7	12.7	2.24 J	2.3 J	18.6
Copper	mg/kg	11.3	11.9	13.8	13.4	19.8	6.25	7.7	22.1
Iron	mg/kg	18800	16300	21000	34100	21700	16900	15100	25200
Lead	mg/kg	11.3	10.4	11.8	9.95	13	280	425	30
Magnesium	mg/kg	1980	3070	4160	5500 J	6070 J	593 J	839 J	3590 J
Manganese	mg/kg	189	79.4	542 J	1050	371	86.3	57.2	212
Mercury	mg/kg	0.0631	<0.0477	0.0533	0.0731	0.104	<0.048	<0.049	0.0799
Nickel	mg/kg	16.8	21.2	32.6	37.2	32	4.7	5.88	28.3
Potassium	mg/kg	490 J	489 J	744 J	688 J	779 J	499 J	544 J	967 J
Selenium	mg/kg	0.574 J	0.772 J	0.702 J	0.792 J	0.639 J	<0.63	<0.59	0.972 J
Silver	mg/kg	<0.11	<0.11	<0.12	<0.11	<0.12	<0.13	<0.12	<0.13
Sodium	mg/kg	60.5 J	120 J	140 J	698	855	<63	<59	157 J
Strontium	mg/kg	21.7	26.4	46.5	55.8	67.6	23.8	24.7	40.3
Thallium	mg/kg	<1.1	<1.1	<1.2	<1.1	<1.2	<1.3	<1.2	<1.3
Vanadium	mg/kg	24.4	25	23.7	22.1	23.6	26	22.3	33.9
Zinc	mg/kg	38.6	49	65.7	67.7	83.5	29.2	45	80.2
Pesticides									
1,2,4,5-Tetrachloro-benzene	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDD	mg/kg	NA	NA	<.0036	<.0034	<.0034	.0063 J	.0434 J	<.0039
4,4'-DDE	mg/kg	NA	NA	<.0036	<.0034	<.0034	.145 J	1.09 J	<.0039
4,4'-DDT	mg/kg	NA	NA	<.0036	<.0034	<.0034	.0392 J	.103 J	<.0039
alpha-Chlordane	mg/kg	NA	NA	<.0036	<.0034	<.0034	<.0037	<.0036	<.0039
cis-nonachlor	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	mg/kg	NA	NA	<.0036	<.0034	<.0034	<.0037	<.0036	<.0039
o,p'-DDD	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
o,p'-DDT	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Polychlorinated biphenyls	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA

Table B-1
Detected Parameters in Soil and Sediment
LHAAP-49

	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SB33	49SB33	49SB34	49SB34	49SB34	49SB35	49SB35	49SB35
	Sample Date:	12/3/2000	12/3/2000	12/7/2000	12/7/2000	12/7/2000	12/7/2000	12/7/2000	12/7/2000
	Sample ID:	49SB33(0-0_5)	49SB33(1-2)	49SB34(0-0_5)	49SB34(1-3)	49SB34(3-5)	49SB35(0-0_5)	49SB35(0-0_5)QC	49SB35(1-3)
	Start Depth:	0	1	0	1	3	0	0	1
	End Depth:	0.5	2	0.5	3	5	0.5	0.5	3
	Sample Type:	REG	REG	REG	REG	REG	REG	FD	REG
PARAMETER	UNITS								
Dioxins/Furans									
1,2,3,4,6,7,8-Heptachlorodibenzofuran	ng/kg	NA	NA	<0.33	<0.23	<0.54	13	7.6	0.54 J
1,2,3,4,6,7,8-HpCDD	ng/kg	NA	NA	4 J	1.8 I	1.4 J	44	27	2.5 J
1,2,3,4,7,8,9-Heptachlorodibenzofuran	ng/kg	NA	NA	<0.51	<0.34	<0.77	<0.48	<0.21	<0.64
1,2,3,4,7,8-Hexachlorodibenzofuran	ng/kg	NA	NA	<0.43	<0.4	<0.43	<0.2	2.5 J	<0.14
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	NA	NA	<0.23	<0.33	<0.78	0.89 J	0.79 J	<0.47
1,2,3,6,7,8-Hexachlordibenzo-p-dioxin	ng/kg	NA	NA	<0.28	<0.48	<0.8	2.4 J	2.4 J	<0.4
1,2,3,7,8,9-Hexachlordibenzo-p-dioxin	ng/kg	NA	NA	<0.24	<0.36	<0.65	1.6 J	1.3 J	<0.28
1,2,3,7,8,9-Hexachlorodibenzofuran	ng/kg	NA	NA	<0.33	<0.39	<0.49	<0.25	1.6 J	<0.47
1,2,3,7,8-Pentachlordibenzo-p-dioxin	ng/kg	NA	NA	<0.27	<0.28	<0.97	0.7 I	1.5 J	<0.51
2,3,4,6,7,8-Hexachlorodibenzofuran	ng/kg	NA	NA	<0.19	<0.28	<0.46	3.8 J	8.1	<0.18
2,3,4,7,8-Pentachlorodibenzofuran	ng/kg	NA	NA	<0.37	<0.23	<0.65	4 J	11	0.78 J
2,3,7,8-TCDD	ng/kg	NA	NA	<0.49	<0.5	<0.707	0.51 UJ	23 J	<0.721
Heptachlorodibenzofuran	ng/kg	NA	NA	1.6 J	<0.29	<0.65	40	22	1.2 J
Heptachlorodibenzo-p-dioxin	ng/kg	NA	NA	9.1	2.2 J	3 J	73	55	5.6 J
Hexachloridibenzo-p-dioxin	ng/kg	NA	NA	0.65 J	<0.39	<0.74	19	20	1.3 J
Hexachlorodibenzofuran	ng/kg	NA	NA	<0.35	<0.35	<0.47	58	110	4.4 J
Octachlorodibenzofuran	ng/kg	NA	NA	<0.96	0.69 J	<1.3	26	8.8 J	<0.64
Octachlorodibenzo-p-dioxin	ng/kg	NA	NA	270	150	24 B	820	1400	250
Pentachlorodibenzofuran	ng/kg	NA	NA	<0.31	<0.24	<0.57	37	100	3.8 J
Pentachlorodibenzo-p-dioxin	ng/kg	NA	NA	<0.27	<0.28	<0.97	<0.27	9.9	<0.51
Tetrachlorodibenzofuran, Total	ng/kg	NA	NA	<0.36	<0.38	<0.58	8.5 J	0.39 UJ	3.7
Tetrachlorodibenzo-p-dioxin	ng/kg	NA	NA	<0.49	<0.5	<0.707	<0.51	<0.58	<0.721
General Chemistry									
Chloride	mg/kg	<11.8	<12	<12.8	15.6	135	<12.9	<12	<12.9
Sulfate	mg/kg	<11.8	13.8	<12.8	29.3	113	<12.9	<12	15.9
Volatiles									
Methylene chloride	mg/kg	NA	NA	<.00639	<.00579	<.0058	0.00696	<.00619	0.00803

Table B-1
Detected Parameters in Soil and Sediment
LHAAP-49

	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SB35	49SB36	49SB36	49SB36	49SB51	49SB51	49SB51	49SB51	49SB52
	Sample Date:	12/7/2000	12/7/2000	12/7/2000	12/7/2000	12/16/2004	12/16/2004	12/16/2004	12/16/2004	12/16/2004
	Sample ID:	49SB35(3-5)	49SB36(0-0_5)	49SB36(1-3)	49SB36(3-5)	49SB51-001	49SB51-001-QC	49SB51-002	49SB51-002-QC	49SB52-001
	Start Depth:	3	0	1	3	0	0	3	3	0
	End Depth:	5	0.5	3	5	0.5	0.5	4	4	0.5
	Sample Type:	REG	REG	REG	REG	REG	FD	REG	FD	REG
PARAMETER	UNITS									
Metals										
Aluminum	mg/kg	13600 J	10800 J	8710 J	10100 J	NA	NA	NA	NA	NA
Arsenic	mg/kg	2.87	3.37	3.86	2.15	NA	NA	NA	NA	NA
Barium	mg/kg	327 J	89.6 J	1050 J	81.2 J	NA	NA	NA	NA	NA
Beryllium	mg/kg	1.02	0.538	2.13	0.503	NA	NA	NA	NA	NA
Cadmium	mg/kg	0.233 J	0.202 J	0.682	0.254 J	NA	NA	NA	NA	NA
Calcium	mg/kg	1460	2490	848	2490	NA	NA	NA	NA	NA
Chromium	mg/kg	25.2	17.9	17.8	19.2	NA	NA	NA	NA	NA
Cobalt	mg/kg	18.4	6.97	14.8	9.36	NA	NA	NA	NA	NA
Copper	mg/kg	24.3	16.1	23.6	20.6	NA	NA	NA	NA	NA
Iron	mg/kg	20300	17200	66300	16400	NA	NA	NA	NA	NA
Lead	mg/kg	24.1	374	15.2	147	76.4	56.6	13.8	14.5	9.65
Magnesium	mg/kg	4620 J	3110	2240	4520	NA	NA	NA	NA	NA
Manganese	mg/kg	258	200 J	428 J	193 J	NA	NA	NA	NA	NA
Mercury	mg/kg	0.0639	0.0752	<0.047	0.108	0.0225 J	0.0234 J	0.0257 J	0.0531 J	0.0335 J
Nickel	mg/kg	33.4	20.8	54.8	25.4	NA	NA	NA	NA	NA
Potassium	mg/kg	1060 J	954 J	491 J	910 J	NA	NA	NA	NA	NA
Selenium	mg/kg	1.07 J	0.826 J	0.801 J	<0.53	NA	NA	NA	NA	NA
Silver	mg/kg	<0.12	<0.12	<0.12	0.13 J	NA	NA	NA	NA	NA
Sodium	mg/kg	118 J	<60	<59	<53	NA	NA	NA	NA	NA
Strontium	mg/kg	45.8	29.7	51.5	46.8	NA	NA	NA	NA	NA
Thallium	mg/kg	<1.2	<1.2	<1.2	<1.1	NA	NA	NA	NA	NA
Vanadium	mg/kg	28.6	26.2	27.5	25	NA	NA	NA	NA	NA
Zinc	mg/kg	87	52.7	113	66.8	NA	NA	NA	NA	NA
Pesticides										
1,2,4,5-Tetrachloro-benzene	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDD	mg/kg	<.0037	<.0038	<.0037	<.0034	NA	NA	NA	NA	NA
4,4'-DDE	mg/kg	<.0037	<.0038	<.0037	<.0034	NA	NA	NA	NA	NA
4,4'-DDT	mg/kg	<.0037	<.0038	<.0037	<.0034	NA	NA	NA	NA	NA
alpha-Chlordane	mg/kg	<.0037	<.0038	<.0037	<.0034	NA	NA	NA	NA	NA
cis-nonachlor	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	mg/kg	<.0037	<.0038	<.0037	<.0034	NA	NA	NA	NA	NA
o,p'-DDD	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
o,p'-DDT	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Polychlorinated biphenyls	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table B-1
Detected Parameters in Soil and Sediment
LHAAP-49

	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SB35	49SB36	49SB36	49SB36	49SB51	49SB51	49SB51	49SB51	49SB52
	Sample Date:	12/7/2000	12/7/2000	12/7/2000	12/7/2000	12/16/2004	12/16/2004	12/16/2004	12/16/2004	12/16/2004
	Sample ID:	49SB35(3-5)	49SB36(0-0_5)	49SB36(1-3)	49SB36(3-5)	49SB51-001	49SB51-001-QC	49SB51-002	49SB51-002-QC	49SB52-001
	Start Depth:	3	0	1	3	0	0	3	3	0
	End Depth:	5	0.5	3	5	0.5	0.5	4	4	0.5
	Sample Type:	REG	REG	REG	REG	REG	FD	REG	FD	REG
PARAMETER	UNITS									
Dioxins/Furans										
1,2,3,4,6,7,8-Heptachlorodibenzofuran	ng/kg	<1.2	14 B	1.4 BJ	<1.5	NA	NA	NA	NA	NA
1,2,3,4,6,7,8-HpCDD	ng/kg	1.4 J	38	2.8 BJ	24	NA	NA	NA	NA	NA
1,2,3,4,7,8,9-Heptachlorodibenzofuran	ng/kg	<1.1	4.9 J	<1	<3	NA	NA	NA	NA	NA
1,2,3,4,7,8-Hexachlorodibenzofuran	ng/kg	<0.97	13	<0.76	<0.65	NA	NA	NA	NA	NA
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	<0.63	2.1 J	<0.84	<1.2	NA	NA	NA	NA	NA
1,2,3,6,7,8-Hexachlordibenzo-p-dioxin	ng/kg	<0.78	9.2	<0.94	<1.1	NA	NA	NA	NA	NA
1,2,3,7,8,9-Hexachlordibenzo-p-dioxin	ng/kg	<0.69	4.8 J	<0.71	<0.97	NA	NA	NA	NA	NA
1,2,3,7,8,9-Hexachlorodibenzofuran	ng/kg	<0.83	8.2	<0.67	<0.76	NA	NA	NA	NA	NA
1,2,3,7,8-Pentachlordibenzo-p-dioxin	ng/kg	<0.59	4.5 J	<0.91	<1.3	NA	NA	NA	NA	NA
2,3,4,6,7,8-Hexachlorodibenzofuran	ng/kg	<1.1	22	<0.35	<0.91	NA	NA	NA	NA	NA
2,3,4,7,8-Pentachlorodibenzofuran	ng/kg	<0.9	33	<0.43	<1.1	NA	NA	NA	NA	NA
2,3,7,8-TCDD	ng/kg	<0.741	<0.901	<0.812	<0.829	NA	NA	NA	NA	NA
Heptachlorodibenzofuran	ng/kg	11 J	43 UB	6.2 BJ	<2.2	NA	NA	NA	NA	NA
Heptachlorodibenzo-p-dioxin	ng/kg	1.4 J	66	5.5 BJ	51	NA	NA	NA	NA	NA
Hexachloridibenzo-p-dioxin	ng/kg	<0.7	73	3.6 J	1.6 J	NA	NA	NA	NA	NA
Hexachlorodibenzofuran	ng/kg	<0.98	360	<0.56	<0.73	NA	NA	NA	NA	NA
Octachlorodibenzofuran	ng/kg	6.9 J	13 UB	<3.9	9.9 UB	NA	NA	NA	NA	NA
Octachlorodibenzo-p-dioxin	ng/kg	27 B	4400	350 B	7200	NA	NA	NA	NA	NA
Pentachlorodibenzofuran	ng/kg	<0.79	250	2.1 J	<1.1	NA	NA	NA	NA	NA
Pentachlorodibenzo-p-dioxin	ng/kg	<0.59	50	<0.91	<1.3	NA	NA	NA	NA	NA
Tetrachlorodibenzofuran, Total	ng/kg	<0.52	85	1.2	<0.829	NA	NA	NA	NA	NA
Tetrachlorodibenzo-p-dioxin	ng/kg	<0.741	5.7	<0.812	<0.829	NA	NA	NA	NA	NA
General Chemistry										
Chloride	mg/kg	<12.9	<12.6	<12	<11.5	NA	NA	NA	NA	NA
Sulfate	mg/kg	53.7	<12.6	<12	<11.5	NA	NA	NA	NA	NA
Volatiles										
Methylene chloride	mg/kg	0.00686	<.0063	<.0062	<.00575	NA	NA	NA	NA	NA

Table B-1
Detected Parameters in Soil and Sediment
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	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SB52	49SB53	49SB53	49SB54	49SB54	49SB55	49SB55	49SB56	49SB56	49SB57
	Sample Date:	12/16/2004	12/16/2004	12/16/2004	12/16/2004	12/16/2004	12/16/2004	12/16/2004	12/17/2004	12/17/2004	12/17/2004
	Sample ID:	49SB52-002	49SB53-001	49SB53-002	49SB54-001	49SB54-002	49SB55-001	49SB55-002	49SB56-001	49SB56-002	49SB57-001
	Start Depth:	3	0	3	0	3	0	3	0	3	0
	End Depth:	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5
	Sample Type:	REG	REG	REG	REG	REG	REG	REG	REG	REG	REG
PARAMETER	UNITS										
Metals											
Aluminum	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	mg/kg	9.78	356	5.48	218	9.62	13.2	9.92	46.1	10.4	8.81
Magnesium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	mg/kg	0.0478 J	0.0580 J	<0.257	0.0475 J	0.0478 J	0.0359 BJ	0.0214 BJ	0.0301 BJ	0.00827 BJ	0.0143 BJ
Nickel	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Strontium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides											
1,2,4,5-Tetrachloro-benzene	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDD	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-nonachlor	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
o,p'-DDD	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
o,p'-DDT	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Polychlorinated biphenyls	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table B-1
Detected Parameters in Soil and Sediment
LHAAP-49

	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SB52	49SB53	49SB53	49SB54	49SB54	49SB55	49SB55	49SB56	49SB56	49SB57
	Sample Date:	12/16/2004	12/16/2004	12/16/2004	12/16/2004	12/16/2004	12/16/2004	12/16/2004	12/17/2004	12/17/2004	12/17/2004
	Sample ID:	49SB52-002	49SB53-001	49SB53-002	49SB54-001	49SB54-002	49SB55-001	49SB55-002	49SB56-001	49SB56-002	49SB57-001
	Start Depth:	3	0	3	0	3	0	3	0	3	0
	End Depth:	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5
	Sample Type:	REG	REG	REG	REG	REG	REG	REG	REG	REG	REG
PARAMETER	UNITS										
Dioxins/Furans											
1,2,3,4,6,7,8-Heptachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,6,7,8-HpCDD	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8,9-Heptachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,6,7,8-Hexachlordibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-Hexachlordibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8-Pentachlordibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,6,7,8-Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,7,8-Pentachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,7,8-TCDD	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachloridibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Octachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Octachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachlorodibenzofuran, Total	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
General Chemistry											
Chloride	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Volatiles											
Methylene chloride	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table B-1
Detected Parameters in Soil and Sediment
LHAAP-49

	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SB57	49SB58	49SB58	49SB59	49SB59	49SB60	49SB60	49SB61	49SB61
	Sample Date:	12/17/2004	12/17/2004	12/17/2004	12/17/2004	12/17/2004	12/17/2004	12/17/2004	12/17/2004	12/17/2004
	Sample ID:	49SB57-002	49SB58-001	49SB58-002	49SB59-001	49SB59-002	49SB60-001	49SB60-002	49SB61-001	49SB61-001-QC
	Start Depth:	3	0	3	0	3	0	3	0	0
	End Depth:	4	0.5	4	0.5	4	0.5	4	0.5	0.5
	Sample Type:	REG	REG	REG	REG	REG	REG	REG	REG	FD
PARAMETER	UNITS									
Metals										
Aluminum	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	mg/kg	11.1	366	8.33	6.53	7.24	10.9	7.46	22.1 J	10.2 J
Magnesium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	mg/kg	0.0381 BJ	0.0752 J	0.114 J	0.0695 J	0.00976 BJ	0.0836 J	0.0617 J	0.0545 BJ	0.0463 BJ
Nickel	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Strontium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides										
1,2,4,5-Tetrachloro-benzene	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDD	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-nonachlor	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
o,p'-DDD	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
o,p'-DDT	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Polychlorinated biphenyls	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table B-1
Detected Parameters in Soil and Sediment
LHAAP-49

	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SB57	49SB58	49SB58	49SB59	49SB59	49SB60	49SB60	49SB61	49SB61
	Sample Date:	12/17/2004	12/17/2004	12/17/2004	12/17/2004	12/17/2004	12/17/2004	12/17/2004	12/17/2004	12/17/2004
	Sample ID:	49SB57-002	49SB58-001	49SB58-002	49SB59-001	49SB59-002	49SB60-001	49SB60-002	49SB61-001	49SB61-001-QC
	Start Depth:	3	0	3	0	3	0	3	0	0
	End Depth:	4	0.5	4	0.5	4	0.5	4	0.5	0.5
	Sample Type:	REG	REG	REG	REG	REG	REG	REG	REG	FD
PARAMETER	UNITS									
Dioxins/Furans										
1,2,3,4,6,7,8-Heptachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,6,7,8-HpCDD	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8,9-Heptachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,6,7,8-Hexachlordibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-Hexachlordibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8-Pentachlordibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,6,7,8-Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,7,8-Pentachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,7,8-TCDD	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachloridibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Octachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Octachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachlorodibenzofuran, Total	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
General Chemistry										
Chloride	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Volatiles										
Methylene chloride	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table B-1
Detected Parameters in Soil and Sediment
LHAAP-49

	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SB61	49SS37	49SS38	49SS39	49SS45	49SS47	49SS47
	Sample Date:	12/17/2004	6/24/2004	6/24/2004	6/24/2004	6/24/2004	6/24/2004	6/24/2004
	Sample ID:	49SB61-002	49SS37	49SS38	49SS39	49SS45	49SS47	49SS47QC
	Start Depth:	3	0	0	0	0	0	0
	End Depth:	4	0.5	0.5	0.5	0.5	0.5	0.5
	Sample Type:	REG	REG	REG	REG	REG	REG	FD
PARAMETER	UNITS							
Metals								
Aluminum	mg/kg	NA	NA	NA	NA	NA	NA	NA
Arsenic	mg/kg	NA	NA	NA	NA	NA	NA	NA
Barium	mg/kg	NA	NA	NA	NA	NA	NA	NA
Beryllium	mg/kg	NA	NA	NA	NA	NA	NA	NA
Cadmium	mg/kg	NA	NA	NA	NA	NA	NA	NA
Calcium	mg/kg	NA	NA	NA	NA	NA	NA	NA
Chromium	mg/kg	NA	NA	NA	NA	NA	NA	NA
Cobalt	mg/kg	NA	NA	NA	NA	NA	NA	NA
Copper	mg/kg	NA	NA	NA	NA	NA	NA	NA
Iron	mg/kg	NA	NA	NA	NA	NA	NA	NA
Lead	mg/kg	13.4 J	7.06 J	12.4 J	10.0 J	12.0 J	36.1 J	38.2 J
Magnesium	mg/kg	NA	NA	NA	NA	NA	NA	NA
Manganese	mg/kg	NA	NA	NA	NA	NA	NA	NA
Mercury	mg/kg	0.0382 BJ	0.0416	0.28	0.035	0.0494	3.76	3.78
Nickel	mg/kg	NA	NA	NA	NA	NA	NA	NA
Potassium	mg/kg	NA	NA	NA	NA	NA	NA	NA
Selenium	mg/kg	NA	NA	NA	NA	NA	NA	NA
Silver	mg/kg	NA	NA	NA	NA	NA	NA	NA
Sodium	mg/kg	NA	NA	NA	NA	NA	NA	NA
Strontium	mg/kg	NA	NA	NA	NA	NA	NA	NA
Thallium	mg/kg	NA	NA	NA	NA	NA	NA	NA
Vanadium	mg/kg	NA	NA	NA	NA	NA	NA	NA
Zinc	mg/kg	NA	NA	NA	NA	NA	NA	NA
Pesticides								
1,2,4,5-Tetrachloro-benzene	mg/kg	NA	NA	NA	NA	NA	NA	NA
4,4'-DDD	mg/kg	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	mg/kg	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	mg/kg	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	mg/kg	NA	NA	NA	NA	NA	NA	NA
cis-nonachlor	mg/kg	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	mg/kg	NA	NA	NA	NA	NA	NA	NA
o,p'-DDD	mg/kg	NA	NA	NA	NA	NA	NA	NA
o,p'-DDT	mg/kg	NA	NA	NA	NA	NA	NA	NA
Polychlorinated biphenyls	mg/kg	NA	NA	NA	NA	NA	NA	NA

Table B-1
Detected Parameters in Soil and Sediment
LHAAP-49

	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SB61	49SS37	49SS38	49SS39	49SS45	49SS47	49SS47
	Sample Date:	12/17/2004	6/24/2004	6/24/2004	6/24/2004	6/24/2004	6/24/2004	6/24/2004
	Sample ID:	49SB61-002	49SS37	49SS38	49SS39	49SS45	49SS47	49SS47QC
	Start Depth:	3	0	0	0	0	0	0
	End Depth:	4	0.5	0.5	0.5	0.5	0.5	0.5
	Sample Type:	REG	REG	REG	REG	REG	REG	FD
PARAMETER	UNITS							
Dioxins/Furans								
1,2,3,4,6,7,8-Heptachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,6,7,8-HpCDD	ng/kg	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8,9-Heptachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA
1,2,3,6,7,8-Hexachlordibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-Hexachlordibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8-Pentachlordibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA
2,3,4,6,7,8-Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA
2,3,4,7,8-Pentachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA
2,3,7,8-TCDD	ng/kg	NA	NA	NA	NA	NA	NA	NA
Heptachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA
Heptachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA
Hexachloridibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA
Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA
Octachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA
Octachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA
Pentachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA
Pentachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA
Tetrachlorodibenzofuran, Total	ng/kg	NA	NA	NA	NA	NA	NA	NA
Tetrachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA
General Chemistry								
Chloride	mg/kg	NA	NA	NA	NA	NA	NA	NA
Sulfate	mg/kg	NA	NA	NA	NA	NA	NA	NA
Volatiles								
Methylene chloride	mg/kg	NA	NA	NA	NA	NA	NA	NA

Table B-1
Detected Parameters in Soil and Sediment
LHAAP-49

	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SS48	49SS49	49SS50	FWS-029	49SD62	49SD63	49SD64	49SD64	49SD65
	Sample Date:	6/24/2004	6/24/2004	6/24/2004	10/2/2002	12/19/2004	12/19/2004	12/19/2004	12/19/2004	12/19/2004
	Sample ID:	49SS48	49SS49	49SS50	C-SS-029	49SD62	49SD63	49SD64	49SD64-QC	49SD65
	Start Depth:	0	0	0	0	0	0	0	0	0
	End Depth:	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Sample Type:	REG	REG	REG	REG	REG	REG	REG	FD	REG
PARAMETER	UNITS									
Metals										
Aluminum	mg/kg	NA	NA	NA	12620 nv	NA	NA	NA	NA	NA
Arsenic	mg/kg	NA	NA	NA	3.42 nv	NA	NA	NA	NA	NA
Barium	mg/kg	NA	NA	NA	214 J	NA	NA	NA	NA	NA
Beryllium	mg/kg	NA	NA	NA	.787 nv	NA	NA	NA	NA	NA
Cadmium	mg/kg	NA	NA	NA	.706 JH	NA	NA	NA	NA	NA
Calcium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	mg/kg	NA	NA	NA	19.2 J	NA	NA	NA	NA	NA
Cobalt	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	mg/kg	NA	NA	NA	13.8 nv	NA	NA	NA	NA	NA
Iron	mg/kg	NA	NA	NA	24420 nv	NA	NA	NA	NA	NA
Lead	mg/kg	39.5 J	1120 J	123 J	51.9 nv	28.2 J	21.4 J	57.4 J	16.5 J	193 J
Magnesium	mg/kg	NA	NA	NA	3163 J	NA	NA	NA	NA	NA
Manganese	mg/kg	NA	NA	NA	1171 nv	NA	NA	NA	NA	NA
Mercury	mg/kg	0.107	0.216	0.127	.117 nv	0.0750 J	0.0268 BJ	0.0373 BJ	0.0679 BJ	778
Nickel	mg/kg	NA	NA	NA	28.3 nv	NA	NA	NA	NA	NA
Potassium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	mg/kg	NA	NA	NA	.508 nv	NA	NA	NA	NA	NA
Silver	mg/kg	NA	NA	NA	.203 nv	NA	NA	NA	NA	NA
Sodium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Strontium	mg/kg	NA	NA	NA	63.2 nv	NA	NA	NA	NA	NA
Thallium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	mg/kg	NA	NA	NA	23.3 JL	NA	NA	NA	NA	NA
Zinc	mg/kg	NA	NA	NA	92.4 nv	NA	NA	NA	NA	NA
Pesticides										
1,2,4,5-Tetrachloro-benzene	mg/kg	NA	NA	NA	.00309 nv	NA	NA	NA	NA	NA
4,4'-DDD	mg/kg	NA	NA	NA	.0004 nv	NA	NA	NA	NA	NA
4,4'-DDE	mg/kg	NA	NA	NA	.00546 nv	NA	NA	NA	NA	NA
4,4'-DDT	mg/kg	NA	NA	NA	.000467 nv	NA	NA	NA	NA	NA
alpha-Chlordane	mg/kg	NA	NA	NA	.00113 nv	NA	NA	NA	NA	NA
cis-nonachlor	mg/kg	NA	NA	NA	.000814 nv	NA	NA	NA	NA	NA
Endosulfan II	mg/kg	NA	NA	NA	.000705 nv	NA	NA	NA	NA	NA
o,p'-DDD	mg/kg	NA	NA	NA	.0013 B	NA	NA	NA	NA	NA
o,p'-DDT	mg/kg	NA	NA	NA	.000343 nv	NA	NA	NA	NA	NA
Polychlorinated biphenyls	mg/kg	NA	NA	NA	.0275 J	NA	NA	NA	NA	NA

Table B-1
Detected Parameters in Soil and Sediment
LHAAP-49

	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
	Location Code:	49SS48	49SS49	49SS50	FWS-029	49SD62	49SD63	49SD64	49SD64	49SD65
	Sample Date:	6/24/2004	6/24/2004	6/24/2004	10/2/2002	12/19/2004	12/19/2004	12/19/2004	12/19/2004	12/19/2004
	Sample ID:	49SS48	49SS49	49SS50	C-SS-029	49SD62	49SD63	49SD64	49SD64-QC	49SD65
	Start Depth:	0	0	0	0	0	0	0	0	0
	End Depth:	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Sample Type:	REG	REG	REG	REG	REG	REG	REG	FD	REG
PARAMETER	UNITS									
Dioxins/Furans										
1,2,3,4,6,7,8-Heptachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,6,7,8-HpCDD	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8,9-Heptachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,6,7,8-Hexachlordibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-Hexachlordibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8-Pentachlordibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,6,7,8-Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,7,8-Pentachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,7,8-TCDD	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachloridibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Octachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Octachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorodibenzofuran	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachlorodibenzofuran, Total	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachlorodibenzo-p-dioxin	ng/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
General Chemistry										
Chloride	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Volatiles										
Methylene chloride	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Units for Start Depth and End Depth are feet below ground surface.

FD field duplicate
J estimated concentration
mg/kg milligrams per kilogram
NA not analyzed
ng/kg nanograms per kilogram
REG regular

Table B-2
Detected Parameters in Groundwater and Surface Water
LHAAP-49

PARAMETER	UNITS	Associated Site:	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49	AREA 49
		Location Code:	49SW62	49SW62	49WW01	49WW01	49WW01	49WW02	49WW02
		Sample Date:	12/19/2004	12/19/2004	12/7/1998	12/7/1998	12/20/2000	12/8/1998	12/20/2000
		Sample ID:	49SW62	49SW62-QC	49WW01-981207	49WW01QC	49WW01-001220	49WW02-981208	49WW02-001220
		Sample Type:	REG	FD	REG	FD	REG	REG	REG
		Sample Zone:	N/A	N/A	SHALLOW	SHALLOW	SHALLOW	SHALLOW	SHALLOW
		FILTERED	Result	Result	Result	Result	Result	Result	Result
Dioxins/ Furans									
Heptachlorodibenzofuran	pg/L	N	NA	NA	NA	NA	<9	NA	<7.5
Octachlorodibenzofuran	pg/L	N	NA	NA	NA	NA	18 J	NA	11 J
Octachlorodibenzo-p-dioxin	pg/L	N	NA	NA	NA	NA	37 J	NA	33 J
Tetrachlorodibenzofuran, Total	pg/L	N	NA	NA	NA	NA	<9.9	NA	<7.3
General Chemistry									
Chloride	ug/L	N	NA	NA	1420000	1330000	NA	545000	NA
Nitrate / Nitrite	ug/L	N	NA	NA	<100	<100	NA	24000	NA
Sulfate	ug/L	N	NA	NA	2200000	2100000	NA	1200000	NA
Metals									
Aluminum	ug/L	N	NA	NA	<200	<200	544	<200	<50
Antimony	ug/L	N	NA	NA	15	<5	<5	12	<5
Barium	ug/L	N	NA	NA	<200	<200	28.6	<200	41
Cadmium	ug/L	N	NA	NA	<.8	<.8	3.8	<.8	<1
Calcium	ug/L	N	NA	NA	590000	610000	495000	280000	268000
Chromium	ug/L	N	NA	NA	50	30	110	10	14.5
Cobalt	ug/L	N	NA	NA	<50	<50	10.4	<50	<10
Copper	ug/L	N	NA	NA	33	<25	13.2 J	<25	10 UJ
Iron	ug/L	N	NA	NA	2000	1800	1330	870	184
Lead	ug/L	N	<5	13.6	<3	<3	<3	<3	<3
Magnesium	ug/L	N	NA	NA	450000	480000	361000	210000	198000
Manganese	ug/L	N	NA	NA	2470	2590	1410	235	550
Nickel	ug/L	N	NA	NA	140	130	186 J	<40	611 J
Potassium	ug/L	N	NA	NA	6900	7200	5300	7000	6860
Selenium	ug/L	N	NA	NA	<5	<5	13	<5	<10
Sodium	ug/L	N	NA	NA	590000	610000	520000	340000	341000
Strontium	ug/L	N	NA	NA	36000	38000	13200	17000	9740
Thallium	ug/L	N	NA	NA	1 UJ	1.2 J	<5	1 UJ	<5
Zinc	ug/L	N	NA	NA	50	50	14.1 J	30	10 UJ
Volatiles									
Carbon tetrachloride	ug/L	N	NA	NA	<1	<1	<0.1	1	1.54
Chloroform	ug/L	N	NA	NA	0.55 J	0.53 J	<0.1	0.56 J	0.9 J

Table B-2
Detected Parameters in Groundwater and Surface Water
LHAAP-49

PARAMETER	UNITS	Associated Site: / Location Code: / Sample Date: / Sample ID: / Sample Type: / Sample Zone: / FILTERED	AREA 49 / 49WW03 / 12/7/1998 / 49WW03L / REG / SHALLOW / Result	AREA 49 / 49WW03 / 12/20/2000 / 49WW03-001220 / REG / SHALLOW / Result	AREA 49 / 49WW03 / 12/20/2000 / 49WW03QC / FD / SHALLOW / Result
Dioxins/ Furans					
Heptachlorodibenzofuran	pg/L	N	NA	<6.8	22 J
Octachlorodibenzofuran	pg/L	N	NA	41 J	<30
Octachlorodibenzo-p-dioxin	pg/L	N	NA	32 J	<26
Tetrachlorodibenzofuran, Total	pg/L	N	NA	<6.9	15
General Chemistry					
Chloride	ug/L	N	1670000	NA	NA
Nitrate / Nitrite	ug/L	N	<100	NA	NA
Sulfate	ug/L	N	420000	NA	NA
Metals					
Aluminum	ug/L	N	500	52.1 J	<50
Antimony	ug/L	N	<5	<5	<5
Barium	ug/L	N	<200	96.4	93
Cadmium	ug/L	N	1.4	3.74	2.65
Calcium	ug/L	N	390000	331000	322000
Chromium	ug/L	N	220	499	495
Cobalt	ug/L	N	<50	23.4	23.9
Copper	ug/L	N	<25	14.4 J	12.7 J
Iron	ug/L	N	2900	3850	4010
Lead	ug/L	N	4	<3	<3
Magnesium	ug/L	N	360000	289000	278000
Manganese	ug/L	N	3030	2800	2800
Nickel	ug/L	N	290	946 J	1000 J
Potassium	ug/L	N	6800	6110	6040
Selenium	ug/L	N	6	16.6	16.5
Sodium	ug/L	N	580000	505000	493000
Strontium	ug/L	N	27000	10300	10200
Thallium	ug/L	N	1.1 J	<5	<5
Zinc	ug/L	N	40	10 UJ	10 UJ
Volatiles					
Carbon tetrachloride	ug/L	N	<1	<0.1	<0.1
Chloroform	ug/L	N	<1	<0.1	<0.1

Notes:

FD	field duplicate
J	estimated concentration
N	not filtered
NA	not analyzed
N/A	not applicable
pg/L	picograms per liter
REG	regular
U	below reporting limit
µg/L	micrograms per liter

Appendix C

Baseline Human Health Risk Assessment

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List of Tables

List of Attachments

Acronyms and Abbreviations

µg/L	micrograms per liter
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
COC	contaminant of concern; chain-of-custody
COPCs	chemicals of potential concern
EE/CA	Engineering Evaluation/Cost Analysis
ft bgs	feet below ground surface
HI	hazard index
Jacobs	Jacobs Engineering Group, Inc.
LHAAP	Longhorn Army Ammunition Plant
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
OSWER	Office of Solid Waste and Emergency Response
PCB	polychlorinated biphenyl
RBSV	Risk-Based Screening Value
RCRA	Resource Conservation and Recovery Act
Shaw	Shaw Environmental, Inc.
TAC	Texas Administrative Code
TCDD	tetrachlorodibenzo-p-dioxin
TCEQ	Texas Commission on Environmental Quality
TEF	toxicity equivalent factor
TEQ	toxicity equivalent quotient
TNT	2,4,6-trinitrotoluene
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound
WRS	Wilcoxon Rank Sum

1.0 Introduction

This appendix presents the baseline human health risk assessment (HHRA) for industrial use of Longhorn Army Ammunition Plant (LHAAP)-49. The results of this risk assessment support the Site Evaluation Report provided in the main volume.

The assessment of potential risk associated with industrial use (current trespassers or future maintenance workers) at LHAAP-49 and ecological receptors has been reported previously (Jacobs Engineering Group, Inc. [Jacobs], 2002; Shaw, 2007a). This HHRA for LHAAP-49 is intended to supplement the information presented in the industrial HHRA prepared by Jacobs (2002) by including results of sampling and analysis conducted by the U.S. Fish and Wildlife Service (USFWS) in 2002, the U.S. Army Corps of Engineers (USACE) in 2004, and Shaw Environmental, Inc., (Shaw) in December 2004. This assessment will provide risk managers current information to evaluate the need for response action at LHAAP-49.

The same methods employed for the Jacobs (2002) industrial HHRA were employed in this HHRA for industrial assessment, so that the assessments are comparable and, when considered together, represent a comprehensive industrial human health risk assessment for LHAAP-49.

This risk assessment has been conducted using data reported in the assessment for industrial land use (Jacobs, 2002) as supplemented by data from USFWS, USACE, and Shaw events described in the body of this report. **Section 2** describes changes to the data set and the effect on the conclusions of the Jacobs (2002) risk assessment for industrial use of LHAAP-49. **Sections 2.1** and **2.2** describe changes to the data set and data evaluation methods. **Section 2.2** describes data reduction methods and **Section 2.3** describes evaluation of dioxin and furan data. **Section 2.4** describes identification of Chemicals of Potential Concern (COPCs) for LHAAP-49. **Section 2.5** compares COPCs identified in this assessment with the previous industrial risks assessment.

Section 3 discusses additional uncertainties beyond those discussed in the 2002 risk assessment.

Section 4 summarizes the conclusions of the industrial risk assessment.

Section 5 provides a list of the references cited in this assessment.

2.0 Baseline Risk Assessment for Industrial Land Use

The Jacobs (2002) assessment of potential risk associated with industrial use of LHAAP-49 evaluated the exposure of current trespassers and hypothetical future maintenance workers at the site. It was assumed that the current trespasser could be exposed to COPCs in soil within 0 to 0.5 feet below ground surface (bgs). It was assumed that the hypothetical future maintenance worker would be exposed to COPCs in soil within 0 to 0.5 feet bgs or in soil within 0 to 2 feet bgs, and in groundwater used as a drinking water source.

The Jacobs assessment identified aluminum, lead, manganese, mercury, vanadium, and dioxins as COPCs in soil at 0 to 0.5 feet bgs and at 0 to 2 feet bgs. Antimony, chromium, manganese, nickel, strontium, thallium, and dioxins were identified as COPCs in groundwater.

The incremental lifetime cancer risk (ILCR) estimated for the current trespasser was within the acceptable range of 1E-06 to 1E-04 established by U.S. Environmental Protection Agency (USEPA) guidance (1994a). The estimated non-cancer hazard index (HI) was below 1, which is considered acceptable (USEPA, 1994a).

The cancer risk and non-cancer hazard estimated for the hypothetical future maintenance worker potentially exposed to COPCs in soil 0 to 2 feet bgs were within the acceptable range.

The cancer risk estimated for hypothetical future maintenance worker exposures to COPCs in groundwater equaled the upper value of the acceptable risk range (1E-04). The cancer risk is associated with dioxins, primarily through the dermal contact pathway, with a minor contribution from the ingestion pathway. The estimated non-cancer HI exceeded the acceptable level of 1 for the worker exposure to groundwater. The non-cancer hazard was associated with manganese, strontium, nickel, and antimony, with a minor contribution from thallium. The entire non-cancer hazard was associated with the ingestion pathway.

2.1 Changes to the Previous Data Set

This assessment for LHAAP-49 is intended to supplement the Jacobs (2002) industrial assessment by including results of the sampling and analysis effort conducted after that assessment. The Jacobs (2002) industrial risk assessment evaluated soil samples taken from 0 to 0.5 feet bgs and 0 to 2 feet bgs separately. Because the results of both assessments showed acceptable risk and hazard levels, the soil data from the two intervals were combined for this risk assessment. Those data were then combined with analytical data from samples collected by USFWS, USACE, and Shaw (see Section 2 of the main body of this report) and are evaluated here for industrial use of LHAAP-49.

For industrial land use assessments, surface soil is defined as soil 0 to 2 feet below ground surface (ft bgs); subsurface soil is defined as soil between 2 ft bgs and groundwater depth (TCEQ, 1998). The Jacobs (2002) industrial risk assessment included data from soil located 2 feet to 5 feet bgs to evaluate potential worker exposure to vapors from volatile COPCs. In this risk assessment the Jacobs (2002) combined data set, including data from 0 to 2 feet bgs, and samples located below 2 feet bgs are combined and evaluated to determine whether analytical data from the USFWS, USACE, and Shaw samples could affect the conclusions of Jacobs (2002). All data available for the LHAAP-49 assessments are from samples collected from 0 to 5 ft bgs.

Groundwater data consist of the analytical results from monitoring wells. Groundwater samples collected during different sampling events from the same well were treated as independent samples.

2.1.1 Data Evaluation

2.1.1.1 Evaluation of Analytical Methods

Soil and water samples were analyzed according to USEPA methods (USEPA 1983, 1992a). Evaluation of analytical data reported before June 2002 was described in the risk assessment for industrial land use (Jacobs, 2002). After June 2002, samples were collected and analyzed as described in the Installation-Wide Background Study Work Plan (Shaw, 2004a).

2.1.1.2 Summary of Sampling Data for Media of Interest

Surface soil (including sediment) and groundwater are the only two media evaluated in this risk assessment. Surface water was evaluated in the industrial HHRA (Jacobs, 2002), but no water bodies are located within the LHAAP-49 boundary and the surface water samples were apparently collected from low lying areas following rain events. Because surface water is ephemeral at this site, regular exposure to this medium by a worker or potential resident is unlikely, however, exposure to dry sediments is expected at these locations. Therefore, surface water is not included in this evaluation but sediment samples from these locations are included in the evaluation of soil exposures.

The Jacobs (2002) industrial risk assessment evaluated soil samples taken from 0 to 0.5 feet bgs and 0 to 2 feet bgs separately. Because the results of both assessments showed acceptable risk and hazard levels, the soil data from the two intervals were combined with data from analysis of the more recent samples, and the combined data set was used in this risk assessment. The soil within 0 to 2 feet bgs is defined as surface soil for industrial land use assessments (TCEQ, 1998).

Subsurface soil is defined in TCEQ (1998) guidance as soil from depths extending from 2 feet bgs to groundwater. Because risks associated with volatile organic compounds (VOCs) in soil samples taken below 5 feet bgs were evaluated previously and found to be acceptable (Jacobs,

2002), and no samples taken subsequently below 5 feet bgs were analyzed for VOCs, these risks were not re-evaluated in this risk assessment.

Groundwater data consist of the analytical results from monitoring wells. Groundwater samples collected during different sampling events from the same well were treated as independent samples.

Sixty-five surface soil samples (including sediment) were evaluated in this industrial risk assessment **(Table 2-1)**. Six groundwater samples were evaluated, including the data used in the Jacobs industrial HHRA (2002). The data used in this risk assessment are presented in **Tables 2-2** and **2-3** for soil and groundwater, respectively. Appendix B of the Final Site Evaluation Report contains the detected results used for this dataset.

2.2 Data Reduction

Analytical data were evaluated as follows:

- Samples with all validation qualifiers were included in the risk assessment except "R"-qualified data, which were rejected from the data set
- "B"-qualified data were treated as non-detects
- All non-detect samples were assigned a value equal to half the reporting limit
- Regular and field duplicate samples were averaged
- A more detailed discussion of data qualifiers and their interpretation is given in the Installation-Wide Background Study Work Plan (Shaw, 2004a)

2.3 Evaluation of Dioxins and Furans

Dioxins and furans were evaluated using the 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) toxicity equivalent quotient (TEQ) approach. Individual congener concentrations were multiplied by toxicity equivalency factors (TEF) recommended by Van den Berg et al. (1998), and then summed to get a 2,3,7,8-TCDD TEQ for a given sample.

2.4 Identification of Chemicals of Potential Concern for Industrial Use Assessment

The first step in a risk assessment is the selection of COPCs. The COPCs are chemicals that are detected in site media at concentrations that fail one or more highly conservative criteria designed to eliminate from further evaluation those chemicals that are unlikely to cause adverse effects.

The COPCs for the risk assessment were identified using the following criteria:

- Risk-Based Screening. A risk-based screening step was used to estimate whether chemicals would contribute significantly to human health risk. Chemicals with maximum detected concentrations (MDC) equal to or below risk-based screening concentrations were eliminated from further evaluation. The TCEQ risk-based screening values (RBSV) were used as the risk-based screening concentrations (TCEQ, 2006). The RBSVs are concentrations that are protective of human health exposure via ingestion, inhalation, and dermal absorption pathways at a 1E-06 target risk level for carcinogens and a 0.1 target hazard quotient for noncarcinogens. In cases where contaminants have both carcinogenic and non-cancer toxicity factors, the RBSV represents the lower (i.e., more conservative) value. The RBSVs are protective of residential land-use scenarios. When an RBSV was not available for a chemical, other sources were consulted to develop risk-based screening concentrations such as the USEPA Region 6 medium-specific screening levels (MSSLs) (USEPA, 2003).

- Essential human nutrients (i.e., calcium, chloride, iron, magnesium, phosphorus, potassium, and sodium) were eliminated as COPCs (TCEQ, 2001, 2003).

- Background. A comparison to site-specific background concentrations was used to determine whether detected chemicals were related to LHAAP operations. The LHAAP-specific background concentrations for soil were developed using data that represent background concentrations for surface (0 to 0.5 feet bgs) and subsurface (1.5 to 2.5 feet bgs) soil (Shaw, 2004b). These surface and subsurface soil data were combined to create a "total soil" background database.

Concentrations of chemicals in LHAAP-49 soil and groundwater samples were compared with LHAAP-49 specific background concentrations for those chemicals having at least one value that exceeds human health RBSVs. The comparisons used the Wilcoxon Rank Sum (WRS) test (USEPA, 2002a), the Quantile test (USEPA, 1994b), and box-and-whisker plots according to statistical methods described in USEPA guidance.

WRS Test

The WRS test is a nonparametric distributional test to determine if the background and site-related data sets can be assumed to have been drawn from the same population or have different medians with some allowable confidence. The WRS test has the advantage that it is valid with any shape of distribution and is less sensitive to the presence of non-detected concentrations and the assumed values assigned to them.

If the WRS test statistic yields a probability (p-level) greater than 0.05, it can be concluded that the medians of the background and site data sets are not different, and can be assumed to have been drawn from the same population. If the p-level is less than 0.05, it is concluded that the medians of the two distributions are significantly different at the 95 percent confidence level and if the site data are shifted higher relative to background, then contamination may be indicated.

Box-and-Whisker Comparison Plots

The box plot is a quick, robust graphical method recommended by the USEPA to visualize and compare two or more groups of data (USEPA, 1992b). These plots provide a summary view of the entire data set, including the overall location and degree of symmetry. The box encloses the central 50 percent of the data points so that the top of the box represents the 75th percentile and the bottom of the box represents the 25th percentile. The median of the data set is shown within the box. The upper and lower whiskers extend outward from the box to the maximum and minimum points, respectively. Non-detect results are set equal to the laboratory reporting limit for plotting purposes.

For each COPC chemical, box plots of site and background data are placed side by side to visually compare the distributions and qualitatively determine whether the data sets are different and confirm whether any difference identified by the WRS test indicates that site-related data are shifted higher or lower relative to background.

Quantile Test

As recommended in USEPA (1994b) guidance, the Quantile test was performed in parallel with the WRS test and box-and whisker plots to assess whether localized areas have significantly higher levels of contamination than background. Because the Quantile test detects differences in the upper tails of the two data sets, it can compare areas of elevated concentrations at a site that might indicate contamination.

The Quantile test is a test of the null hypothesis that the site data are not different from the background data with respect to the upper tails of the distributions. Because each of the above statistical tests has its advantages and disadvantages, the test results are applied and interpreted in parallel and are reported in **Attachment 1**.

The Quantile testing procedure used is as follows (USEPA 1994b):

- Specify the required Type I error rate (0.05) and then select the corresponding values from Table A-7 of USEPA, 1994b. When both the WRS test and Quantile tests are used in parallel, each test must be applied at the 97.5 percent confidence level (α = 0.025) to achieve 95 percent confidence in the conclusion (α = 0.05, USEPA, 1994b). The Table A-7 of USEPA (1994b) used in this assessment is reproduced in **Attachment 1**.
- Enter m and n (the number of background and site area samples, respectively) into Table A-7 to find the values of r (background area) and kTab (LHAAP-49) needed for the test. If the table has no value of r and kTab for the corresponding values of m and n, enter the closest values of m and n into the table that most closely approximates the desired confidence level (α). The r and kTab values for the number of background

samples (m=56) and LHAAP-49 samples (n=65) selected from Table A-7 are r = 6 and kTab = 6.

- Order the combined m + n (N) measurements from smallest to largest.
- Count the number of the measurements from the site, kObs, that are equal to or greater than the rth largest measurement of the combined (N) values.
- If kObs is greater than or equal to kTab, then reject the null hypothesis and conclude that the site concentrations are different from background for that COPC at the specified α.
- Frequency of Detection. Chemicals were eliminated from further evaluation if they were detected infrequently (5 percent or lower frequency of detection) at low levels, providing that at least 20 samples were analyzed for the chemical and the chemical is not known to be associated with site operations (TCEQ, 1998; USEPA, 1989). Chemicals detected infrequently but at high concentrations were retained in the evaluation unless their exclusion could be justified based on site process information or historical data.

Tables 2-2 and **2-3** illustrate the COPC screen for surface soil and groundwater, respectively, for the industrial risk assessment. For surface soil, four chemicals were identified as COPCs, including three inorganic chemicals (lead, mercury, and vanadium) and dioxins (as the 2,3,7,8-TCDD TEQ). For groundwater, five chemicals were identified as COPCs, all of which were inorganic chemicals (antimony, chromium, nickel, strontium, and nitrate/nitrite).

2.5 Comparison of Chemicals of Potential Concern Identified in the Jacobs (2002) Industrial Risk Assessment

Groundwater

No groundwater samples have been collected subsequent to the Jacobs (2002) industrial risk assessment. Therefore, the conclusions of the Jacobs industrial risk assessment regarding groundwater remain unchanged.

The 2002 risk assessment identified seven COPCs − 2,3,7,8-TCDD TEQ, antimony, chromium, manganese, nickel, strontium, and thallium. The conclusions of the Jacobs risk assessment for future maintenance worker exposures to COPCs in the groundwater at LHAAP-49 indicated that the cancer risk estimate equaled the upper value of the acceptable risk range (1E-04) and the estimated non-cancer HI was 2, which exceeds the acceptable level of 1.

The current risk evaluation (see **Table 2-3**) identifies five COPCs − antimony, chromium, nickel, nitrate/nitrite, and strontium. Three of these (antimony, chromium, and nitrate/nitrite) are COPCs because they exceed their respective MCLs. The other two (nickel and strontium)

exceed screening levels that are not based on MCLs, and thus require further risk evaluation; both are addressed in the 2002 risk assessment. The current evaluation does not identify 2,3,7,8-TCDD or thallium as COPCs because neither was detected at concentrations exceeding MCLs. Also, it does not identify manganese as a COPC because manganese results at LHAAP-49 were consistent with concentrations found in perimeter wells.

Soil

The addition of analytical data from samples collected in by USFWS, USACE, and Shaw to the Jacobs (2002) data to form a combined data set somewhat revised the COPC list identified by Jacobs. The COPCs identified in the Jacobs worker risk assessment were aluminum, lead, manganese, mercury, vanadium, and 2,3,7,8-TCDD TEQ dioxins. The COPCs identified using the combined data set **(Table 2-2)** included lead, mercury, vanadium, and 2,3,7,8-TCDD TEQ dioxins. That is, the screening approach summarized in **Table 2-2** removed aluminum and manganese from the list of COPCs because the detected results were consistent with background concentrations. The screening added no COPCs to the list identified by Jacobs.

Source term concentrations of COPCs identified in the combined data set **(Table 2-2)** were calculated as the 95 percent upper confidence limit of the mean (95 percent upper confidence limit [UCL]) according to USEPA methodology (USEPA, 2004a). Comparison of these concentrations with the 95 percent UCL concentrations of the COPCs used in the Jacobs risk assessment shows that the concentrations of COPCs identified in the combined data set are less than the concentrations used in the previous industrial risk assessment **(Table 2-4)**. Because no new COPCs were identified in the combined data set, and the 95 percent UCL COPC concentrations are below those identified in the Jacobs risk assessment, the combined set confirms the conclusions of the Jacobs industrial risk assessment and no re-evaluation of risks associated with industrial LHAAP-49 use is necessary.

3.0 Uncertainty Analysis

Generally, risk assessments carry two types of uncertainty. Measurement uncertainty refers to the usual variance that accompanies scientific measurements (e.g., analytical accuracy and precision associated with contaminant concentrations). The results of this risk assessment reflect the accumulated variances of the individual measured values.

A different kind of uncertainty stems from data gaps; i.e., additional information needed to complete the database for the assessment, uncertainties associated with exposure parameters assumed for children and adults and toxicity factors used in the characterization of risk, and assumptions regarding additivity of risk and hazard estimates, which are recognized in the USEPA (1989) methodology. The methodology accounts for these uncertainties by using various conservative assumptions that result in overestimations of risks. This risk assessment incorporates all of these uncertainties, which are discussed in detail in USEPA (1989) guidance and the Jacobs (2002) risk assessment.

The presence of elevated concentrations of mercury and lead in soil introduce uncertainty into the risk assessment. The elevated concentrations of these metals were included in the assessment to select COPCs and to estimate risk associated with these metals. The assessment indicated that risks are acceptable.

Conclusions regarding groundwater are affected by uncertainties associated with the collection and analysis of samples. Because the groundwater samples were not filtered or collected using low-flow purging methods, it is probable that the samples contain chemicals adsorbed to suspended particles or in colloidal form. Such suspended forms would tend to overestimate the concentration of dissolved chemicals and exceed the MCL values.

4.0 Conclusions

The assessment of risk to hypothetical future maintenance workers from exposure to chemicals in soil at LHAAP-49 indicates that the potential risk from exposure to COPCs in soil is within the acceptable range established by the USEPA.

Samples from the shallow groundwater-bearing zone contain concentrations of antimony, chromium, and nitrate/nitrite above MCL concentrations. Since the groundwater does not meet requirements of the Safe Drinking Water Act, it would not be acceptable for use as a drinking water supply.

5.0 References

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Tables

Table 2-1
Environmental Samples Evaluated in the Industrial Human Health Risk Assessment of LHAAP-49

Location	Sample Number	Purpose	Type	Sample Date	Depth (ft)	Analyses
Soil [a]						
49SB01	49SB01(0-0.5)	REG	SST	3-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB01	49SB01(1-2)	REG	SS	3-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB01	49SB01(1-2)QC	FD	SS	3-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB01	AVG-49SB01(1-2)	AVG	SS	3-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB02	49SB02(0-0.5)	REG	SST	3-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB02	49SB02(1-2)	REG	SS	3-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB03	49SB03(0-0.5)	REG	SST	3-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB03	49SB03(1-2)	REG	SS	3-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB04	49SB04(0-0.5)	REG	SST	3-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB04	49SB04(1-2)	REG	SS	3-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB05	49SB05(0-0.5)	REG	SST	3-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB05	49SB05(1-2)	REG	SS	3-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB07	49SB07(0-0.5)	REG	SST	3-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB07	49SB07(0-0.5)QC	FD	SST	3-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB07	AVG-49SB07(0-0.5)	AVG	SST	3-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB07	49SB07(1-2)	REG	SS	3-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB08	49SB08(0-0.5)	REG	SST	3-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB08	49SB08(1-2)	REG	SS	3-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB09	49SB09(0-0.5)	REG	SST	3-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB09	49SB09(1-2)	REG	SS	3-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB09	49SB09(1-2)QC	FD	SS	3-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB09	AVG-49SB09(1-2)	AVG	SS	3-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB10	49SB10(0-0.5)	REG	SST	3-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB10	49SB10(1-2)	REG	SS	3-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB11	49SB11(0-0.5)	REG	SST	3-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB11	49SB11(1-2)	REG	SS	3-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB12	49SB12(0-0.5)	REG	SST	2-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB12	49SB12(1-2)	REG	SS	2-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB13	49SB13(0-0.5)	REG	SST	2-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB13	49SB13(1-2)	REG	SS	2-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB14	49SB14(0-0.5)	REG	SST	2-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB14	49SB14(1-2)	REG	SS	2-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB15	49SB15(0-0.5)	REG	SST	2-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB15	49SB15(1-2)	REG	SS	2-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB16	49SB16(0-0.5)	REG	SST	2-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB16	49SB16(1-2)	REG	SS	2-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB16	49SB16(1-2)QC	FD	SS	2-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB16	AVG-49SB16(1-2)	AVG	SS	2-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB17	49SB17(0-0.5)	REG	SST	2-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB17	49SB17(1-2)	REG	SS	2-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB18	49SB18(0-0.5)	REG	SST	2-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB18	49SB18(1-2)	REG	SS	2-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB19	49SB19(0-0.5)	REG	SST	2-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB19	49SB19(1-2)	REG	SS	2-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB20	49SB20(0-0.5)	REG	SST	2-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB20	49SB20(1-2)	REG	SS	2-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB21	49SB21(0-0.5)	REG	SST	2-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB21	49SB21(1-2)	REG	SS	2-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB22	49SB22(0-0.5)	REG	SST	2-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB22	49SB22(0-0.5)QC	FD	SST	2-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB22	AVG-49SB22(0-0.5)	AVG	SST	2-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB22	49SB22(1-2)	REG	SS	2-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB23	49SB23(0-0.5)	REG	SST	2-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB23	49SB23(1-2)	REG	SS	2-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB24	49SB24(0-0.5)	REG	SST	2-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB24	49SB24(1-2)	REG	SS	2-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB25	49SB25(0-0.5)	REG	SST	2-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB25	49SB25(1-2)	REG	SS	2-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB26	49SB26(0-0.5)	REG	SST	2-Dec-00	0 - 0.5	Metals, Gen Chem [b]

Table 2-1
Environmental Samples Evaluated in the Industrial Human Health Risk Assessment of LHAAP-49

Location	Sample Number	Purpose	Type	Sample Date	Depth (ft)	Analyses
Soil [a]						
49SB26	49SB26(1-2)	REG	SS	2-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB27	49SB27(0-0.5)	REG	SST	2-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB27	49SB27(1-2)	REG	SS	2-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB28	49SB28(0-0.5)	REG	SST	2-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB28	49SB28(1-2)	REG	SS	2-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB30	49SB30(0-0.5)	REG	SST	2-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB30	49SB30(0-0.5)QC	FD	SST	2-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB30	AVG-49SB30(0-0.5)	AVG	SST	2-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB30	49SB30(1-2)	REG	SS	2-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB31	49SB31(0-0.5)	REG	SST	3-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB31	49SB31(1-2)	REG	SS	3-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB32	49SB32(0-0.5)	REG	SST	3-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB32	49SB32(0-0.5)QC	FD	SST	3-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB32	AVG-49SB32(0-0.5)	AVG	SST	3-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB32	49SB32(1-2)	REG	SS	3-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB33	49SB33(0-0.5)	REG	SST	3-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB33	49SB33(1-2)	REG	SS	3-Dec-00	1 - 2	Metals, Gen Chem [b]
49SB34	49SB34(0-0.5)	REG	SST	7-Dec-00	0 - 0.5	Dioxins, Explosives, Metals, Perchlorate, Pest/PCB, SVOC, VOC, Gen Chem [b]
49SB34	49SB34(1-3)	REG	SS	7-Dec-00	1 - 3	Dioxins, Explosives, Metals, Perchlorate, Pest/PCB, SVOC, VOC, Gen Chem [b]
49SB34	49SB34(3-5)	REG	DS	7-Dec-00	3 - 5	Dioxins, Explosives, Metals, Perchlorate, Pest/PCB, SVOC, VOC, Gen Chem [b]
49SB35	49SB35(0-0.5)	REG	SST	7-Dec-00	0 - 0.5	Dioxins, Explosives, Metals, Perchlorate, Pest/PCB, SVOC, VOC, Gen Chem [b]
49SB35	49SB35(0-0.5)QC	FD	SST	7-Dec-00	0 - 0.5	Dioxins, Explosives, Metals, Perchlorate, Pest/PCB, SVOC, VOC, Gen Chem [b]
49SB35	AVG-49SB35(0-0.5)	AVG	SST	7-Dec-00	0 - 0.5	Dioxins, Explosives, Metals, Perchlorate, Pest/PCB, SVOC, VOC, Gen Chem [b]
49SB35	49SB35(1-3)	REG	SS	7-Dec-00	1 - 3	Dioxins, Explosives, Metals, Perchlorate, Pest/PCB, SVOC, VOC, Gen Chem [b]
49SB35	49SB35(3-5)	REG	DS	7-Dec-00	3 - 5	Dioxins, Explosives, Metals, Perchlorate, Pest/PCB, SVOC, VOC, Gen Chem [b]
49SB36	49SB36(0-0.5)	REG	SST	7-Dec-00	0 - 0.5	Dioxins, Explosives, Metals, Perchlorate, Pest/PCB, SVOC, VOC, Gen Chem [b]
49SB36	49SB36(1-3)	REG	SS	7-Dec-00	1 - 3	Dioxins, Explosives, Metals, Perchlorate, Pest/PCB, SVOC, VOC, Gen Chem [b]
49SB36	49SB36(3-5)	REG	DS	7-Dec-00	3 - 5	Dioxins, Explosives, Metals, Perchlorate, Pest/PCB, SVOC, VOC, Gen Chem [b]
49SB51	49SB51-001	REG	SST	16-Dec-04	0 - 0.5	Mercury, Lead
49SB51	49SB51-001-QC	FD	SST	16-Dec-04	0 - 0.5	Mercury, Lead
49SB51	AVG-49SB51-001	AVG	SST	16-Dec-04	0 - 0.5	Mercury, Lead
49SB51	49SB51-002	REG	DS	16-Dec-04	3 - 4	Mercury, Lead
49SB51	49SB51-002-QC	FD	DS	16-Dec-04	3 - 4	Mercury, Lead
49SB51	AVG-49SB51-002	AVG	DS	16-Dec-04	3 - 4	Mercury, Lead
49SB52	49SB52-001	REG	SST	16-Dec-04	0 - 0.5	Mercury, Lead
49SB52	49SB52-002	REG	DS	16-Dec-04	3 - 4	Mercury, Lead
49SB53	49SB53-001	REG	SST	16-Dec-04	0 - 0.5	Mercury, Lead
49SB53	49SB53-002	REG	DS	16-Dec-04	3 - 4	Mercury, Lead
49SB54	49SB54-001	REG	SST	16-Dec-04	0 - 0.5	Mercury, Lead
49SB54	49SB54-002	REG	DS	16-Dec-04	3 - 4	Mercury, Lead
49SB55	49SB55-001	REG	SST	16-Dec-04	0 - 0.5	Mercury, Lead
49SB55	49SB55-002	REG	DS	16-Dec-04	3 - 4	Mercury, Lead
49SB56	49SB56-001	REG	SST	17-Dec-04	0 - 0.5	Mercury, Lead
49SB56	49SB56-002	REG	DS	17-Dec-04	3 - 4	Mercury, Lead
49SB57	49SB57-001	REG	SST	17-Dec-04	0 - 0.5	Mercury, Lead
49SB57	49SB57-002	REG	DS	17-Dec-04	3 - 4	Mercury, Lead
49SB58	49SB58-001	REG	SST	17-Dec-04	0 - 0.5	Mercury, Lead
49SB58	49SB58-002	REG	DS	17-Dec-04	3 - 4	Mercury, Lead
49SB59	49SB59-001	REG	SST	17-Dec-04	0 - 0.5	Mercury, Lead
49SB59	49SB59-002	REG	DS	17-Dec-04	3 - 4	Mercury, Lead
49SB60	49SB60-001	REG	SST	17-Dec-04	0 - 0.5	Mercury, Lead
49SB60	49SB60-002	REG	DS	17-Dec-04	3 - 4	Mercury, Lead
49SB61	49SB61-001	REG	SST	17-Dec-04	0 - 0.5	Mercury, Lead
49SB61	49SB61-001-QC	FD	SST	17-Dec-04	0 - 0.5	Mercury, Lead
49SB61	AVG-49SB61-001	AVG	SST	17-Dec-04	0 - 0.5	Mercury, Lead
49SB61	49SB61-002	REG	DS	17-Dec-04	3 - 4	Mercury, Lead
49SS37	49SS37	REG	SST	24-Jun-04	0 - 0.5	Mercury, Lead
49SS38	49SS38	REG	SST	24-Jun-04	0 - 0.5	Mercury, Lead
49SS39	49SS39	REG	SST	24-Jun-04	0 - 0.5	Mercury, Lead

Table 2-1
Environmental Samples Evaluated in the Industrial Human Health Risk Assessment of LHAAP-49

Location	Sample Number	Purpose	Type	Sample Date	Depth (ft)	Analyses
Soil [a]						
49SS45	49SS45	REG	SST	24-Jun-04	0 - 0.5	Mercury, Lead
49SS47	49SS47	REG	SST	24-Jun-04	0 - 0.5	Mercury, Lead
49SS47	49SS47QC	FD	SST	24-Jun-04	0 - 0.5	Mercury, Lead
49SS47	AVG-49SS47	AVG	SST	24-Jun-04	0 - 0.5	Mercury, Lead
49SS48	49SS48	REG	SST	24-Jun-04	0 - 0.5	Mercury, Lead
49SS49	49SS49	REG	SST	24-Jun-04	0 - 0.5	Mercury, Lead
49SS50	49SS50	REG	SST	24-Jun-04	0 - 0.5	Mercury, Lead
FWS-029	C-SS-029	REG	SST	2-Oct-02	0 - 0.5	Metals, Pest, SVOC
Sediment [a]						
49SD62	49SD62	REG	SED	19-Dec-04	0 - 0.5	Mercury, Lead
49SD63	49SD63	REG	SED	19-Dec-04	0 - 0.5	Mercury, Lead
49SD64	49SD64	REG	SED	19-Dec-04	0 - 0.5	Mercury, Lead
49SD64	49SD64-QC	FD	SED	19-Dec-04	0 - 0.5	Mercury, Lead
49SD64	AVG-49SD64	AVG	SED	19-Dec-04	0 - 0.5	Mercury, Lead
49SD65	49SD65	REG	SED	19-Dec-04	0 - 0.5	Mercury, Lead
Soil Samples Excluded [c]						
49SB06	49SB06(0-0.5)	REG	SST	3-Dec-00	0 - 0.5	Metals, Gen Chem [b]
49SB06	49SB06(1-2)	REG	SS	3-Dec-00	1 - 2	Metals, Gen Chem [b]
49SS40	49SS40	REG	SST	24-Jun-04	0 - 0.5	Mercury, Lead
49SS41	49SS41	REG	SST	24-Jun-04	0 - 0.5	Mercury, Lead
49SS42	49SS42	REG	SST	24-Jun-04	0 - 0.5	Mercury, Lead
49SS43	49SS43	REG	SST	24-Jun-04	0 - 0.5	Mercury, Lead
49SS44	49SS44	REG	SST	24-Jun-04	0 - 0.5	Mercury, Lead
49SS46	49SS46	REG	SST	24-Jun-04	0 - 0.5	Mercury, Lead
FWS-026	C-SS-026	REG	SST	2-Oct-02	0 - 0.5	Metals, Pest, SVOC
Groundwater						
49WW01	49WW01-981207	REG	GW	7-Dec-98		Metals, SVOC, VOC, Gen Chem [d]
49WW01	49WW01QC	FD	GW	7-Dec-98		Metals, SVOC, VOC, Gen Chem [d]
49WW01	49WW01-001220	REG	GW	20-Dec-00		Dioxins, Explosives, Metals, Pest/PCB, SVOC, VOC
49WW02	49WW02-981208	REG	GW	8-Dec-98		Metals, SVOC, VOC, Gen Chem [d]
49WW02	49WW02-001220	REG	GW	20-Dec-00		Dioxins, Explosives, Metals, Pest/PCB, SVOC, VOC
49WW03	49WW03L	REG	GW	7-Dec-98		Metals, SVOC, VOC, Gen Chem [d]
49WW03	49WW03-001220	REG	GW	20-Dec-00		Dioxins, Explosives, Metals, Pest/PCB, SVOC, VOC
49WW03	49WW03QC	FD	GW	20-Dec-00		Dioxins, Explosives, Metals, Pest/PCB, SVOC, VOC
Surface Water [e]						
49SW62	49SW62	REG	SW	19-Dec-04		Mercury, Lead
49SW62	49SW62-QC	FD	SW	19-Dec-04		Mercury, Lead

Notes and Abbreviations:

This sample set is a combination of samples collected by Jacobs Engineering Inc. and Sverdrup Environmental Inc. for Phase III of the Remedial Investigation (1998-2000), by U.S. Fish & Wildlife Service in 2002, by U.S. Army Corps of Engineers in 2004, and by Shaw Environmental, Inc., in 2004.

[a] Only soil depths from 0 to 2 ft bgs were available for the industrial evaluation protective of direct pathways.
Analytical results from sediment samples collected from ephemeral water sources were combined with the soil data for the risk assessment

[b] General chemistry parameters include nitrite, sulfate, and chloride.

[c] Sample locations were outside of the site boundary and therefore not included in the risk evaluation.

[d] General chemistry parameters include nitrate / nitrite, sulfate, and chloride.

[e] Surface water samples were from ephemeral sources and excluded from the risk evaluation.

DS Subsurface soil sample, > 2 ft
FD Field duplicate; the field duplicate was averaged with the regular sample to produce one result for the same sample location and depth
GW Groundwater sample
Pest/PCB Organochlorine pesticides and polychlorinated biphenyls
REG Regular environmental sample
SED Sediment
SS Surface soil sample, 0 - 2 ft
SST Surface soil-top layer sample, 0 - 0.5 ft
SVOC Semivolatile organic compounds
SW Surface water sample
VOC Volatile organic compounds
ft feet below ground surface (bgs)

Table 2-2
Occurrence, Distribution, and Selection of Chemicals of Potential Concern (COPC) Surface Soil (0 to 2 ft bgs) a LHAAP-49

Chemical	Detection Frequency	Percent Detection	Range of Values, mg/kg: Detected Concentrations Minimum - Maximum	Range of Values, mg/kg: Reporting Limits Minimum - Maximum	Statistical Distribution [b]	Mean mg/kg	95% UCL mg/kg [c]	Texas RBSV mg/kg [d]		COPC? [e,f]	Source-Term Concentration mg/kg [g]	
Inorganics												
Aluminum	65 / 65	100	2200 - 19200	1.02 - 210	U	1.06E+04	1.13E+04	1.55E+04		N(c)	---	
Arsenic	65 / 65	100	1.22 - 11.7	0.508 - 0.645	U	3.69E+00		2.00E+01		N (a)	---	
Barium	65 / 65	100	16 - 533	0.52 - 1.02	U	1.10E+02		2.61E +03		N (a)	---	
Beryllium	65 / 65	100	0.143 - 2.15	0.0305 - 0.1045	U	7.08E-01		4.56E+00		N (a)	---	
Cadmium	47 / 65	72	0.114 - 0.8535	0.1 - 0.13	U	2.50E-01		5.20E+00		N (a)	---	
Calcium	64 / 64	100	259 - 295000	52 - 11900	U	9.41E+03		Not Required		N (b)	---	
Chromium	65 / 65	100	5.02 - 70.2	0.508 - 0.645	U	2.02E+01		5.93E+03	h	N (a)	---	
Cobalt	64 / 64	100	0.701 - 16.7	0.52 - 0.645	U	7.90E+00		1.53E+03		N (a)	---	
Copper	65 / 65	100	4.73 - 55.2	0.508 - 0.645	U	1.56E+01		1.02E+03		N (a)	---	
Iron	65 / 65	100	4160 - 61700	5.08 - 1800	U	2.09E+04		Not Required		N (b)	---	
Lead	86 / 86	100	6.32 - 1740	0.31 - 7.17	L	1.41E+02		5.00E+02		Y	1.41E+02	i
Magnesium	65 / 65	100	208 - 6730	5.08 - 1290	U	2.60E+03		Not Required		N (b)	---	
Manganese	65 / 65	100	8.92 - 1800	1 - 23	U	2.53E+02	3.00E+02	1.68E+03		N (c)	---	
Mercury	44 / 86	51	0.02295 - 778	0.00927 - 640	L	1.05E+01	2.87E+01	1.08E-02		Y	2.87E+01	
Nickel	65 / 65	100	2.31 - 54.65	0.508 - 0.645	U	1.93E+01		1.87E+02		N (a)	---	
Potassium	64 / 64	100	181 - 1340	52 - 64.5	U	6.93E+02		Not Required		N (b)	---	
Selenium	41 / 65	63	0.449 - 2.33	0.508 - 0.645	U	6.33E-01		1.27E+02		N (a)	---	
Silver	3 / 65	5	0.096 - 0.143	0.1 - 0.203	U	6.21E-02		4.68E+01		N (a)	---	
Sodium	23 / 52	44	60.5 - 545	52 - 64.5	U	9.65E+01		Not Required		N (b)	---	
Strontium	65 / 65	100	5.22 - 921	0.508 - 59.7	U	5.38E+01		1.19E+04		N (a)	---	
Thallium	2 / 64	3	1.21 - 1.37	1 - 1.3	U	6.06E-01		2.04E+00		N (a)	---	
Vanadium	65 / 65	100	8.54 - 75.9	0.508 - 1.3	L	2.87E+01	3.11E+01	4.84E+01		Y	3.11E+01	
Zinc	65 / 65	100	7.17 - 1310	1 - 24	U	8.32E+01		5.94E+03		N (a)	---	
General Chemistry												
Chloride	7 / 64	11	17.2 - 36.9	10.7 - 13.25	U	8.14E+00		Not Required		N (b)	---	
Sulfate	16 / 64	25	12 - 267	10.7 - 13.25	U	2.10E+01		Not Required		N (b)	---	
Dioxins/Furans												
2,3,7,8-TCDD TEQ	2 / 2	100	6.757E-07 - 1.964E-05	NA - NA	U	1.02E-05		3.90E-06	j	Y	1.96E-05	
Organochlorine Pesticides												
1,2,4,5-Tetrachlorobenzene	1 / 1	100	0.00309 - 0.00309	0.00033 - 0.00033	U	3.09E-03		4.64E+00		N (a)	---	
4,4'-DDD	2 / 3	67	0.0004 - 0.02485	0.00033 - 0.00365	U	9.02E-03		2.44E+00		N (a)	---	
4,4'-DDE	2 / 3	67	0.00546 - 0.6175	0.00033 - 0.01085	U	2.08E-01		1.72E+00		N (a)	---	
4,4'-DDT	2 / 3	67	0.000467 - 0.0711	0.00033 - 0.00365	U	2.45E-02		1.69E+00		N (a)	---	
alpha-Chlordane	1 / 3	33	0.00113 - 0.00113	0.00033 - 0.00365	U	1.59E-03		1.39E+00		N (a)	---	
cis-Nonachlor	1 / 1	100	0.000814 - 0.000814	0.00033 - 0.00033	U	8.14E-04		1.38E+00		N (a)	---	
Endosulfan II	1 / 3	33	0.000705 - 0.000705	0.00033 - 0.00365	U	1.44E-03		9.29E+01		N (a)	---	
o,p'-DDT	1 / 1	100	0.000343 - 0.000343	0.00033 - 0.00033	U	3.43E-04		1.69E+00	k	N (a)	---	
Polychlorinated Biphenyls												
Polychlorinated biphenyls	1 / 1	100	0.0275 - 0.0275	0.00165 - 0.00165	U	2.75E-02		1.00E+01		N (a)	---	

Notes and Abbreviations:

[a] Surface soil for industrial evaluation is defined as the interval less than or equal to 2 feet below the ground surface and includes sediment samples. Soil samples were classified on the basis of the end depth of the sample.

[b] Statistical Distribution: U = Distribution not determined if chemical is not selected as a COPC, or if sample size is less than 10; L = Lognormal distribution.

[c] 95% upper confidence limit (UCL) calculated for COPC using bootstrapping (2000 replications).

[d] Based on Texas Risk-Based Screening Values (RBSVs) for soil, March 31, 2004 update. Values are based on a cancer risk of 1E-6 and a hazard index of 0.1

[e] N = Chemical is not chosen as a COPC; Y = Chemical is chosen as a COPC.

[f] Rationale for exclusion of chemical as a COPC:
(a) maximum detected concentration is below or equal to risk-based screening concentration
(b) no screening value available/required
(c) chemical concentration is below or equal to background screening concentration (see Attachment A).
(d) chemical is detected infrequently (i.e., < 5% frequency of detection).

[g] Concentration used in risk assessment equal to 95% UCL or maximum detected concentration, whichever is lower.

[h] Based on RBSV for total chromium.

[i] Based on RBSV for total chromium.

[i] The mean concentration is used as the source-term concentration for lead.

[j] Based on the medium-specific screening level (MSSL) for dioxin (2,3,7,8-TCDD) from EPA Region 6 (EPA Region 6, 2004, Human Health Medium-Specific Screening Levels 2004-2005, December).

[k] Based on RBSV for 4,4'-DDT.

COPC chemical of potential concern
ft bgs feet below ground surface
mg/kg milligram per kilogram
NA not applicable
TEQ toxicity equivalency

Table 2-3
Occurrence, Distribution, and Selection of Chemicals of Potential Concern (COPC) Groundwater a LHAAP-49

Chemical	Detection Frequency	Percent Detection	Range of Values, µg/L: Detected Concentrations Minimum	Detected Concentrations Maximum	Reporting Limits Minimum	Reporting Limits Maximum	Statistical Distribution [b]	Mean µg/L	MCL µg/L	MDC Exceeds MCL?	Texas RBSV µg/L [c]		COPC? [d,e]	Source-Term Concentration µg/L [f]
Inorganics														
Aluminum	3 / 6	50	38.55	544	50	200	U	2.18E+02		NA	3.65E+03		N (a)	---
Antimony	2 / 6	33	8.75	12	5	5	U	5.13E+00	6.00E+00	**Yes**	6.00E+00		Y	1.20E+01
Barium	3 / 6	50	28.6	94.7	10	200	U	7.74E+01	2.00E+03	No	2.00E+03		N (a)	---
Cadmium	3 / 6	50	1.4	3.8	0.8	1	U	1.62E+00	5.00E+00	No	5.00E+00		N (a)	---
Calcium	6 / 6	100	268000	600000	5000	100000	U	3.93E+05		NA	Not Required		N (b)	---
Chromium	6 / 6	100	10	497	5	10	U	1.49E+02	1.00E+02	**Yes**	1.00E+02	g	Y	4.97E+02
Cobalt	2 / 6	33	10.4	23.65	10	50	U	1.90E+01		NA	2.19E+02		N (a)	---
Copper	3 / 6	50	13.2	22.75	10	25	U	1.33E+01	1.30E+03	No	1.30E+03		N (a)	---
Iron	6 / 6	100	184	3930	100	100	U	1.85E+03		NA	Not Required		N (b)	---
Lead	1 / 6	17	4	4	3	3	U	1.92E+00	1.50E+01	No	1.50E+01		N (a)	---
Magnesium	6 / 6	100	198000	465000	5000	100000	U	3.13E+05		NA	Not Required		N (b)	---
Manganese	6 / 6	100	235	3030	10	1000	U	1.76E+03		NA	1.72E+02		N (c)	---
Nickel	5 / 6	83	135	973	10	40	U	3.69E+02		NA	7.30E+01		Y	9.73E+02
Potassium	6 / 6	100	5300	7050	1000	5000	U	6.51E+03		NA	Not Required		N (b)	---
Selenium	3 / 6	50	6	16.55	5	10	U	7.59E+00	5.00E+01	No	5.00E+01		N (a)	---
Sodium	6 / 6	100	340000	600000	5000	100000	U	4.80E+05		NA	Not Required		N (b)	---
Strontium	6 / 6	100	9740	37000	50	1000	U	1.90E+04		NA	2.19E+03		Y	3.70E+04
Thallium	2 / 6	33	0.85	1.1	1	5	U	1.66E+00	2.00E+00	No	2.00E+00		N (a)	---
Zinc	4 / 6	67	14.1	50	10	20	U	2.40E+01		NA	1.10E+03		N (a)	---
General Chemistry														
Chloride	3 / 3	100	545000	1670000	20000	40000	U	1.20E+06		NA	Not Required		N (b)	---
Nitrate / Nitrite	1 / 3	33	24000	24000	100	10000	U	8.03E+03	1.00E+04	**Yes**	1.00E+03	h	Y	2.40E+04
Sulfate	3 / 3	100	420000	2150000	20000	400000	U	1.26E+06		NA	Not Required		N (b)	---
Dioxins/Furans														
2,3,7,8-TCDD TEQ	3 / 3	100	1.16E-05	1.62E-05	NA	NA	U	1.32E-05	3.00E-05	No	4.48E-07	i	N (d)	---
Volatile Organics														
Carbon tetrachloride	2 / 6	33	1	1.54	0.1	1	U	6.07E-01	5.00E+00	No	5.00E+00		N (a)	---
Chloroform	3 / 6	50	0.54	0.9	0.1	1	U	4.33E-01	8.00E+01	No	3.65E+01		N (a)	---

Notes & Abbreviations:

[a] Unfiltered groundwater from monitoring wells at LHAAP-49.

[b] Statistical Distribution: U = Distribution not determined for groundwater.

[c] Based on Texas Risk-Based Screening Values (RBSVs) for groundwater, March 31, 2004 update. Values are based on a cancer risk of 1E-6 and a hazard index of 0.1.

[d] N = chemical is not chosen as a COPC; Y = chemical is chosen as a COPC.

[e] Rationale for exclusion of chemical as a COPC:

(a) maximum detected concentration is below or equal to RBSV

(b) no screening value available/required

(c) chemical concentration is below or equal to background screening concentration (Shaw, 2007b).

(d) Results are below MCL. As noted in the Consistency Memorandum (TCEQ, 1998) regarding cumulative risk evaluation, "…it is not necessary or appropriate to include contaminants present at levels at or below the MCL…"

[f] The maximum detected concentration is selected as the source-term concentration for COPC in groundwater.

[g] Based on the RBSV for total chromium.

[h] Based on RBSV for nitrite.

[i] Based on the medium-specific screening level (MSSL) for dioxin (2,3,7,8-TCDD) from EPA Region 6 (EPA Region 6, Human Health Medium-Specific Screening Levels 2007, May)

COPC chemical of potential concern

MCL Maximum Contaminant Level for drinking water source (TCEQ, 2006).

NA Not applicable

TEQ Toxicity equivalency

µg/L micrograms per liter

Table 2-4
Exposure Point Concentrations of COPCs Identified in the Combined Soil Data Set Compared to Exposure Point Concentrations Evaluated Previously
LHAAP-49

	Exposure Point Concentration (mg/kg) [a]	
	Combined Data Set [b]	Previous Assessment [c]
Lead	1.21E+02	1.57E+02
Mercury	1.69E+01	1.25E+02
Vanadium	3.01E+01	3.04E+01
Dioxins [d]	2.83E-05	3.51E-05

Notes and Abbreviations:

[a] All values represent the 95% upper confidence limit of the mean concentration.

[b] see Table 2-2

[c] Table 3-68 of *Final Baseline Human Health and Screening Ecological Risk Assessment for the Group 2 Sites, Sites 12, 17, 18/24, 29, 32, 49, Harrison Bayou, and Caddo Lake, Volume 1, Longhorn Army Ammunition Plant, Karnack, Texas, April (Jacobs, 2002)*

[d] 2,3,7,8-TCDD TEQ concentration (Table 2-2)

COPC chemical of potential concern
mg/kg milligrams/kilogram

Attachment 1

Statistical Analysis

Table A-7 of Values of r, k, and α Used in Quantile Test

USEPA, 1994b, *Statistical Methods for Evaluating the Attainment of Cleanup Standards,* Environmental Statistics and Information Division, Office of Policy, Planning, and Evaluation, EPA/230/R-94/004, June.

TABLE A.7 Values of r, k, and α for the Quantile Test for Combinations of m and n When α is Approximately Equal to 0.025

Number of Cleanup-Unit Measurements, n

Number of Reference-Area Measurements, m

m \ n	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
5			9,9 0.030	12,12 0.024	15,15 0.021	17,17 0.026	20,20 0.024	22,22 0.028	25,25 0.025									r,k α		
10		7,6 0.029	6,6 0.028	8,8 0.022	9,9 0.029	11,11 0.024	12,12 0.029	14,14 0.025	15,15 0.029	17,17 0.025	18,18 0.029	20,20 0.026	21,21 0.029	23,23 0.026	24,24 0.029	26,26 0.026	27,27 0.029			
15	11,5 0.030	6,5 0.023	5,5 0.021	6,6 0.024	7,7 0.026	8,8 0.027	9,9 0.028	10,10 0.029	11,11 0.030	13,13 0.022	14,14 0.023	15,15 0.023	16,16 0.024	17,17 0.025	18,18 0.025	19,19 0.026	21,21 0.021	21,21 0.027	22,22 0.027	23,23 0.027
20	8,4 0.023	3,3 0.030	4,4 0.026	5,5 0.024	6,6 0.022	7,7 0.020	12,11 0.021	13,12 0.024	9,9 0.028	10,10 0.026	11,11 0.024	12,12 0.023	13,13 0.022	13,13 0.029	14,14 0.027	15,15 0.026	16,16 0.025	17,17 0.024	17,17 0.029	18,18 0.028
25	2,2 0.023	8,5 0.027	6,5 0.021	7,6 0.023	5,5 0.025	6,6 0.020	10,9 0.026	7,7 0.027	8,8 0.023	13,12 0.027	9,9 0.027	10,10 0.024	11,11 0.022	11,11 0.028	12,12 0.025	13,13 0.023	13,13 0.028	14,14 0.025	15,15 0.023	15,15 0.028
30	6,3 0.026	6,4 0.026	9,6 0.026	4,4 0.021	7,6 0.029	5,5 0.026	9,8 0.024	6,6 0.029	7,7 0.023	12,11 0.021	8,8 0.025	9,9 0.021	9,9 0.027	10,10 0.023	10,10 0.029	11,11 0.025	11,11 0.030	12,12 0.026	13,13 0.023	13,13 0.027
35	7,3 0.030	4,3 0.030	3,3 0.023	6,5 0.020	4,4 0.026	10,8 0.022	5,5 0.027	9,8 0.024	6,6 0.027	7,7 0.020	7,7 0.027	8,8 0.021	8,8 0.027	9,9 0.022	9,9 0.027	10,10 0.022	10,10 0.027	11,11 0.022	11,11 0.027	12,12 0.023
40	3,2 0.029	4,3 0.022	8,5 0.028	11,7 0.025	6,5 0.028	4,4 0.030	10,8 0.026	5,5 0.027	9,8 0.023	6,6 0.026	10,9 0.028	7,7 0.024	12,11 0.020	8,8 0.023	8,8 0.029	9,9 0.022	9,9 0.027	10,10 0.021	10,10 0.026	11,11 0.021
45	3,2 0.023	8,4 0.029	6,4 0.030	3,3 0.026	8,6 0.021	4,4 0.023	7,6 0.025	5,5 0.020	5,5 0.028	9,8 0.023	6,6 0.024	10,9 0.026	7,7 0.022	7,7 0.027	8,8 0.020	8,8 0.025	8,8 0.030	9,9 0.023	9,9 0.027	10,10 0.021
50		2,2 0.025	6,4 0.022	3,3 0.021	11,7 0.027	6,5 0.026	4,4 0.026	7,6 0.028	5,5 0.021	5,5 0.028	9,8 0.022	6,6 0.023	6,6 0.029	7,7 0.020	7,7 0.025	12,11 0.020	8,8 0.022	8,8 0.026	13,12 0.027	9,9 0.023
55		2,2 0.022	4,3 0.029	8,5 0.028	3,3 0.028	8,6 0.021	4,4 0.020	4,4 0.029	10,8 0.021	5,5 0.022	5,5 0.028	9,8 0.022	6,6 0.023	6,6 0.028	10,9 0.029	7,7 0.023	7,7 0.027	12,11 0.023	8,8 0.023	8,8 0.027
60		14,5 0.022	4,3 0.024	8,5 0.021	3,3 0.023	11,7 0.029	6,5 0.024	4,4 0.023	7,6 0.023	10,8 0.024	5,5 0.023	5,5 0.029	9,8 0.022	6,6 0.022	6,6 0.027	10,9 0.027	7,7 0.021	7,7 0.025	7,7 0.030	8,8 0.021
65		6,3 0.028	7,4 0.021	6,4 0.025	10,6 0.025	3,3 0.029	8,6 0.021	6,5 0.029	4,4 0.026	7,6 0.026	10,8 0.026	5,5 0.023	5,5 0.029	9,8 0.022	6,6 0.021	6,6 0.026	10,9 0.026	7,7 0.020	7,7 0.024	7,7 0.028
70		6,3 0.024	2,2 0.029	6,4 0.021	8,5 0.028	3,3 0.025	13,8 0.026	6,5 0.023	4,4 0.022	4,4 0.029	7,6 0.028	10,8 0.027	5,5 0.024	5,5 0.029	9,8 0.022	6,6 0.021	6,6 0.025	6,6 0.029	10,9 0.030	7,7 0.022
75		11,4 0.022	2,2 0.026	4,3 0.028	8,5 0.022	3,3 0.022	9,6 0.028	8,6 0.021	6,5 0.027	4,4 0.024	7,6 0.023	7,6 0.030	10,8 0.029	5,5 0.024	5,5 0.029	9,8 0.021	6,6 0.021	6,6 0.024	6,6 0.028	10,9 0.028
80		7,3 0.028	2,2 0.024	4,3 0.024	6,4 0.028	10,6 0.024	3,3 0.027	13,8 0.027	6,5 0.023	4,4 0.020	4,4 0.026	7,6 0.024	10,8 0.023	5,5 0.020	5,5 0.025	5,5 0.029	9,8 0.021	6,6 0.020	6,6 0.024	6,6 0.027
85		3,2 0.029	2,2 0.021	4,3 0.021	6,4 0.023	8,5 0.028	3,3 0.023	9,6 0.030	8,6 0.020	6,5 0.026	4,4 0.022	4,4 0.028	7,6 0.026	10,8 0.024	5,5 0.021	5,5 0.025	5,5 0.029	9,8 0.021	6,6 0.020	6,6 0.023
90			5,3 0.020	11,5 0.027	9,5 0.023	8,5 0.023	3,3 0.021	3,3 0.028	13,8 0.028	6,5 0.022	6,5 0.029	4,4 0.024	4,4 0.029	7,6 0.028	10,8 0.026	5,5 0.022	5,5 0.025	5,5 0.030	9,8 0.021	9,8 0.025
95			10,4 0.029	2,2 0.029	4,3 0.028	6,4 0.029	10,6 0.023	3,3 0.025	11,7 0.026	8,6 0.020	6,5 0.025	4,4 0.021	4,4 0.026	7,6 0.024	7,6 0.029	10,8 0.027	5,5 0.022	5,5 0.026	5,5 0.030	9,8 0.021
100			6,3 0.029	2,2 0.027	4,3 0.025	6,4 0.025	8,5 0.028	3,3 0.022	3,3 0.029	13,8 0.028	6,5 0.022	6,5 0.028	4,4 0.023	4,4 0.027	7,6 0.025	10,8 0.022	10,8 0.028	5,5 0.022	5,5 0.026	5,5 0.030

Statistical Comparison of Aluminum and Manganese Concentrations in Soil with Background Concentrations

- Data file: Background Comparison – Ind. STA
- Mann-Whitney U Test, Variable Al
- Boxplot, Variable: Al
- Table C-1-1, Quantile Test Comparison of Aluminum Concentrations in Surface Soil at LHAAP-49 to Background Concentrations
- Mann-Whitney U Test, Variable: Mn
- Boxplot, Variable: Mn
- Table C-1-2, Quantile Test Comparison of Manganese Concentrations in Surface Soil at LHAAP-49 to Background Concentrations

data file: Background Comparison-Ind.STA [121 cases with 4 variables]

	1 DEPTH_F	2 DATA	3 AL	4 MN
1	0-0.5	BKG	1800.0	91.90
2	0-0.5	BKG	1850.0	122.00
3	0-0.5	BKG	1900.0	131.00
4	0-0.5	BKG	2080.0	134.00
5	0-0.5	BKG	2280.0	145.00
6	0-0.5	BKG	2510.0	228.00
7	0-0.5	BKG	2530.0	255.00
8	0-0.5	BKG	2690.0	257.00
9	0-0.5	BKG	2930.0	262.00
10	0-0.5	BKG	2990.0	273.00
11	0-0.5	BKG	3030.0	280.00
12	0-0.5	BKG	3210.0	292.00
13	0-0.5	BKG	3330.0	301.00
14	0-0.5	BKG	3560.0	328.00
15	0-0.5	BKG	3710.0	366.00
16	0-0.5	BKG	3780.0	378.00
17	0-0.5	BKG	3850.0	394.00
18	0-0.5	BKG	3940.0	397.00
19	0-0.5	BKG	3980.0	405.00
20	0-0.5	BKG	4000.0	414.00
21	0-0.5	BKG	4130.0	485.00
22	0-0.5	BKG	4390.0	501.00
23	0-0.5	BKG	4700.0	556.00
24	0-0.5	BKG	5180.0	684.00
25	0-0.5	BKG	5850.0	843.00
26	0-0.5	BKG	5980.0	1250.00
27	0-0.5	BKG	6050.0	1410.00
28	0-0.5	BKG	16300.0	1870.00
29	1.5-3.5	BKG	3110.0	5.40
30	1.5-3.5	BKG	4250.0	7.10
31	1.5-3.5	BKG	6160.0	8.50
32	1.5-3.5	BKG	6840.0	9.00
33	1.5-3.5	BKG	7170.0	9.10
34	1.5-3.5	BKG	7940.0	11.40
35	1.5-3.5	BKG	8310.0	12.40
36	1.5-3.5	BKG	8380.0	17.80
37	1.5-3.5	BKG	8690.0	20.30
38	1.5-3.5	BKG	9030.0	20.70
39	1.5-3.5	BKG	9510.0	21.90
40	1.5-3.5	BKG	9660.0	22.90
41	1.5-3.5	BKG	10200.0	27.00
42	1.5-3.5	BKG	10300.0	27.50
43	1.5-3.5	BKG	10700.0	28.20
44	1.5-3.5	BKG	10700.0	28.90
45	1.5-3.5	BKG	11300.0	47.10
46	1.5-3.5	BKG	11600.0	58.40
47	1.5-3.5	BKG	11700.0	67.90
48	1.5-3.5	BKG	11700.0	78.00
49	1.5-3.5	BKG	12200.0	78.50
50	1.5-3.5	BKG	12900.0	79.80
51	1.5-3.5	BKG	12900.0	81.70
52	1.5-3.5	BKG	14600.0	88.90
53	1.5-3.5	BKG	14700.0	113.00
54	1.5-3.5	BKG	16100.0	141.00
55	1.5-3.5	BKG	21100.0	142.00

	1 DEPTH__F	2 DATA	3 AL	4 MN
56	1.5-3.5	BKG	22500.0	266.00
57	0-2	SITE	19200.0	1800.00
58	0-2	SITE	18000.0	1171.00
59	0-2	SITE	16350.0	851.00
60	0-2	SITE	16200.0	784.00
61	0-2	SITE	14100.0	591.00
62	0-2	SITE	13900.0	573.00
63	0-2	SITE	13300.0	542.00
64	0-2	SITE	13300.0	480.00
65	0-2	SITE	13300.0	460.00
66	0-2	SITE	13200.0	422.00
67	0-2	SITE	13100.0	373.00
68	0-2	SITE	13050.0	345.50
69	0-2	SITE	13000.0	305.00
70	0-2	SITE	13000.0	300.00
71	0-2	SITE	13000.0	294.00
72	0-2	SITE	13000.0	290.00
73	0-2	SITE	13000.0	281.00
74	0-2	SITE	12700.0	275.00
75	0-2	SITE	12700.0	262.00
76	0-2	SITE	12620.0	247.00
77	0-2	SITE	12600.0	246.00
78	0-2	SITE	12200.0	245.00
79	0-2	SITE	12100.0	244.00
80	0-2	SITE	12000.0	240.00
81	0-2	SITE	11700.0	239.00
82	0-2	SITE	11600.0	233.00
83	0-2	SITE	11600.0	219.00
84	0-2	SITE	11500.0	197.00
85	0-2	SITE	11500.0	195.00
86	0-2	SITE	11100.0	193.00
87	0-2	SITE	11000.0	192.50
88	0-2	SITE	10900.0	189.00
89	0-2	SITE	10785.0	183.00
90	0-2	SITE	10700.0	179.00
91	0-2	SITE	10600.0	179.00
92	0-2	SITE	10500.0	176.00
93	0-2	SITE	10400.0	174.00
94	0-2	SITE	10400.0	165.50
95	0-2	SITE	10300.0	156.00
96	0-2	SITE	10100.0	151.00
97	0-2	SITE	10100.0	142.00
98	0-2	SITE	10100.0	137.00
99	0-2	SITE	9560.0	131.00
100	0-2	SITE	9410.0	121.00
101	0-2	SITE	9370.0	114.00
102	0-2	SITE	9360.0	112.00
103	0-2	SITE	9120.0	110.00
104	0-2	SITE	8980.0	107.00
105	0-2	SITE	8890.0	106.00
106	0-2	SITE	8400.0	86.60
107	0-2	SITE	8340.0	79.40
108	0-2	SITE	8280.0	77.20
109	0-2	SITE	8210.0	71.75
110	0-2	SITE	7500.0	58.90
111	0-2	SITE	7450.0	54.10
112	0-2	SITE	7330.0	46.70
113	0-2	SITE	7290.0	43.60
114	0-2	SITE	7010.0	39.30
115	0-2	SITE	6610.0	37.10

	1 DEPTH__F	2 DATA	3 AL	4 MN
116	0-2	SITE	5780.0	34.00
117	0-2	SITE	5385.0	27.20
118	0-2	SITE	4650.0	25.70
119	0-2	SITE	3480.0	21.50
120	0-2	SITE	2280.0	18.60
121	0-2	SITE	2200.0	8.92

STAT. NONPAR STATS	Mann-Whitney U Test (background comparison-ind.sta) By variable DATA Group 1: 100-BKG Group 2: 101-SITE						
variable	Rank Sum BKG	Rank Sum SITE	U	Z	p-level	Z adjusted	p-level
AL	2598.500	4782.500	1002.500	-4.24960	.000021	-4.24994	.000021

STAT. NONPAR STATS	Mann-Whitney U Test (background comparison-ind.sta) By variable DATA Group 1: 100-BKG Group 2: 101-SITE		
variable	Valid N BKG	Valid N SITE	2*1sided exact p
AL	56	65	.000014

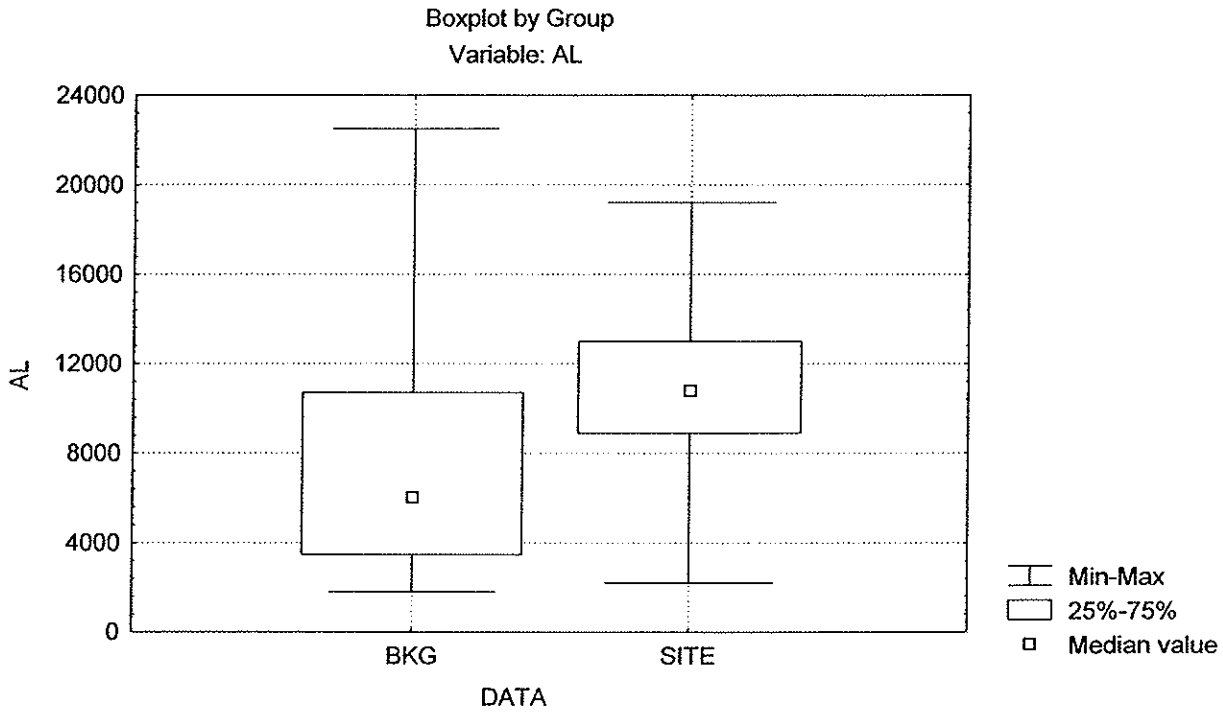
Boxplot by Group
Variable: AL
24000
20000
16000
12000
8000
4000
0
AL
BKG
SITE
DATA
Min-Max
25%-75%
Median value

Table C-1-1
Quantile Test Comparison of Aluminum Concentrations in Surface Soil at LHAAP-49 to Background Concentrations

Data Group	Aluminum Concentration (ppm)
BKG	1800
BKG	1850
BKG	1900
BKG	2080
SITE	2200
BKG	2280
SITE	2280
BKG	2510
BKG	2530
BKG	2690
BKG	2930
BKG	2990
BKG	3030
BKG	3110
BKG	3210
BKG	3330
SITE	3480
BKG	3560
BKG	3710
BKG	3780
BKG	3850
BKG	3940
BKG	3980
BKG	4000
BKG	4130
BKG	4250
BKG	4390
SITE	4650
BKG	4700
BKG	5180
SITE	5385
SITE	5780
BKG	5850
BKG	5980
BKG	6050
BKG	6160
SITE	6610
BKG	6840
SITE	7010
BKG	7170
SITE	7290
SITE	7330
SITE	7450
SITE	7500
BKG	7940
SITE	8210
SITE	8280
BKG	8310
SITE	8340

Quantile Test [a]					
Number of Samples in Data Set			(alpha = 0.025)		
Background (BKG)	Site Data (SITE)	Total	Tabulated [b]		Observed
m	n	N	r	k_{tab}	k_{obs}
56	65	121	6	6	3
Are site data different from background (k_{obs} >= k_{tab})?			**No**		

Notes:

[a] *Statistical Methods For Evaluating The Attainment Of Cleanup Standards*, Environmental Statistics and Information Division, Office of Policy, Planning, and Evaluation, EPA/230/R-94/004, June (USEPA, 1994).

[b] Table A.7 of USEPA, 1994

Table C-1-1
Quantile Test Comparison of Aluminum Concentrations in Surface Soil at LHAAP-49 to Background Concentrations

Data Group	Aluminum Concentration (ppm)
BKG	8380
SITE	8400
BKG	8690
SITE	8890
SITE	8980
BKG	9030
SITE	9120
SITE	9360
SITE	9370
SITE	9410
BKG	9510
SITE	9560
BKG	9660
SITE	10100
SITE	10100
SITE	10100
BKG	10200
BKG	10300
SITE	10300
SITE	10400
SITE	10400
SITE	10500
SITE	10600
BKG	10700
BKG	10700
SITE	10700
SITE	10785
SITE	10900
SITE	11000
SITE	11100
BKG	11300
SITE	11500
SITE	11500
BKG	11600
SITE	11600
SITE	11600
BKG	11700
BKG	11700
SITE	11700
SITE	12000
SITE	12100
BKG	12200
SITE	12200
SITE	12600
SITE	12620
SITE	12700
SITE	12700
BKG	12900
BKG	12900
SITE	13000
SITE	13000
SITE	13000

Table C-1-1
Quantile Test Comparison of Aluminum Concentrations in Surface Soil at LHAAP-49 to Background Concentrations

Data Group	Aluminum Concentration (ppm)
SITE	13000
SITE	13000
SITE	13050
SITE	13100
SITE	13200
SITE	13300
SITE	13300
SITE	13300
SITE	13900
SITE	14100
BKG	14600
BKG	14700
BKG	16100
SITE	16200
BKG	16300
SITE	16350
SITE	18000
SITE	19200
BKG	21100
BKG	22500

STAT. NONPAR STATS	Mann-Whitney U Test (background comparison-ind.sta) By variable DATA Group 1: 100-BKG Group 2: 101-SITE						
variable	Rank Sum BKG	Rank Sum SITE	U	Z	p-level	Z adjusted	p-level
MN	3208.500	4172.500	1612.500	-1.07864	.280755	-1.07865	.280751

STAT. NONPAR STATS	Mann-Whitney U Test (background comparison-ind.sta) By variable DATA Group 1: 100-BKG Group 2: 101-SITE		
variable	Valid N BKG	Valid N SITE	2*1sided exact p
MN	56	65	.281862

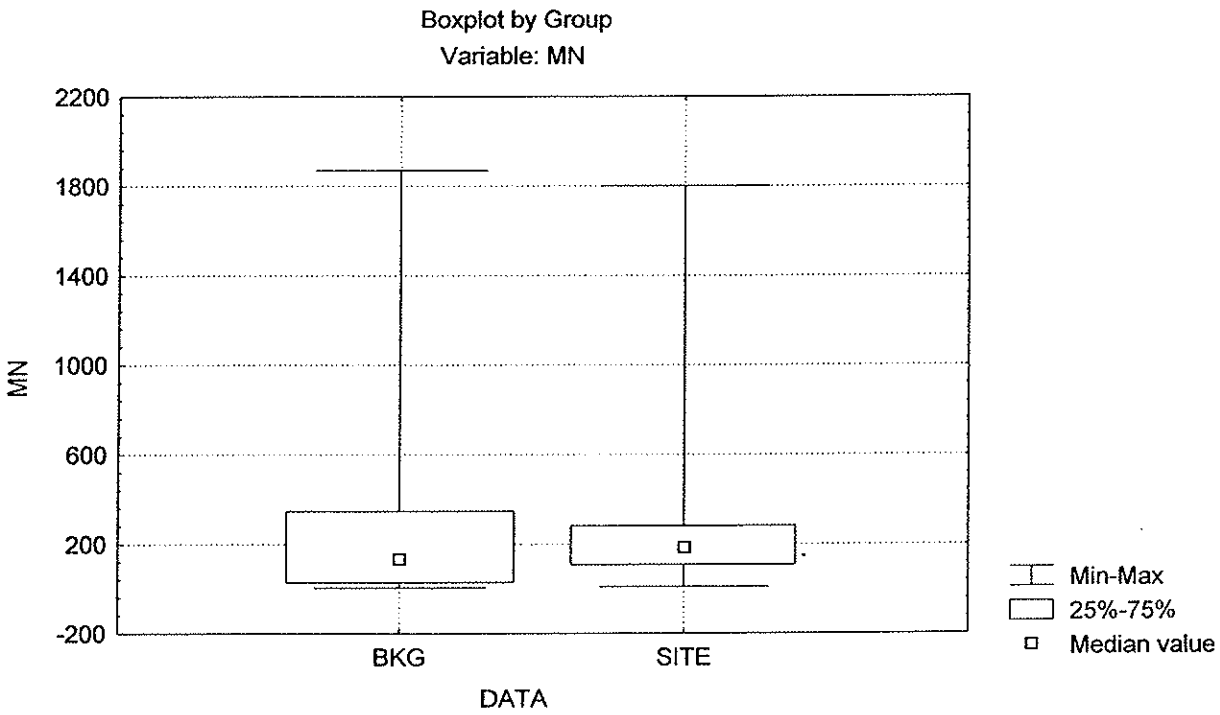
Boxplot by Group
Variable: MN
2200
1800
1400
1000
600
200
-200
MN
BKG
SITE
DATA
Min-Max
25%-75%
Median value

Table C-1-2
Quantile Test Comparison of Manganese Concentrations in Surface Soil at LHAAP-49 to Background Concentrations

Data Group	Manganese Concentration (ppm)
BKG	5.4
BKG	7.1
BKG	8.5
SITE	8.92
BKG	9
BKG	9.1
BKG	11.4
BKG	12.4
BKG	17.8
SITE	18.6
BKG	20.3
BKG	20.7
SITE	21.5
BKG	21.9
BKG	22.9
SITE	25.7
BKG	27
SITE	27.2
BKG	27.5
BKG	28.2
BKG	28.9
SITE	34
SITE	37.1
SITE	39.3
SITE	43.6
SITE	46.7
BKG	47.1
SITE	54.1
BKG	58.4
SITE	58.9
BKG	67.9
SITE	71.75
SITE	77.2
BKG	78
BKG	78.5
SITE	79.4
BKG	79.8
BKG	81.7
SITE	86.6
BKG	88.9
BKG	91.9
SITE	106
SITE	107
SITE	110
SITE	112
BKG	113
SITE	114
SITE	121

Quantile Test [a]					
Number of Samples in Data Set			(alpha = 0.025)		
Background (BKG)	Site Data (SITE)	Total	Tabulated [b]		Observed
m	n	N	r	k_{tab}	k_{obs}
56	65	121	6	6	3
Are site data different from background (k_{obs} >= k_{tab})?			**No**		

Notes:

[a] *Statistical Methods For Evaluating The Attainment Of Cleanup Standards*, Environmental Statistics and Information Division, Office of Policy, Planning, and Evaluation, EPA/230/R-94/004, June (USEPA, 1994).

[b] Table A.7 of USEPA, 1994

Table C-1-2
Quantile Test Comparison of Manganese Concentrations in Surface Soil at LHAAP-49 to Background Concentrations

Data Group	Manganese Concentration (ppm)
BKG	122
BKG	131
SITE	131
BKG	134
SITE	137
BKG	141
BKG	142
SITE	142
BKG	145
SITE	151
SITE	156
SITE	165.5
SITE	174
SITE	176
SITE	179
SITE	179
SITE	183
SITE	189
SITE	192.5
SITE	193
SITE	195
SITE	197
SITE	219
BKG	228
SITE	233
SITE	239
SITE	240
SITE	244
SITE	245
SITE	246
SITE	247
BKG	255
BKG	257
BKG	262
SITE	262
BKG	266
BKG	273
SITE	275
BKG	280
SITE	281
SITE	290
BKG	292
SITE	294
SITE	300
BKG	301
SITE	305
BKG	328
SITE	345.5
BKG	366
SITE	373
BKG	378

Table C-1-2
Quantile Test Comparison of Manganese Concentrations in Surface Soil at LHAAP-49 to Background Concentrations

Data Group	Manganese Concentration (ppm)
BKG	394
BKG	397
BKG	405
BKG	414
SITE	422
SITE	460
SITE	480
BKG	485
BKG	501
SITE	542
BKG	556
SITE	573
SITE	591
BKG	684
SITE	784
BKG	843
SITE	851
SITE	1171
BKG	1250
BKG	1410
SITE	1800
BKG	1870

Appendix D

Soil Removal Report

APPENDIX D
SOIL REMOVAL REPORT
LHAAP-49, FORMER ACID STORAGE AREA

FINAL

SITE EVALUATION REPORT, LHAAP-49
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Prepared for

U.S. Army Corps of Engineers
Tulsa District
1645 South 101st Avenue
Tulsa, Oklahoma

Prepared by

Shaw Environmental, Inc.
1430 Enclave Parkway
Houston, Texas 77077

Contract Number W912QR-04-D-0027, Shaw Project No. 117591
Task Order No. DS02

June 2009

Table of Contents

List of Tables

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List of Attachments

1.0 Introduction

This Soil Removal Report was prepared by Shaw Environmental, Inc. (Shaw), for the U.S. Army Corps of Engineers (USACE), Tulsa District, under the Louisville District's Multiple Award Remediation Contract (MARC) Contract No. W912QR-04-D-0027, for remediation activities at the former Longhorn Army Ammunition Plant (LHAAP) in Karnack, Texas. This report describes the excavation and off-site disposal of soil from a portion of site LHAAP-49 in October 2008.

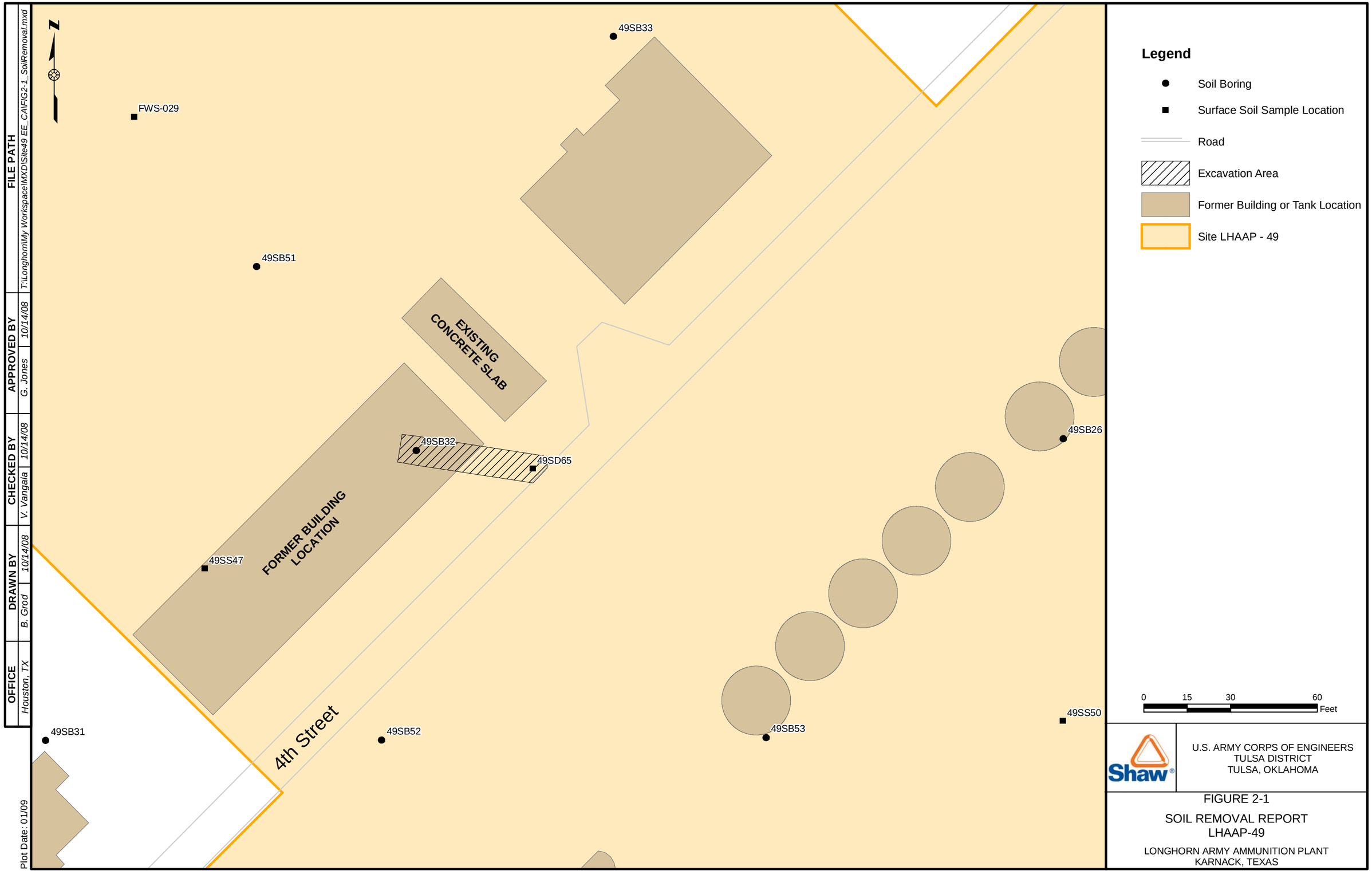
LHAAP is an inactive, government-owned, formerly contractor-operated and maintained Department of Defense facility located in central-east Texas. LHAAP-49 is a former acid storage area that supported trinitrotoluene (TNT) production during World War II. The overall human health and ecological risks associated with the soil at site LHAAP-49 have been shown to be acceptable via a risk assessment (Jacobs, 2002) and further evaluation in the Final Site Evaluation Report (Shaw, 2009). However, two soil sample locations at LHAAP-49 had mercury concentrations that were markedly higher than mercury concentrations from samples elsewhere within LHAAP-49. The U.S. Army and the Texas Commission on Environmental Quality (TCEQ) agreed that removal of soil in the vicinity of these two sample locations would eliminate the need for evaluation of risks from the hotspot (TCEQ, 2008).

2.0 Site Description

The excavation site is located north of 4th Street (**Figure 2-1**). The site is covered by trees, grass, and shrubs. Some concrete slabs are nearby, but not in the excavation area itself. The two sampling locations at LHAAP-49 with high mercury concentrations were 49SB32 with 84.2 mg/kg of mercury and 49SD65 with 778 mg/kg of mercury. Sample locations are shown on **Figure 2-1**.

Figure 2-1
Soil Removal Report, LHAAP-49

00073940



FILE PATH	T:\Longhorn\My Workspace\MXD\Site49 EE_CA\FIG2-1_SoilRemoval.mxd
APPROVED BY	G. Jones 10/14/08
CHECKED BY	V. Vangala 10/14/08
DRAWN BY	B. Grod 10/14/08
OFFICE	Houston, TX

Plot Date: 01/09

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

FIGURE 2-1

SOIL REMOVAL REPORT
LHAAP-49

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

3.0 Field Work

Prior to the initiation of field work, discussions between U.S. Army and TCEQ established the following general steps for the removal (TCEQ, 2008):

1. Locate the two sampling points (49SB32 and 49SD65) using geographic positioning system (GPS).
2. Remove soil in a rectangle surrounding the two sampling points. The rectangle will be 10 feet wide and the ends of the rectangle will extend 5 feet beyond each sampling point. Soil will be removed to a depth of 1 foot.
3. Containerize the waste and collect a composite sample for waste characterization
4. Regrade the excavated area to establish positive drainage using clean soil
5. Dispose of the waste soil at an off-site landfill as hazardous or non-hazardous waste, based on characterization analyses
6. Submit a completion report after the action

The following subsections provide additional details on clearing, excavation, backfilling with clean soil, and disposal of waste soil. The field activities were documented with digital photographs that are included in **Appendix A**.

3.1 Clearing

The trees and small brush located within the excavation area were removed prior to the excavation activities (Photo 1, **Appendix A**). The trees were cut at the bottom using a chain saw and the stumps were removed using a trackhoe and placed in roll-off containers.

3.2 Excavation

The soil excavation limits are shown on **Figure 2-1**. The soil within the excavation limits was removed to a minimum depth of one foot using a trackhoe (Photo 2, **Appendix A**). The excavated soil, including tree stumps, was loaded into lined and covered roll-off containers. Approximately 25 cubic yards of soil was removed from the excavation area and placed in two roll-off boxes (Photo 3, **Appendix A**). A composite soil sample (549WC100808) was collected from the roll-off boxes for waste characterization analysis. The required depth of excavation of 1-foot was checked at several points to verify that removal of the soil was complete (Photo 4, **Appendix A**). Following the excavation, the trackhoe was decontaminated with a high pressure water rinse (Photo 5, **Appendix A**) prior to demobilizing the trackhoe from the project site.

3.3 Backfill

Following the confirmation of the depth of excavation to a minimum of 1 foot, the excavated area was backfilled with clean fill soil obtained from an off-site source (Photo 6, **Appendix A**). Approximately 35 cubic yards of clean fill were placed in the excavation, compacted, and graded to provide positive drainage (Photos 7 and 8, **Appendix A**). A soil sample from the off-site source (549B5100908) was collected for analysis to confirm that the fill soil does not contain Resource Conservation and Recovery Act metals at concentrations exceeding the background levels (Shaw, 2004). Based on the analytical results, the fill soil from the off-site source did not contain any contaminants above the criteria (see **Table 3-1**). The full analytical results for the soil sample from the fill material are included in **Appendix B**.

Table 3-1
Borrow Soil Analytical Results

Parameter	Result (mg/kg)	Validation Qualifier	Background 95%UCL[1]	Background 95/95 UTL[1]
Arsenic	0.597		2.73	6.12
Barium	31.3		77.6	205
Cadmium	0.170	J	0.226	1.40
Chromium	3.31		13.3	36.7
Lead	3.15	J	13.7	27.6
Mercury	0.0108	U	0.0503	0.100
Selenium	0.105	U	1.83	4.58
Silver [2]	0.191	U	0.14	0.31

Notes and Abbreviations:

1. Source: *Final Background Soil Study Report, Longhorn Army Ammunition Plant, Karnack, Texas* (Shaw, 2004)
2. Silver was not detected. The detection limit exceeds the 95% UCL, but was well below the 95/95 UTL.

J	estimated value
mg/kg	milligrams per kilogram
U	undetected
UCL	upper confidence level on the mean
UTL	upper tolerance limit (95/95 indicates 95% coverage with 95% confidence)

3.4 Disposal

The excavated soil was loaded into lined and covered roll-off containers. Based on the analytical results, the waste was characterized as non-hazardous (see **Table 3-2**). The full waste characterization results are included in **Appendix B**. Approximately 30 tons of excavated soil were disposed at the Waste Management Landfill in New Boston, Texas. The waste shipping documents for the excavated soil are provided in **Appendix C**.

Table 3-2
Waste Characterization Results

Parameter	TCLP Result (mg/L)	Validation Qualifier	Regulatory Limit
Arsenic	0.1	U	5
Barium	1.20	J	100
Cadmium	0.025	U	1
Chromium	0.025	U	5
Lead	0.1	U	5
Mercury	0.001	U	0.2
Selenium	0.5	U	1
Silver	0.05	U	5

Abbreviations:

J	estimated value
mg/L	milligrams per liter
TCLP	toxicity characteristic leaching procedure
U	undetected

4.0 References

Jacobs, 2002, *Final Baseline Human Health and Screening Ecological Risk Assessment Report for the Group 2 Sites, Longhorn Army Ammunition Plant, Karnack, Texas*, Oak Ridge, Tennessee, January.

Shaw Environmental, Inc. (Shaw), 2004, *Final Background Soil Study Reports, Longhorn Army Ammunition Plant, Karnack, Texas*, Houston, Texas, July.

Shaw, 2009, *Final Site Evaluation Report, LHAAP-49, Longhorn Army Ammunition Plant, Karnack, Texas*, Houston, Texas, June.

Texas Commission on Environmental Quality (TCEQ), 2008, Email from Fay Duke to Stephen Tzhone/U.S.EPA, Subject: LHAAP-49 Soil Removal, September 22, Austin, Texas.

Attachment 1

Site Photographs

SITE PHOTOGRAPHS

Photo No.	Task and Description
1	Site clearing by removing trees and shrubs
2	Removal of soil within the excavation limits
3	Excavated area with the roll-off container in the background
4	Checking the excavation depth
5	Decontamination of the trackhoe bucket using high pressure washer
6	Placing of clean backfill in the excavated area
7	Spreading and compacting the clean fill in the excavated area
8	Final grade of the site

PHOTO 1: Site clearing by removing trees and shrubs

PHOTO 2: Removal of soil within the excavation limits

PHOTO 3: Excavated area with the roll-off container in the background

PHOTO 4: Checking the excavation depth

PHOTO 5: Decontamination of the trackhoe bucket using high pressure washer

PHOTO 6: Placing of clean backfill in the excavated area

PHOTO 7: Spreading and compacting the clean fill in the excavated area

PHOTO 8: Final grade of the site

Attachment 2

Fill Material and Waste Characterization

(Refer to CD located in the back of binder)

00073952

Quick Facts

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DUNS#: 048192892

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Facilities Corporate –Wide: 18 Divisions, 28 locations across 15 states

Please note these administrative changes for our Ohio Valley Division laboratory in Marietta, OH (formerly KEMRON Environmental Services, Inc.) , in particular the address, which is a revised routing of remittances on our invoices. All invoices dated April 1, 2008 or later will reflect this change, and will be highlighted with an attention-getting sticker during our transition. Please adjust your records to ensure proper routing of payments.

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Laboratory Report Number: L08100257

Please find enclosed the analytical results for the samples you submitted to Microbac Laboratories.

Review and compilation of your report was completed by Microbac's Sales and Service Team. If you have questions, comments or require further assistance regarding this report, please contact your team member noted in the reviewed box bleow at 800-373-4071. Team member e-mail addresses also appear here for your convenience.

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Jacqueline Parsons	*Team Assistant*	jparsons@microbac.com

This report was reviewed on October 17, 2008.

Stephanie Mossburg

Stephanie Mossburg - Team Chemist/Data Specialist

I certify that all test results meet all of the requirements of the accrediting authority listed below. All results for soil samples are reported on a 'dry-weight' basis unless specified otherwise. Analytical results for water and wastes are reported on a 'as received' basis unless specified otherwise. A statement of uncertainty for each analysis is available upon request. This laboratory report shall not be reproduced, except in full, without the written approval of Microbac Laboratories.

This report was certified on October 17, 2008.

David E. Vandenberg

David Vandenberg - Managing Director

State of origin: Texas
Accrediting authority: Texas Commission on Environmental Quality ID:T104704252-07-TX
QAPP: Microbac (OVD) LQAP
This report contains a total of 216 pages.

Look closer. Go further. Do more.

Microbac REPORT L08100257
PREPARED FOR Shaw E I, Inc.
WORK ID:

1.0 Introduction

Microbac Laboratories Inc.
REPORT NARRATIVE

Microbac Login No: L08100257

CHAIN OF CUSTODY: The chain of custody number was 5714.

SHIPMENT CONDITIONS: The chain of custody forms were received sealed in a cooler. The cooler temperature was 0 degrees C.

SAMPLE MANAGEMENT: All samples received were intact.

I certify that this data package is in compliance with the terms and conditions agreed to by the client and Microbac Laboratories Inc., both technically and for completeness, except for the conditions noted above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designated person, as verified by the following signature.

Approved: 13-OCT-08
Stephanie Mossburg

Laboratory Data Package Cover Page

00073957

This data Package consists of:

This signature page, the laboratory review checklists, and the following reportable data:

R1 Field chain-of-custody documentation;

R2 sample identification cross-reference;

R3 Test reports (analytical data sheets) for each enviornmental sample that includes:

a) Items consistant with NELAC 5.13 or ISO/IEC 17025 Section 5.10

b) dilution factors,

c) preparation methods,

d) Cleanup methods, and

e) If required for the project, tentatively identified compounds (TICs)

R4 Surrogate recovery data including:

a) Calculated recovery (%R) for each analyte, and

b) The laboratory's surrogate QC limits.

R5 Test reports/summary forms for blank samples;

R6 Test reports/summary forms FOR laboratory control samples (LCSs) including:

a) LCS spiking amount,

b) Calculated %R for each analyte, and

c) The laboratory"s LCS QC limits.

R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:

a) Samples associated with the MS/MSD clearly identified,

b) MS/MSD spiking amounts,

c) Concentration of each MS/MSD analyte measured in the parent and spiked samples,

d) Calculated %R and relative percent differences (RPDs), and

e) The laboratory's MS/MSD QC limits

R8 Laboratory analytical duplicate (if applicable) revocery and precision:

a) the amount of analyte measured in the duplicate,

b) the calculated RPD, and

c) the laboratory's QC limits for anlytical duplicates.

R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix;

R10 Other problems or anomalies.

The exception Report for every "No" or "Not Reviewed (NR)" item in laboratory review checklist.

Release statement: I am responsible for the release of this laboratory data package. This data package has been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exceptions reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratoy in the Laboratory Review Checklist, and no information or data have been knowingly withheld that would affect the quality of the data.

Check, If applicable: [] This laboratory is an in-house laboratory controlled by the person repsonding to rule. The official signing the cover page of the rule-required report (for example, the APAR) in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is trus.

MAREN M. BEERY	Maren Beery	Metals Supervisor	October 15, 2008
Name (Printed)	Signature	Official Title (printed)	DATE

Microbac Laboratories Inc.
Laboratory Review Checklist

Laboratory Name:	Microbac Laboratories Inc.
Laboratory Log Number:	L08100257
Project Name:	798-LONGHORN
Method:	6010
Prep Batch Number(s):	WG284491
Reviewer Name:	MAREN M. BEERY
LRC Date:	October 15, 2008

Description	Yes	No	NA(1)	NR(2)	ER(3)
Chain-Of-Custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	✓				
Were all departures from standard conditions described in an exception report?	✓				
Sample and quality control (QC) identification					
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	✓				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	✓				
Test reports					
Were all samples prepared and analyzed within holding times?	✓				
Other than those results <MQL, were all other raw values bracketed by calibration standards?			✓		
Were calculations checked by a peer or supervisor?	✓				
Were all analyte identifications checked by a peer or supervisor?	✓				
Were sample quantitation limits reported for all analytes not detected?	✓				
Were all results for soil and sediment samples reported on a dry weight basis?	✓				
Were % moisture (or solids) reported for all soil and sediment samples?	✓				
If required for the project, TICs reported?			✓		
Surrogate recovery data					
Were surrogates added prior to extraction?			✓		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			✓		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	✓				
Were blanks analyzed at the appropriate frequency?	✓				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	✓				
Were blank concentrations <RL?	✓				
Laboratory control samples (LCS):					
Were all COCs included in the LCS?	✓				
Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	✓				
Were LCSs analyzed at the required frequency?	✓				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	✓				
Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?	✓				
Was the LCSD RPD within QC limits?			✓		
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?			✓		
Were MS/MSD analyzed at the appropriate frequency?			✓		
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?			✓		

Description	Yes	No	NA(1)	NR(2)	ER(3)
Were MS/MSD RPDs within laboratory QC limits?			✓		
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			✓		
Were analytical duplicates analyzed at the appropriate frequency?			✓		
Were RPDs or relative standard deviations within the laboratory QC limits?			✓		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	✓				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	✓				
Are unadjusted MQLs included in the laboratory data package?	✓				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	✓				
Were all necessary corrective actions performed for the reported data?	✓				
Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?	✓				
ICAL					
Were response factors and/or relative response factors for each analyte within QC limits?			✓		
Were percent RSDs or correlation coefficient criteria met?	✓				
Was the number of standards recommended in the method used for all analytes?	✓				
Were all points generated between the lowest and highest standard used to calculate the curve?	✓				
Are ICAL data available for all instruments used?	✓				
Has the initial calibration curve been verified using an appropriate second source standard?	✓				
Initial and continuing calibration verification (ICV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	✓				
Were percent differences for each analyte within the method-required QC limits?	✓				
Was the ICAL curve verified for each analyte?	✓				
Was the absolute value of the analyte concentration in the inorganic CCB <RL?	✓				
Mass spectral tuning:					
Was the appropriate compound for the method used for tuning?			✓		
Were ion abundance data within the method-required QC limits?			✓		
Internal standards (IS):					
Were IS area counts and retention times within the method-required QC limits?			✓		
Raw data (NELAC section 1 appendix A glossary, and section 5.12 or ISO/IEC 17025 section 4.12.2)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	✓				
Were data associated with manual integrations flagged on the raw data?			✓		
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			✓		
Tentatively identified compounds (TICs):					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			✓		
Interference Check Sample (ICS) results:					
Were percent recoveries within method QC limits?	✓				
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	✓				
Method detection limit (MDL) studies					
Was a MDL study performed for each reported analyte?	✓				
Is the MDL either adjusted or supported by the analysis of DCSs?	✓				
Proficiency test reports:					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	✓				

Description	Yes	No	NA(1)	NR(2)	ES(3)
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	✓				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	✓				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5C or ISO/IEC 4?	✓				
Is documentation of the analyst's competency up-to-date and on file?	✓				
Verification/validation documentation for methods (NELAC Chap 5 or ISO/IEC 17025 Section 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	✓				
Laboratory standard operating procedures (SOPs):					
Are laboratory SOPs current and on file for each method performed?	✓				

Microbac Laboratories Inc.
Laboratory Review Checklist

Laboratory Name:	Microbac Laboratories Inc.
Laboratory Log Number:	L08100257
Project Name:	798-LONGHORN
Method:	6010
Prep Batch Number(s):	WG284491
Reviewer Name:	MAREN M. BEERY
LRC Date:	October 15, 2008

EXCEPTIONS REPORT
ER# - Description
Footnotes:
(1) NA = Not applicable to method or project
(2) NR = Not reviewed
(3) ER# = Exception report number

Laboratory Data Package Cover Page

00073962

This data Package consists of:

This signature page, the laboratory review checklists, and the following reportable data:

R1 Field chain-of-custody documentation;

R2 sample identification cross-reference;

R3 Test reports (analytical data sheets) for each enviornmental sample that includes:

a) Items consistant with NELAC 5.13 or ISO/IEC 17025 Section 5.10

b) dilution factors,

c) preparation methods,

d) Cleanup methods, and

e) If required for the project, tentatively identified compounds (TICs)

R4 Surrogate recovery data including:

a) Calculated recovery (%R) for each analyte, and

b) The laboratory's surrogate QC limits.

R5 Test reports/summary forms for blank samples;

R6 Test reports/summary forms FOR laboratory control samples (LCSs) including:

a) LCS spiking amount,

b) Calculated %R for each analyte, and

c) The laboratory"s LCS QC limits.

R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:

a) Samples associated with the MS/MSD clearly identified,

b) MS/MSD spiking amounts,

c) Concentration of each MS/MSD analyte measured in the parent and spiked samples,

d) Calculated %R and relative percent differences (RPDs), and

e) The laboratory's MS/MSD QC limits

R8 Laboratory analytical duplicate (if applicable) revocery and precision:

a) the amount of analyte measured in the duplicate,

b) the calculated RPD, and

c) the laboratory's QC limits for anlytical duplicates.

R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix;

R10 Other problems or anomalies.

The exception Report for every "No" or "Not Reviewed (NR)" item in laboratory review checklist.

Release statement: I am responsible for the release of this laboratory data package. This data package has been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exceptions reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratoy in the Laboratory Review Checklist, and no information or data have been knowingly withheld that would affect the quality of the data.

Check, If applicable: [] This laboratory is an in-house laboratory controlled by the person repsonding to rule. The official signing the cover page of the rule-required report (for example, the APAR) in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is trus.

MAREN M. BEERY	Maren Beery	Metals Supervisor	October 15, 2008
Name (Printed)	Signature	Official Title (printed)	DATE

Microbac Laboratories Inc.
Laboratory Review Checklist

Laboratory Name:	Microbac Laboratories Inc.
Laboratory Log Number:	L08100257
Project Name:	798-LONGHORN
Method:	7471
Prep Batch Number(s):	WG284475
Reviewer Name:	MAREN M. BEERY
LRC Date:	October 15, 2008

Description	Yes	No	NA(1)	NR(2)	ER(3)
Chain-Of-Custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	✓				
Were all departures from standard conditions described in an exception report?	✓				
Sample and quality control (QC) identification					
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	✓				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	✓				
Test reports					
Were all samples prepared and analyzed within holding times?	✓				
Other than those results <MQL, were all other raw values bracketed by calibration standards?	✓				
Were calculations checked by a peer or supervisor?	✓				
Were all analyte identifications checked by a peer or supervisor?	✓				
Were sample quantitation limits reported for all analytes not detected?	✓				
Were all results for soil and sediment samples reported on a dry weight basis?	✓				
Were % moisture (or solids) reported for all soil and sediment samples?	✓				
If required for the project, TICs reported?			✓		
Surrogate recovery data					
Were surrogates added prior to extraction?			✓		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			✓		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	✓				
Were blanks analyzed at the appropriate frequency?	✓				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	✓				
Were blank concentrations <RL?	✓				
Laboratory control samples (LCS):					
Were all COCs included in the LCS?	✓				
Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	✓				
Were LCSs analyzed at the required frequency?	✓				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	✓				
Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?	✓				
Was the LCSD RPD within QC limits?			✓		
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?			✓		
Were MS/MSD analyzed at the appropriate frequency?			✓		
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?			✓		

Description	Yes	No	NA(1)	NR(2)	ER(3)
Were MS/MSD RPDs within laboratory QC limits?			✓		
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			✓		
Were analytical duplicates analyzed at the appropriate frequency?			✓		
Were RPDs or relative standard deviations within the laboratory QC limits?			✓		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	✓				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	✓				
Are unadjusted MQLs included in the laboratory data package?	✓				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	✓				
Were all necessary corrective actions performed for the reported data?	✓				
Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?	✓				
ICAL					
Were response factors and/or relative response factors for each analyte within QC limits?			✓		
Were percent RSDs or correlation coefficient criteria met?	✓				
Was the number of standards recommended in the method used for all analytes?	✓				
Were all points generated between the lowest and highest standard used to calculate the curve?	✓				
Are ICAL data available for all instruments used?	✓				
Has the initial calibration curve been verified using an appropriate second source standard?	✓				
Initial and continuing calibration verification (ICV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	✓				
Were percent differences for each analyte within the method-required QC limits?	✓				
Was the ICAL curve verified for each analyte?	✓				
Was the absolute value of the analyte concentration in the inorganic CCB <RL?	✓				
Mass spectral tuning:					
Was the appropriate compound for the method used for tuning?			✓		
Were ion abundance data within the method-required QC limits?			✓		
Internal standards (IS):					
Were IS area counts and retention times within the method-required QC limits?			✓		
Raw data (NELAC section 1 appendix A glossary, and section 5.12 or ISO/IEC 17025 section 4.12.2)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	✓				
Were data associated with manual integrations flagged on the raw data?			✓		
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			✓		
Tentatively identified compounds (TICs):					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			✓		
Interference Check Sample (ICS) results:					
Were percent recoveries within method QC limits?			✓		
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	✓				
Method detection limit (MDL) studies					
Was a MDL study performed for each reported analyte?	✓				
Is the MDL either adjusted or supported by the analysis of DCSs?	✓				
Proficiency test reports:					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	✓				

Description	Yes	No	NA(1)	NR(2)	ED(3)
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	✓				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	✓				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5C or ISO/IEC 4?	✓				
Is documentation of the analyst's competency up-to-date and on file?	✓				
Verification/validation documentation for methods (NELAC Chap 5 or ISO/IEC 17025 Section 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	✓				
Laboratory standard operating procedures (SOPs):					
Are laboratory SOPs current and on file for each method performed?	✓				

Microbac Laboratories Inc.
Laboratory Review Checklist

Laboratory Name:	Microbac Laboratories Inc.
Laboratory Log Number:	L08100257
Project Name:	798-LONGHORN
Method:	7471
Prep Batch Number(s):	WG284475
Reviewer Name:	MAREN M. BEERY
LRC Date:	October 15, 2008

EXCEPTIONS REPORT
ER# - Description
Footnotes:
(1) NA = Not applicable to method or project
(2) NR = Not reviewed
(3) ER# = Exception report number

Laboratory Data Package Cover Page

00073967

This data Package consists of:

This signature page, the laboratory review checklists, and the following reportable data:

R1 Field chain-of-custody documentation;

R2 sample identification cross-reference;

R3 Test reports (analytical data sheets) for each enviornmental sample that includes:

a) Items consistant with NELAC 5.13 or ISO/IEC 17025 Section 5.10

b) dilution factors,

c) preparation methods,

d) Cleanup methods, and

e) If required for the project, tentatively identified compounds (TICs)

R4 Surrogate recovery data including:

a) Calculated recovery (%R) for each analyte, and

b) The laboratory's surrogate QC limits.

R5 Test reports/summary forms for blank samples;

R6 Test reports/summary forms FOR laboratory control samples (LCSs) including:

a) LCS spiking amount,

b) Calculated %R for each analyte, and

c) The laboratory"s LCS QC limits.

R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:

a) Samples associated with the MS/MSD clearly identified,

b) MS/MSD spiking amounts,

c) Concentration of each MS/MSD analyte measured in the parent and spiked samples,

d) Calculated %R and relative percent differences (RPDs), and

e) The laboratory's MS/MSD QC limits

R8 Laboratory analytical duplicate (if applicable) revocery and precision:

a) the amount of analyte measured in the duplicate,

b) the calculated RPD, and

c) the laboratory's QC limits for anlytical duplicates.

R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix;

R10 Other problems or anomalies.

The exception Report for every "No" or "Not Reviewed (NR)" item in laboratory review checklist.

Release statement: I am responsible for the release of this laboratory data package. This data package has been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exceptions reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratoy in the Laboratory Review Checklist, and no information or data have been knowingly withheld that would affect the quality of the data.

Check, If applicable: [] This laboratory is an in-house laboratory controlled by the person repsonding to rule. The official signing the cover page of the rule-required report (for example, the APAR) in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is trus.

MAREN M. BEERY	Maren Beery	Metals Supervisor	October 16, 2008
Name (Printed)	Signature	Official Title (printed)	DATE

Microbac Laboratories Inc.
Laboratory Review Checklist

Laboratory Name:	Microbac Laboratories Inc.
Laboratory Log Number:	L08100257
Project Name:	798-LONGHORN
Method:	6010
Prep Batch Number(s):	WG284791
Reviewer Name:	MAREN M. BEERY
LRC Date:	October 16, 2008

Description	Yes	No	NA(1)	NR(2)	ER(3)
Chain-Of-Custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	✓				
Were all departures from standard conditions described in an exception report?	✓				
Sample and quality control (QC) identification					
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	✓				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	✓				
Test reports					
Were all samples prepared and analyzed within holding times?	✓				
Other than those results <MQL, were all other raw values bracketed by calibration standards?			✓		
Were calculations checked by a peer or supervisor?	✓				
Were all analyte identifications checked by a peer or supervisor?	✓				
Were sample quantitation limits reported for all analytes not detected?	✓				
Were all results for soil and sediment samples reported on a dry weight basis?	✓				
Were % moisture (or solids) reported for all soil and sediment samples?	✓				
If required for the project, TICs reported?			✓		
Surrogate recovery data					
Were surrogates added prior to extraction?			✓		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			✓		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	✓				
Were blanks analyzed at the appropriate frequency?	✓				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	✓				
Were blank concentrations <RL?	✓				
Laboratory control samples (LCS):					
Were all COCs included in the LCS?	✓				
Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	✓				
Were LCSs analyzed at the required frequency?	✓				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	✓				
Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?	✓				
Was the LCSD RPD within QC limits?			✓		
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?			✓		
Were MS/MSD analyzed at the appropriate frequency?			✓		
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?			✓		

Description	Yes	No	NA(1)	NR(2)	ER(3)
Were MS/MSD RPDs within laboratory QC limits?			✓		
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			✓		
Were analytical duplicates analyzed at the appropriate frequency?			✓		
Were RPDs or relative standard deviations within the laboratory QC limits?			✓		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	✓				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	✓				
Are unadjusted MQLs included in the laboratory data package?	✓				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	✓				
Were all necessary corrective actions performed for the reported data?	✓				
Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?	✓				
ICAL					
Were response factors and/or relative response factors for each analyte within QC limits?			✓		
Were percent RSDs or correlation coefficient criteria met?	✓				
Was the number of standards recommended in the method used for all analytes?	✓				
Were all points generated between the lowest and highest standard used to calculate the curve?	✓				
Are ICAL data available for all instruments used?	✓				
Has the initial calibration curve been verified using an appropriate second source standard?	✓				
Initial and continuing calibration verification (ICV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	✓				
Were percent differences for each analyte within the method-required QC limits?	✓				
Was the ICAL curve verified for each analyte?	✓				
Was the absolute value of the analyte concentration in the inorganic CCB <RL?	✓				
Mass spectral tuning:					
Was the appropriate compound for the method used for tuning?			✓		
Were ion abundance data within the method-required QC limits?			✓		
Internal standards (IS):					
Were IS area counts and retention times within the method-required QC limits?			✓		
Raw data (NELAC section 1 appendix A glossary, and section 5.12 or ISO/IEC 17025 section 4.12.2)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	✓				
Were data associated with manual integrations flagged on the raw data?			✓		
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			✓		
Tentatively identified compounds (TICs):					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			✓		
Interference Check Sample (ICS) results:					
Were percent recoveries within method QC limits?	✓				
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	✓				
Method detection limit (MDL) studies					
Was a MDL study performed for each reported analyte?	✓				
Is the MDL either adjusted or supported by the analysis of DCSs?	✓				
Proficiency test reports:					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	✓				

Description	Yes	No	NA(1)	NR(2)	ER(3)
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	✓				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	✓				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5C or ISO/IEC 4?	✓				
Is documentation of the analyst's competency up-to-date and on file?	✓				
Verification/validation documentation for methods (NELAC Chap 5 or ISO/IEC 17025 Section 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	✓				
Laboratory standard operating procedures (SOPs):					
Are laboratory SOPs current and on file for each method performed?	✓				

Microbac Laboratories Inc.
Laboratory Review Checklist

Laboratory Name:	Microbac Laboratories Inc.
Laboratory Log Number:	L08100257
Project Name:	798-LONGHORN
Method:	6010
Prep Batch Number(s):	WG284791
Reviewer Name:	MAREN M. BEERY
LRC Date:	October 16, 2008

EXCEPTIONS REPORT
ER# - Description
Footnotes:
(1) NA = Not applicable to method or project
(2) NR = Not reviewed
(3) ER# = Exception report number

Laboratory Data Package Cover Page

00073972

This data Package consists of:

This signature page, the laboratory review checklists, and the following reportable data:

R1 Field chain-of-custody documentation;

R2 sample identification cross-reference;

R3 Test reports (analytical data sheets) for each enviornmental sample that includes:

a) Items consistant with NELAC 5.13 or ISO/IEC 17025 Section 5.10

b) dilution factors,

c) preparation methods,

d) Cleanup methods, and

e) If required for the project, tentatively identified compounds (TICs)

R4 Surrogate recovery data including:

a) Calculated recovery (%R) for each analyte, and

b) The laboratory's surrogate QC limits.

R5 Test reports/summary forms for blank samples;

R6 Test reports/summary forms FOR laboratory control samples (LCSs) including:

a) LCS spiking amount,

b) Calculated %R for each analyte, and

c) The laboratory"s LCS QC limits.

R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:

a) Samples associated with the MS/MSD clearly identified,

b) MS/MSD spiking amounts,

c) Concentration of each MS/MSD analyte measured in the parent and spiked samples,

d) Calculated %R and relative percent differences (RPDs), and

e) The laboratory's MS/MSD QC limits

R8 Laboratory analytical duplicate (if applicable) revocery and precision:

a) the amount of analyte measured in the duplicate,

b) the calculated RPD, and

c) the laboratory's QC limits for anlytical duplicates.

R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix;

R10 Other problems or anomalies.

The exception Report for every "No" or "Not Reviewed (NR)" item in laboratory review checklist.

Release statement: I am responsible for the release of this laboratory data package. This data package has been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exceptions reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratoy in the Laboratory Review Checklist, and no information or data have been knowingly withheld that would affect the quality of the data.

Check, If applicable: [] This laboratory is an in-house laboratory controlled by the person repsonding to rule. The official signing the cover page of the rule-required report (for example, the APAR) in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is trus.

MAREN M. BEERY	Maren Beery	Metals Supervisor	October 16, 2008
Name (Printed)	Signature	Official Title (printed)	DATE

Microbac Laboratories Inc.
Laboratory Review Checklist

Laboratory Name:	Microbac Laboratories Inc.
Laboratory Log Number:	L08100257
Project Name:	798-LONGHORN
Method:	7471
Prep Batch Number(s):	WG284838
Reviewer Name:	MAREN M. BEERY
LRC Date:	October 16, 2008

Description	Yes	No	NA(1)	NR(2)	ER(3)
Chain-Of-Custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	✓				
Were all departures from standard conditions described in an exception report?	✓				
Sample and quality control (QC) identification					
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	✓				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	✓				
Test reports					
Were all samples prepared and analyzed within holding times?	✓				
Other than those results <MQL, were all other raw values bracketed by calibration standards?	✓				
Were calculations checked by a peer or supervisor?	✓				
Were all analyte identifications checked by a peer or supervisor?	✓				
Were sample quantitation limits reported for all analytes not detected?	✓				
Were all results for soil and sediment samples reported on a dry weight basis?	✓				
Were % moisture (or solids) reported for all soil and sediment samples?	✓				
If required for the project, TICs reported?			✓		
Surrogate recovery data					
Were surrogates added prior to extraction?			✓		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			✓		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	✓				
Were blanks analyzed at the appropriate frequency?	✓				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	✓				
Were blank concentrations <RL?	✓				
Laboratory control samples (LCS):					
Were all COCs included in the LCS?	✓				
Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	✓				
Were LCSs analyzed at the required frequency?	✓				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	✓				
Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?	✓				
Was the LCSD RPD within QC limits?			✓		
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?			✓		
Were MS/MSD analyzed at the appropriate frequency?			✓		
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?			✓		

Description	Yes	No	NA(1)	NR(2)	ER(3)
Were MS/MSD RPDs within laboratory QC limits?			✓		
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			✓		
Were analytical duplicates analyzed at the appropriate frequency?			✓		
Were RPDs or relative standard deviations within the laboratory QC limits?			✓		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	✓				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	✓				
Are unadjusted MQLs included in the laboratory data package?	✓				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	✓				
Were all necessary corrective actions performed for the reported data?	✓				
Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?	✓				
ICAL					
Were response factors and/or relative response factors for each analyte within QC limits?			✓		
Were percent RSDs or correlation coefficient criteria met?	✓				
Was the number of standards recommended in the method used for all analytes?	✓				
Were all points generated between the lowest and highest standard used to calculate the curve?	✓				
Are ICAL data available for all instruments used?	✓				
Has the initial calibration curve been verified using an appropriate second source standard?	✓				
Initial and continuing calibration verification (ICV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	✓				
Were percent differences for each analyte within the method-required QC limits?		✓			ER1
Was the ICAL curve verified for each analyte?	✓				
Was the absolute value of the analyte concentration in the inorganic CCB <RL?	✓				
Mass spectral tuning:					
Was the appropriate compound for the method used for tuning?			✓		
Were ion abundance data within the method-required QC limits?			✓		
Internal standards (IS):					
Were IS area counts and retention times within the method-required QC limits?			✓		
Raw data (NELAC section 1 appendix A glossary, and section 5.12 or ISO/IEC 17025 section 4.12.2)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	✓				
Were data associated with manual integrations flagged on the raw data?			✓		
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			✓		
Tentatively identified compounds (TICs):					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			✓		
Interference Check Sample (ICS) results:					
Were percent recoveries within method QC limits?			✓		
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	✓				
Method detection limit (MDL) studies					
Was a MDL study performed for each reported analyte?	✓				
Is the MDL either adjusted or supported by the analysis of DCSs?	✓				
Proficiency test reports:					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	✓				

Description	Yes	No	NA(1)	NR(2)	ER(3)
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	✓				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	✓				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5C or ISO/IEC 4?	✓				
Is documentation of the analyst's competency up-to-date and on file?	✓				
Verification/validation documentation for methods (NELAC Chap 5 or ISO/IEC 17025 Section 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	✓				
Laboratory standard operating procedures (SOPs):					
Are laboratory SOPs current and on file for each method performed?	✓				

Microbac Laboratories Inc.
Laboratory Review Checklist

Laboratory Name:	Microbac Laboratories Inc.
Laboratory Log Number:	L08100257
Project Name:	798-LONGHORN
Method:	7471
Prep Batch Number(s):	WG284838
Reviewer Name:	MAREN M. BEERY
LRC Date:	October 16, 2008

EXCEPTIONS REPORT
ER#1 - Due to continuing calibration verification failure for mercury on 15-OCT-2008 at 12:37, client sample 01 was reanalyzed on a later calibration which was compliant for mercury.
Footnotes:
(1) NA = Not applicable to method or project
(2) NR = Not reviewed
(3) ER# = Exception report number

Laboratory Data Package Cover Page

00073977

This data Package consists of:

This signature page, the laboratory review checklists, and the following reportable data:

R1 Field chain-of-custody documentation;

R2 sample identification cross-reference;

R3 Test reports (analytical data sheets) for each enviornmental sample that includes:

a) Items consistant with NELAC 5.13 or ISO/IEC 17025 Section 5.10

b) dilution factors,

c) preparation methods,

d) Cleanup methods, and

e) If required for the project, tentatively identified compounds (TICs)

R4 Surrogate recovery data including:

a) Calculated recovery (%R) for each analyte, and

b) The laboratory's surrogate QC limits.

R5 Test reports/summary forms for blank samples;

R6 Test reports/summary forms FOR laboratory control samples (LCSs) including:

a) LCS spiking amount,

b) Calculated %R for each analyte, and

c) The laboratory"s LCS QC limits.

R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:

a) Samples associated with the MS/MSD clearly identified,

b) MS/MSD spiking amounts,

c) Concentration of each MS/MSD analyte measured in the parent and spiked samples,

d) Calculated %R and relative percent differences (RPDs), and

e) The laboratory's MS/MSD QC limits

R8 Laboratory analytical duplicate (if applicable) revocery and precision:

a) the amount of analyte measured in the duplicate,

b) the calculated RPD, and

c) the laboratory's QC limits for anlytical duplicates.

R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix;

R10 Other problems or anomalies.

The exception Report for every "No" or "Not Reviewed (NR)" item in laboratory review checklist.

Release statement: I am responsible for the release of this laboratory data package. This data package has been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exceptions reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratoy in the Laboratory Review Checklist, and no information or data have been knowingly withheld that would affect the quality of the data.

Check, If applicable: [] This laboratory is an in-house laboratory controlled by the person repsonding to rule. The official signing the cover page of the rule-required report (for example, the APAR) in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is trus.

MAREN M. BEERY	Maren Beery	Metals Supervisor	October 14, 2008
Name (Printed)	Signature	Official Title (printed)	DATE

Microbac Laboratories Inc.
Laboratory Review Checklist

Laboratory Name:	Microbac Laboratories Inc.
Laboratory Log Number:	L08100257
Project Name:	798-LONGHORN
Method:	6020
Prep Batch Number(s):	WG284433
Reviewer Name:	MAREN M. BEERY
LRC Date:	October 14, 2008

Description	Yes	No	NA(1)	NR(2)	ER(3)
Chain-Of-Custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	✓				
Were all departures from standard conditions described in an exception report?	✓				
Sample and quality control (QC) identification					
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	✓				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	✓				
Test reports					
Were all samples prepared and analyzed within holding times?	✓				
Other than those results <MQL, were all other raw values bracketed by calibration standards?	✓				
Were calculations checked by a peer or supervisor?	✓				
Were all analyte identifications checked by a peer or supervisor?	✓				
Were sample quantitation limits reported for all analytes not detected?	✓				
Were all results for soil and sediment samples reported on a dry weight basis?	✓				
Were % moisture (or solids) reported for all soil and sediment samples?	✓				
If required for the project, TICs reported?			✓		
Surrogate recovery data					
Were surrogates added prior to extraction?			✓		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			✓		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	✓				
Were blanks analyzed at the appropriate frequency?	✓				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	✓				
Were blank concentrations <RL?	✓				
Laboratory control samples (LCS):					
Were all COCs included in the LCS?	✓				
Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	✓				
Were LCSs analyzed at the required frequency?	✓				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	✓				
Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?	✓				
Was the LCSD RPD within QC limits?			✓		
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?			✓		
Were MS/MSD analyzed at the appropriate frequency?			✓		
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?			✓		

Description	Yes	No	NA(1)	NR(2)	ER(3)
Were MS/MSD RPDs within laboratory QC limits?			✓		
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			✓		
Were analytical duplicates analyzed at the appropriate frequency?			✓		
Were RPDs or relative standard deviations within the laboratory QC limits?			✓		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	✓				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	✓				
Are unadjusted MQLs included in the laboratory data package?	✓				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	✓				
Were all necessary corrective actions performed for the reported data?	✓				
Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?	✓				
ICAL					
Were response factors and/or relative response factors for each analyte within QC limits?			✓		
Were percent RSDs or correlation coefficient criteria met?	✓				
Was the number of standards recommended in the method used for all analytes?	✓				
Were all points generated between the lowest and highest standard used to calculate the curve?	✓				
Are ICAL data available for all instruments used?	✓				
Has the initial calibration curve been verified using an appropriate second source standard?	✓				
Initial and continuing calibration verification (ICV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	✓				
Were percent differences for each analyte within the method-required QC limits?	✓				
Was the ICAL curve verified for each analyte?	✓				
Was the absolute value of the analyte concentration in the inorganic CCB <RL?	✓				
Mass spectral tuning:					
Was the appropriate compound for the method used for tuning?			✓		
Were ion abundance data within the method-required QC limits?			✓		
Internal standards (IS):					
Were IS area counts and retention times within the method-required QC limits?			✓		
Raw data (NELAC section 1 appendix A glossary, and section 5.12 or ISO/IEC 17025 section 4.12.2)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	✓				
Were data associated with manual integrations flagged on the raw data?			✓		
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			✓		
Tentatively identified compounds (TICs):					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			✓		
Interference Check Sample (ICS) results:					
Were percent recoveries within method QC limits?	✓				
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	✓				
Method detection limit (MDL) studies					
Was a MDL study performed for each reported analyte?	✓				
Is the MDL either adjusted or supported by the analysis of DCSs?	✓				
Proficiency test reports:					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	✓				

Description	Yes	No	NA(1)	NR(2)	ER(3)
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	✓				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	✓				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5C or ISO/IEC 4?	✓				
Is documentation of the analyst's competency up-to-date and on file?	✓				
Verification/validation documentation for methods (NELAC Chap 5 or ISO/IEC 17025 Section 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	✓				
Laboratory standard operating procedures (SOPs):					
Are laboratory SOPs current and on file for each method performed?	✓				

Microbac Laboratories Inc.
Laboratory Review Checklist

Laboratory Name:	Microbac Laboratories Inc.
Laboratory Log Number:	L08100257
Project Name:	798-LONGHORN
Method:	6020
Prep Batch Number(s):	WG284433
Reviewer Name:	MAREN M. BEERY
LRC Date:	October 14, 2008

EXCEPTIONS REPORT
ER# - Description
Footnotes:
(1) NA = Not applicable to method or project
(2) NR = Not reviewed
(3) ER# = Exception report number

Laboratory Data Package Cover Page

00073982

This data Package consists of:

This signature page, the laboratory review checklists, and the following reportable data:

R1 Field chain-of-custody documentation;

R2 sample identification cross-reference;

R3 Test reports (analytical data sheets) for each enviornmental sample that includes:

a) Items consistant with NELAC 5.13 or ISO/IEC 17025 Section 5.10

b) dilution factors,

c) preparation methods,

d) Cleanup methods, and

e) If required for the project, tentatively identified compounds (TICs)

R4 Surrogate recovery data including:

a) Calculated recovery (%R) for each analyte, and

b) The laboratory's surrogate QC limits.

R5 Test reports/summary forms for blank samples;

R6 Test reports/summary forms FOR laboratory control samples (LCSs) including:

a) LCS spiking amount,

b) Calculated %R for each analyte, and

c) The laboratory"s LCS QC limits.

R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:

a) Samples associated with the MS/MSD clearly identified,

b) MS/MSD spiking amounts,

c) Concentration of each MS/MSD analyte measured in the parent and spiked samples,

d) Calculated %R and relative percent differences (RPDs), and

e) The laboratory's MS/MSD QC limits

R8 Laboratory analytical duplicate (if applicable) revocery and precision:

a) the amount of analyte measured in the duplicate,

b) the calculated RPD, and

c) the laboratory's QC limits for anlytical duplicates.

R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix;

R10 Other problems or anomalies.

The exception Report for every "No" or "Not Reviewed (NR)" item in laboratory review checklist.

Release statement: I am responsible for the release of this laboratory data package. This data package has been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exceptions reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratoy in the Laboratory Review Checklist, and no information or data have been knowingly withheld that would affect the quality of the data.

Check, If applicable: [] This laboratory is an in-house laboratory controlled by the person repsonding to rule. The official signing the cover page of the rule-required report (for example, the APAR) in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is trus.

DEANNA I. HESSON	Deanna Hesson	Conventional Lab Supervisor	October 16, 2008
Name (Printed)	Signature	Official Title (printed)	DATE

Microbac Laboratories Inc.
Laboratory Review Checklist

Laboratory Name:	Microbac Laboratories Inc.
Laboratory Log Number:	L08100257
Project Name:	798-LONGHORN
Method:	PCTSOLIDS
Prep Batch Number(s):	QG284523
Reviewer Name:	DEANNA I. HESSON
LRC Date:	October 16, 2008

Description	Yes	No	NA(1)	NR(2)	ER(3)
Chain-Of-Custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	✓				
Were all departures from standard conditions described in an exception report?	✓				
Sample and quality control (QC) identification					
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	✓				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	✓				
Test reports					
Were all samples prepared and analyzed within holding times?	✓				
Other than those results <MQL, were all other raw values bracketed by calibration standards?			✓		
Were calculations checked by a peer or supervisor?	✓				
Were all analyte identifications checked by a peer or supervisor?			✓		
Were sample quantitation limits reported for all analytes not detected?			✓		
Were all results for soil and sediment samples reported on a dry weight basis?	✓				
Were % moisture (or solids) reported for all soil and sediment samples?	✓				
If required for the project, TICs reported?			✓		
Surrogate recovery data					
Were surrogates added prior to extraction?			✓		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			✓		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?			✓		
Were blanks analyzed at the appropriate frequency?			✓		
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?			✓		
Were blank concentrations <MQL?			✓		
Laboratory control samples (LCS):					
Were all COCs included in the LCS?			✓		
Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?			✓		
Were LCSs analyzed at the required frequency?			✓		
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?			✓		
Does the detectability data document the laboratorys capability to detect the COCs at the MDL used to calculate the SQLs?			✓		
Was the LCSD RPD within QC limits?			✓		
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?			✓		
Were MS/MSD analyzed at the appropriate frequency?			✓		
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?			✓		

Description	Yes	No	NA(1)	NR(2)	ER(3)
Were MS/MSD RPDs within laboratory QC limits?			✓		
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?	✓				
Were analytical duplicates analyzed at the appropriate frequency?	✓				
Were RPDs or relative standard deviations within the laboratory QC limits?	✓				
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?			✓		
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?			✓		
Are unadjusted MQLs included in the laboratory data package?			✓		
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	✓				
Were all necessary corrective actions performed for the reported data?	✓				
Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?			✓		
Were response factors and/or relative response factors for each analyte within QC limits?			✓		
Were percent RSDs or correlation coefficient criteria met?			✓		
Was the number of standards recommended in the method used for all analytes?			✓		
Were all points generated between the lowest and highest standard used to calculate the curve?			✓		
Are ICAL data available for all instruments used?			✓		
Has the initial calibration curve been verified using an appropriate second source standard?			✓		
Initial and continuing calibration verification (ICV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?			✓		
Were percent differences for each analyte within the method-required QC limits?			✓		
Was the ICAL curve verified for each analyte?			✓		
Was the absolute value of the analyte concentration in the inorganic CCB <MDL?			✓		
Mass spectral tuning:					
Was the appropriate compound for the method used for tuning?			✓		
Were ion abundance data within the method-required QC limits?			✓		
Internal standards (IS):					
Were IS area counts and retention times within the method-required QC limits?			✓		
Raw data (NELAC section 1 appendix A glossary, and section 5.12 or ISO/IEC 17025 section 4.12.2)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	✓				
Were data associated with manual integrations flagged on the raw data?			✓		
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			✓		
Tentatively identified compounds (TICs):					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			✓		
Interference Check Sample (ICS) results:					
Were percent recoveries within method QC limits?			✓		
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			✓		
Method detection limit (MDL) studies					
Was a MDL study performed for each reported analyte?			✓		
Is the MDL either adjusted or supported by the analysis of DCSs?			✓		
Proficiency test reports:					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?			✓		

Description	Yes	No	NA(1)	NR(2)	ED(3)
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?			✓		
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?			✓		
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5C or ISO/IEC 4?	✓				
Is documentation of the analyst's competency up-to-date and on file?	✓				
Verification/validation documentation for methods (NELAC Chap 5 or ISO/IEC 17025 Section 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	✓				
Laboratory standard operating procedures (SOPs):					
Are laboratory SOPs current and on file for each method performed?	✓				

Microbac Laboratories Inc.
Laboratory Review Checklist

Laboratory Name:	Microbac Laboratories Inc.
Laboratory Log Number:	L08100257
Project Name:	798-LONGHORN
Method:	PCTSOLIDS
Prep Batch Number(s):	QG284523
Reviewer Name:	DEANNA I. HESSON
LRC Date:	October 16, 2008

EXCEPTIONS REPORT
ER# - Description
Footnotes:
(1) NA = Not applicable to method or project
(2) NR = Not reviewed
(3) ER# = Exception report number

2.1 Metals Data

2.1.1 Metals I C P Data

2.1.1.1 Summary Data

LABORATORY REPORT

00073990

L08100257

10/17/08 08:46

Submitted By

Microbac Laboratories Inc.
158 Starlite Drive
Marietta , OH 45750
(740) 373 - 4071

For

Account Name: Shaw E & I, Inc.
ABB Lummus Biulding
3010 Briarpark Drive Suite 4N
Houston, TX 77042
Attention: Larry Duty

Project Number: 2773.025
Project: Longhorn AAP
Site: LONGHORN AAP KARNACK TX

P.O. Number: 389869/ 390836(GWTP)

Sample Analysis Summary

Client ID	Lab ID	Method	Dilution	Date Received
S49WC100808	L08100257-01	6010B	1	09-OCT-08
S49BS100908	L08100257-02	6010B	1	09-OCT-08

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Microbac Laboratories Inc.

Report Number: **L08100257**
Report Date : **October 17, 2008**

00073991

Sample Number: **L08100257-01**
Client ID: **S49WC100808**
Matrix: **Leachate**
Workgroup Number: **WG284810**
Collect Date: **10/08/2008 11:45**
Sample Tag: **01**

PrePrep Method: **1311**
Prep Method: **3015**
Analytical Method: **6010B**
Analyst: **JYH**
Dilution: **1**
Units: **mg/L**

Instrument: **PE-ICP2**
Prep Date: **10/14/2008 06:53**
Cal Date: **10/14/2008 10:51**
Run Date: **10/14/2008 11:54**
File ID: **P2.101408.115450**

Analyte	CAS.Number	Result	Qual	PQL	SDL	EPA HW#	Reg. Limit
Silver, TCLP	7440-22-4		U	.1	.05	D011	5
Arsenic, TCLP	7440-38-2		U	1	.1	D004	5
Barium, TCLP	7440-39-3	1.20	J	5	.025	D005	100
Cadmium, TCLP	7440-43-9		U	.1	.025	D006	1
Chromium, TCLP	7440-47-3		U	.2	.025	D007	5
Lead, TCLP	7439-92-1		U	1	.1	D008	5
Selenium, TCLP	7782-49-2		U	.8	.5	D010	1

U Not detected at or above adjusted sample detection limit
J The analyte was positively identified, but the quantitation was below the RL

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Report Number: **L08100257**
Report Date : **October 17, 2008**

00073992

Sample Number: **L08100257-02**
Client ID: **S49BS100908**
Matrix: **Soil**
Workgroup Number: **WG284673**
Collect Date: **10/09/2008 09:00**
Sample Tag: **01**

PrePrep Method: **NONE**
Prep Method: **3051**
Analytical Method: **6010B**
Analyst: **KHR**
Dilution: **1**
Units: **mg/kg**

Instrument: **IRIS-ICP**
Prep Date: **10/10/2008 08:18**
Cal Date: **10/13/2008 09:56**
Run Date: **10/13/2008 11:27**
File ID: **IR.101308.112700**
Percent Solid: **91.5**

Analyte	CAS. Number	Result	Qual	PQL	SDL
Silver, Total	7440-22-4		U	1.53	0.191
Barium, Total	7440-39-3	31.3		0.383	0.0766
Cadmium, Total	7440-43-9	0.170	J	0.383	0.0383
Chromium, Total	7440-47-3	3.31		0.766	0.0919
Lead, Total	7439-92-1	3.15	J	3.83	0.383

J The analyte was positively identified, but the quantitation was below the RL
U Not detected at or above adjusted sample detection limit

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2.1.1.2 QC Summary Data

Example 6010 Calculations
Perkin Elmer Optima 4300 DV

1.0 Initial Calibration (ICAL) Parameters
The system performs linear regression from data consisting of a blank and three standards.

2.0 Calculating the concentration (C) of an element in water using data from prep log, run log, and quantitation report (note:the data system performs this calculation automatically when correction factors have been entered):

$$Cx = Cs \times \frac{Vf}{Vi} \times D$$

Where:	**Example:**
Cs = Concentration computed by the data system in ug/mL (ppm)	0.1
Vf = Final volume (mL)	50
Vi = Initial volume (mL)	50
D = Dilution factor as a multiplier (10X = 10)	1
Cx = Concentration of element in ug/mL (mg/L)	0.1

3.0 Calculating the concentration (C) of an element in soil using data from prep log, run log, and quantitation report (note: the data system performs this calculation automatically when correction factors have been entered):

$$Cx = Cs \times \frac{Vf}{Vi} \times D$$

Where:	**Example:**
Cs = Concentration computed by the data system (mg/L) (ppm)	0.1
Vf = Final volume (mL)	50
Vi = Initial weight (g)	1
D = Dilution factor as a multiplier (10X = 10)	1
Cx = Concentration of element in ug/g (mg/kg)	5

4.0 Adjusting the concentration to dry weight:

$$Cdry = \frac{Cx \times 100}{Px}$$

Where:	**Example:**
Cx = Concentration calculated as received (wet basis)	5
Px = Percent solids of sample (%wt)	80
$Cdry$ = Concentration calculated as dry weight (mg/kg)	6.25

Example 6010 Calculations
Thermo Scientific IRIS Advantage

1.0 Initial Calibration (ICAL) Parameters
The system performs linear regression from data consisting of a blank and three standards.

2.0 Calculating the concentration (C) of an element in water using data from prep log, run log, and quantitation report (note:the data system performs this calculation automatically when correction factors have been entered):

$$Cx = Cs \times \frac{Vf}{Vi} \times D$$

Where:	**Example:**
Cs = Concentration computed by the data system in ug/mL (ppm)	0.1
Vf = Final volume (mL)	50
Vi = Initial volume (mL)	50
D = Dilution factor as a multiplier (10X = 10)	1
Cx = Concentration of element in ug/mL (mg/L)	0.1

3.0 Calculating the concentration (C) of an element in soil using data from prep log, run log, and quantitation report (note: the data system performs this calculation automatically when correction factors have been entered):

$$Cx = Cs \times \frac{Vf}{Vi} \times D$$

Where:	**Example:**
Cs = Concentration computed by the data system (mg/L) (ppm)	0.1
Vf = Final volume (mL)	50
Vi = Initial weight (g)	1
D = Dilution factor as a multiplier (10X = 10)	1
Cx = Concentration of element in ug/g (mg/kg)	5

4.0 Adjusting the concentration to dry weight:

$$Cdry = \frac{Cx \times 100}{Px}$$

Where:	**Example:**
Cx = Concentration calculated as received (wet basis)	5
Px = Percent solids of sample (%wt)	80
$Cdry$ = Concentration calculated as dry weight (mg/kg)	6.25

Example 6010 Calculations
Thermo Scientific iCAP 6500

1.0 Initial Calibration (ICAL) Parameters
The system performs linear regression from data consisting of a blank and four standards.

2.0 Calculating the concentration (C) of an element in water using data from prep log, run log, and quantitation report (note:the data system performs this calculation automatically when correction factors have been entered):

$$Cx = Cs \times \frac{Vf}{Vi} \times D$$

Where:	**Example:**
Cs = Concentration computed by the data system in ug/mL (ppm)	0.1
Vf = Final volume (mL)	50
Vi = Initial volume (mL)	50
D = Dilution factor as a multiplier (10X = 10)	1
Cx = Concentration of element in ug/mL (mg/L)	0.1

3.0 Calculating the concentration (C) of an element in soil using data from prep log, run log, and quantitation report (note: the data system performs this calculation automatically when correction factors have been entered):

$$Cx = Cs \times \frac{Vf}{Vi} \times D$$

Where:	**Example:**
Cs = Concentration computed by the data system (mg/L) (ppm)	0.1
Vf = Final volume (mL)	50
Vi = Initial weight (g)	1
D = Dilution factor as a multiplier (10X = 10)	1
Cx = Concentration of element in ug/g (mg/kg)	5

4.0 Adjusting the concentration to dry weight:

$$Cdry = \frac{Cx \times 100}{Px}$$

Where:	**Example:**
Cx = Concentration calculated as received (wet basis)	5
Px = Percent solids of sample (%wt)	80
$Cdry$ = Concentration calculated as dry weight (mg/kg)	6.25

00073997

Microbac Laboratories Inc.
Microwave Digestion Log

Workgroup: WG284491
Analyst: PDM
Run Date: 10/10/2008 08:30
Method: 3051

SOP: ME406 Revison 11
Spike Solution: STD27613
Spike Witness: VC
HNO3 Lot #: COA13347
hcl Lot #: COA13324
Digest tubes Lot #: COA13407

SAMPLE #	Type	Initial Amount	Final Volume	Initial Vessel Wt	Final Vessel Wt	Spike Amount	Due Date
WG284491-02	BLANK	1 g	50 mL	175.259 g	175.221 g		
WG284491-03	LCS	1 g	50 mL	181.714 g	181.703 g	5 mL	
L08100257-02	SAMP	1.427 g	50 mL	179.036 g	179.024 g		10/16/08
L08100267-01	SAMP	1.406 g	50 mL	179.239 g	179.23 g		10/16/08
L08100267-02	SAMP	1.358 g	50 mL	179.955 g	179.95 g		10/16/08
L08100267-03	SAMP	1.314 g	50 mL	178.748 g	178.713 g		10/16/08
L08100272-02	SAMP	1.435 g	50 mL	179.662 g	179.652 g		10/20/08
L08100272-04	SAMP	1.379 g	50 mL	177.987 g	177.953 g		10/20/08
WG284491-01	REF	1.393 g	50 mL	177.823 g	177.78 g		
L08100272-06	RS01	1.393 g	50 mL	177.823 g	177.78 g		10/20/08
WG284491-04	MS	1.393 g	50 mL	182.458 g	182.39 g	5 mL	
L08100272-08	MS01	1.393 g	50 mL	182.458 g	182.39 g	5 mL	10/20/08
WG284491-05	MSD	1.393 g	50 mL	183.468 g	183.441 g	5 mL	
L08100272-10	SD01	1.393 g	50 mL	183.468 g	183.441 g	5 mL	10/20/08
L08100272-12	SAMP	1.339 g	50 mL	177.198 g	177.181 g		10/20/08
L08100272-14	SAMP	1.318 g	50 mL	177.943 g	177.904 g		10/20/08
L08100272-16	SAMP	1.358 g	50 mL	177.722 g	177.693 g		10/20/08
L08100272-18	SAMP	1.47 g	50 mL	177.422 g	177.363 g		10/20/08

Analyst: Pierce Morris

Reviewer:

MW_DIG - Modified 07/02/2008
PDF ID: 1217766
Report generated: 10/10/2008 09:16

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TCLP Non-Volatile

Analyst(s): RWC
Date: 10-13-08

Analyst/Date		Analyst/Date	
RWC 10-13-08		TDH 10-14-08	
Time On	Temp On °C	Time Off	Temp Off °C
1200	23	0510	23

Jug #	Sample #	Tests	Method	Fluid #	Matrix*	%Solid	Size Reduction Yes	Size Reduction No	Int. Wt. (g)	Fluid Vol. (mL)
G 7	10-0272-03	ME 8082 PAH	1312	SFI-307	S/S	100		✓	110.01	2200
G 1	05								110.00	
G 4	07	MS 8270RS							110.08	
G 17	09	MS MS MS							110.07	
G 29	11	SD SD SD							110.05	
G 2	13								110.07	
G 26	15								110.02	
G 3	17								110.05	
G 10	19								110.03	
N/A	FBLK	8082 PAH			N/A	N/A			2200	
G-11	10-261-02	DRO GRO	WET-DI	DI	S/S	100			100.00	2000
G 5	04								100.00	
G 12	06								100.07	
G 18	08								100.05	
G 6	13								100.04	
G-31	15								100.08	
G 23	19								100.00	
G 30	21								100.00	
G 19	10-329-20								100.05	
G 15	22								100.00	
G 25	24								100.02	
G 32	26								100.05	
G 8	30								100.01	
G 9	32								100.06	
G 27	35								100.08	
G 14	37								100.02	
G 16	39								100.07	
G 22	41								100.00	
N/A	FBLK				N/A	N/A			2000	
D	10-257-01	ME	1311	FI-725	S/S	100			100.00	
N/A	FBLK				N/A	N/A		✓	2000	

*Matrix Code = (S-solid) (SS-sand, soil or sludge) (P-paint) (O-organic) (W-water or waste)
Agitator speed is 30 ± 2 rpm unless otherwise noted.

Comments: RWC 10-13-08

Peer Review By: _____ Supervisor Review: _____

00073999

Microbac Laboratories Inc.
Microwave Digestion Log

Workgroup: WG284791
Analyst: VC
Run Date: 10/14/2008 06:52
Method: 3015

SOP: ME407 Revison 10
Spike Solution: STD27612
Spike Witness: REK
HNO3 Lot #: COA13347
Digest tubes Lot #: COA13407

SAMPLE #	Type	Matrix	Initial Amount	Final Volume	Initial Vessel Wt	Final Vessel Wt	Spike Amount	Due Date
WG284791-02	BLANK	17	50 mL	50 mL	204.504 g	204.475 g		
WG284725-01	FBLK	17	5 mL	50 mL	213.668 g	213.647 g		
WG284791-03	LCS	17	50 mL	50 mL	205.385 g	205.368 g	5 mL	
WG284791-01	REF	17	5 mL	50 mL	210.867 g	210.839 g		
L08100257-01	SAMP	17	5 mL	50 mL	210.867 g	210.839 g		10/16/08
WG284791-04	MS	17	5 mL	50 mL	207.56 g	207.538 g	5 mL	
WG284791-05	MSD	17	5 mL	50 mL	208.54 g	208.522 g	5 mL	

Analyst: Vicki Collins

Reviewer:

MW_DIG - Modified 07/02/2008
PDF ID: 1220507
Report generated: 10/14/2008 07:46

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Microbac Laboratories Inc.

Instrument Run Log

Instrument: IRIS-ICP Dataset: 20081013.1
Analyst1: KHR Analyst2: N/A
Method: 6010B SOP: ME600E Rev: 8
Maintenance Log ID: 26163

Calibration Std: STD28931 ICV/CCV Std: STD29150 Post Spike: STD27612
ICSA: STD28929 ICSAB: STD28982

Workgroups: 284518, 284673, 284675, 284676

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
1	IR.101308.092500	WG284736-01	Calibration Point		1		10/13/08 09:25
2	IR.101308.093100	WG284736-02	Calibration Point		1		10/13/08 09:31
3	IR.101308.093700	WG284736-03	Calibration Point		1		10/13/08 09:37
4	IR.101308.094300	WG284736-04	Calibration Point		1		10/13/08 09:43
5	IR.101308.095000	WG284736-05	Calibration Point		1		10/13/08 09:50
6	IR.101308.095600	WG284736-06	Calibration Point		1		10/13/08 09:56
7	IR.101308.100300	WG284736-07	Initial Calibration Verification		1		10/13/08 10:03
8	IR.101308.100900	WG284736-08	Initial Calib Blank		1		10/13/08 10:09
9	IR.101308.101500	WG284736-09	Interference Check		1		10/13/08 10:15
10	IR.101308.102100	WG284736-10	Interference Check		1		10/13/08 10:21
11	IR.101308.102700	WG284736-11	CCV		1		10/13/08 10:27
12	IR.101308.103300	WG284736-12	CCB		1		10/13/08 10:33
13	IR.101308.104700	L08100235-01	0810-87-001	1.4/50	2		10/13/08 10:47
14	IR.101308.105300	L08100235-01	0810-87-001		5		10/13/08 10:53
15	IR.101308.105900	WG284736-13	CCV		1		10/13/08 10:59
16	IR.101308.110500	WG284736-14	CCB		1		10/13/08 11:05
17	IR.101308.111400	WG284491-02	Method/Prep Blank	1/50	1		10/13/08 11:14
18	IR.101308.112100	WG284491-03	Laboratory Control S	1/50	1		10/13/08 11:21
19	IR.101308.112700	L08100257-02	S49BS100908	1.427/50	1		10/13/08 11:27
20	IR.101308.113300	L08100267-01	WR-10 COMP 1	1.406/50	1		10/13/08 11:33
21	IR.101308.113900	L08100267-02	WR-10 COMP 2	1.358/50	1		10/13/08 11:39
22	IR.101308.114500	L08100267-03	WR-10 COMP 3	1.314/50	1		10/13/08 11:45
23	IR.101308.115100	L08100272-02	AV-NCB-AS-RR12-17.5-19.5	1.435/50	1		10/13/08 11:51
24	IR.101308.115700	WG284673-01	Post Digestion Spike		1	L08100272-02	10/13/08 11:57
25	IR.101308.120300	WG284673-02	Serial Dilution		5	L08100272-02	10/13/08 12:03
26	IR.101308.120900	WG284673-02	Serial Dilution		25	L08100272-02	10/13/08 12:09
27	IR.101308.121500	WG284736-15	CCV		1		10/13/08 12:15
28	IR.101308.122100	WG284736-16	CCB		1		10/13/08 12:21
29	IR.101308.122800	L08100272-04	AV-NCB-AS-RR12-19.5-21-G	1.379/50	1		10/13/08 12:28
30	IR.101308.123400	WG284491-01	Reference Sample		1	L08100272-06	10/13/08 12:34
31	IR.101308.124000	WG284491-04	Matrix Spike	1.393/50	1	L08100272-06	10/13/08 12:40
32	IR.101308.124600	WG284491-05	Matrix Spike Duplica	1.393/50	1	L08100272-06	10/13/08 12:46
33	IR.101308.125200	L08100272-12	AV-NCB-AS-VIS-RR10-18.5-	1.339/50	1		10/13/08 12:52
34	IR.101308.125800	L08100272-14	AV-NCB-AS-VIS-RR10-25-D	1.318/50	1		10/13/08 12:58
35	IR.101308.130400	L08100272-16	AV-NCB-AS-AC1-RR08-17-1	1.358/50	1		10/13/08 13:04
36	IR.101308.131000	L08100272-18	AV-NCB-AS-AC1-RR08-19-1	1.47/50	1		10/13/08 13:10
37	IR.101308.131600	WG284539-02	Method/Prep Blank	1/50	1		10/13/08 13:16

Approved: October 15, 2008

Maren Berry

Microbac®

Microbac Laboratories Inc.

Instrument Run Log

Instrument: IRIS-ICP Dataset: 20081013.1
Analyst1: KHR Analyst2: N/A
Method: 6010B SOP: ME600E Rev: 8
Maintenance Log ID: 26163

Calibration Std: STD28931 ICV/CCV Std: STD29150 Post Spike: STD27612
ICSA: STD28929 ICSAB: STD28982

Workgroups: 284518, 284673, 284675, 284676

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
38	IR.101308.132200	WG284539-03	Laboratory Control S	1/50	1		10/13/08 13:22
39	IR.101308.132800	WG284736-17	CCV		1		10/13/08 13:28
40	IR.101308.133400	WG284736-18	CCB		1		10/13/08 13:34
41	IR.101308.134000	L08100288-08	15847-C0023	1.366/50	2		10/13/08 13:40
42	IR.101308.134600	WG284675-01	Post Digestion Spike		2	L08100288-08	10/13/08 13:46
43	IR.101308.135300	WG284675-02	Serial Dilution		10	L08100288-08	10/13/08 13:53
44	IR.101308.135900	WG284675-02	Serial Dilution		50	L08100288-08	10/13/08 13:59
45	IR.101308.140500	L08100288-09	15847-C0024	1.338/50	2		10/13/08 14:05
46	IR.101308.141100	L08100288-10	15847-C0025	1.476/50	2		10/13/08 14:11
47	IR.101308.141700	WG284539-01	Reference Sample		2	L08100288-11	10/13/08 14:17
48	IR.101308.142300	WG284539-04	Matrix Spike	1.439/50	2	L08100288-11	10/13/08 14:23
49	IR.101308.142900	WG284539-05	Matrix Spike Duplica	1.439/50	2	L08100288-11	10/13/08 14:29
50	IR.101308.143500	L08100288-14	15851-C0021	1.304/50	2		10/13/08 14:35
51	IR.101308.144100	WG284736-19	CCV		1		10/13/08 14:41
52	IR.101308.144700	WG284736-20	CCB		1		10/13/08 14:47
53	IR.101308.145300	L08100288-15	15853-G0005	1.47/50	2		10/13/08 14:53
54	IR.101308.145900	L08100288-16	15853-G0006	1.348/50	2		10/13/08 14:59
55	IR.101308.150500	L08100288-17	15853-G0007	1.406/50	2		10/13/08 15:05
56	IR.101308.151200	L08100288-18	15853-G0008	1.324/50	2		10/13/08 15:12
57	IR.101308.151800	L08100288-21	15853-G0011	1.347/50	2		10/13/08 15:18
58	IR.101308.152400	L08100288-22	15853-G0012	1.411/50	2		10/13/08 15:24
59	IR.101308.153000	L08100288-25	15853-G0015	1.339/50	2		10/13/08 15:30
60	IR.101308.153600	L08100288-26	15853-G0016	1.462/50	2		10/13/08 15:36
61	IR.101308.154200	L08100288-31	15853-G0019	1.363/50	2		10/13/08 15:42
62	IR.101308.154800	L08100288-32	15854-C0015	1.432/50	2		10/13/08 15:48
63	IR.101308.155400	WG284736-21	CCV		1		10/13/08 15:54
64	IR.101308.160000	WG284736-22	CCB		1		10/13/08 16:00
65	IR.101308.160600	L08100288-33	15854-C0016	1.328/50	2		10/13/08 16:06
66	IR.101308.161200	L08100288-34	15854-C0017	1.314/50	2		10/13/08 16:12
67	IR.101308.161800	L08100288-35	15854-C0018	1.449/50	2		10/13/08 16:18
68	IR.101308.162400	L08100288-36	15854-C0019	1.304/50	2		10/13/08 16:24
69	IR.101308.163000	L08100288-37	15854-C0020	1.365/50	2		10/13/08 16:30
70	IR.101308.163700	WG284214-02	Method/Prep Blank	1/50	1		10/13/08 16:37
71	IR.101308.164300	WG284214-03	Laboratory Control S	1/50	1		10/13/08 16:43
72	IR.101308.164900	L08100049-18	ORG-Q2A-229-10	1.478/50	1		10/13/08 16:49
73	IR.101308.165500	WG284676-01	Post Digestion Spike		1	L08100049-18	10/13/08 16:55
74	IR.101308.170100	WG284676-02	Serial Dilution		5	L08100049-18	10/13/08 17:01

Approved: October 15, 2008

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Instrument Run Log

Instrument: IRIS-ICP Dataset: 20081013.1
Analyst1: KHR Analyst2: N/A
Method: 6010B SOP: ME600E Rev: 8
Maintenance Log ID: 26163

Calibration Std: STD28931 ICV/CCV Std: STD29150 Post Spike: STD27612
ICSA: STD28929 ICSAB: STD28982

Workgroups: 284518, 284673, 284675, 284676

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
75	IR.101308.170700	WG284736-23	CCV		1		10/13/08 17:07
76	IR.101308.171300	WG284736-24	CCB		1		10/13/08 17:13
77	IR.101308.171900	WG284676-02	Serial Dilution		25	L08100049-18	10/13/08 17:19
78	IR.101308.172500	L08100049-19	ORG-S3A-229-10	1.498/50	1		10/13/08 17:25
79	IR.101308.173200	L08100049-20	ORG-T1A-229-10	1.328/50	1		10/13/08 17:32
80	IR.101308.173800	L08100049-21	ORG-T4A-229-10	1.47/50	1		10/13/08 17:38
81	IR.101308.174400	WG284214-01	Reference Sample		1	L08100049-22	10/13/08 17:44
82	IR.101308.175000	WG284214-04	Matrix Spike	1.47/50	1	L08100049-22	10/13/08 17:50
83	IR.101308.175600	WG284214-05	Matrix Spike Duplica	1.47/50	1	L08100049-22	10/13/08 17:56
84	IR.101308.180200	L08100049-25	ORG-V4A-229-10	1.364/50	1		10/13/08 18:02
85	IR.101308.180800	L08100049-26	ORG-V4B-229-10	1.344/50	1		10/13/08 18:08
86	IR.101308.181400	L08100049-27	ORG-W3A-229-10	1.349/50	1		10/13/08 18:14
87	IR.101308.182000	WG284736-25	CCV		1		10/13/08 18:20
88	IR.101308.182600	WG284736-26	CCB		1		10/13/08 18:26
89	IR.101308.183200	L08100049-28	ORG-Y2A-229-10	1.337/50	1		10/13/08 18:32
90	IR.101308.183900	L08100049-29	ORG-Z1A-229-10	1.338/50	1		10/13/08 18:39
91	IR.101308.184500	L08100049-30	ORG-Z4A-229-10	1.335/50	1		10/13/08 18:45
92	IR.101308.185100	L08100049-31	ORG-HH1-229-10	1.354/50	1		10/13/08 18:51
93	IR.101308.185700	L08100049-32	ORG-EE1-229-10	1.356/50	1		10/13/08 18:57
94	IR.101308.190300	L08100049-33	ORG-AA1-229-10	1.355/50	1		10/13/08 19:03
95	IR.101308.190900	L08100049-34	ORG-DD1-229-10	1.391/50	1		10/13/08 19:09
96	IR.101308.191500	WG284736-27	CCV		1		10/13/08 19:15
97	IR.101308.192100	WG284736-28	CCB		1		10/13/08 19:21

Approved: October 15, 2008

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Instrument Run Log

Instrument: PE-ICP2 Dataset: 101408H.CSV

Analyst1: JYH Analyst2: ED

Method: 6010B SOP: ME600E Rev: 8

Maintenance Log ID: 26187

Calibration Std: STD29127 ICV/CCV Std: STD29146 Post Spike: STD27612

ICSA: STD29188 ICSAB: STD29044

Workgroups: 284730,284810,284732,284871,284872,284874,284877

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
1	P2.101408.102643	WG284928-01	Calibration Point		1		10/14/08 10:26
2	P2.101408.103255	WG284928-02	Calibration Point		1		10/14/08 10:32
3	P2.101408.103911	WG284928-03	Calibration Point		1		10/14/08 10:39
4	P2.101408.104526	WG284928-04	Calibration Point		1		10/14/08 10:45
5	P2.101408.105142	WG284928-05	Calibration Point		1		10/14/08 10:51
6	P2.101408.105711	WG284928-06	Initial Calibration Verification		1		10/14/08 10:57
7	P2.101408.110234	WG284928-07	Initial Calib Blank		1		10/14/08 11:02
8	P2.101408.110853	WG284928-08	Interference Check		1		10/14/08 11:08
9	P2.101408.111413	WG284928-09	Interference Check		1		10/14/08 11:14
10	P2.101408.111933	WG284928-10	CCV		1		10/14/08 11:19
11	P2.101408.112453	WG284928-11	CCB		1		10/14/08 11:24
12	P2.101408.112941	L08100294-04	OUTFALL 003/COMP	50/50	50		10/14/08 11:29
13	P2.101408.113558	WG284791-02	Method/Prep Blank	50/50	1		10/14/08 11:35
14	P2.101408.114213	WG284791-02	Method/Prep Blank	50/50	1		10/14/08 11:42
15	P2.101408.114833	WG284725-01	Fluid Blank		1		10/14/08 11:48
16	P2.101408.115450	WG284791-01	Reference Sample		1	L08100257-01	10/14/08 11:54
17	P2.101408.120114	WG284810-01	Post Digestion Spike		1	L08100257-01	10/14/08 12:01
18	P2.101408.120735	WG284810-02	Serial Dilution		5	L08100257-01	10/14/08 12:07
19	P2.101408.121351	WG284791-04	Matrix Spike	5/50	1	L08100257-01	10/14/08 12:13
20	P2.101408.122013	WG284791-05	Matrix Spike Duplica	5/50	1	L08100257-01	10/14/08 12:20
21	P2.101408.122634	L08100295-02	LTL-G-MWL2A-DIS	50/50	5		10/14/08 12:26
22	P2.101408.123259	WG284928-12	CCV		1		10/14/08 12:32
23	P2.101408.123819	WG284928-13	CCB		1		10/14/08 12:38
24	P2.101408.124437	L08100295-04	LTL-G-MWL7-DIS	50/50	2		10/14/08 12:44
25	P2.101408.125103	WG284872-03	Louisville Chem Requ		1		10/14/08 12:51
26	P2.101408.125717	L08100295-06	LTL-G-MWL9-DIS	50/50	20		10/14/08 12:57
27	P2.101408.130342	L08100302-02	LTL-G-MWL6-DIS	50/50	10		10/14/08 13:03
28	P2.101408.131028	WG284872-04	Louisville Chem Requ		1		10/14/08 13:10
29	P2.101408.131742	L08100302-04	LTL-G-MWL13A-DIS	50/50	10		10/14/08 13:17
30	P2.101408.132402	L08100302-06	LTL-G-MWL14A-DIS	50/50	5		10/14/08 13:24
31	P2.101408.133025	WG284664-01	Reference Sample		2	L08100306-02	10/14/08 13:30
32	P2.101408.133642	WG284732-01	Post Digestion Spike		2	L08100306-02	10/14/08 13:36
33	P2.101408.134304	WG284732-02	Serial Dilution		10	L08100306-02	10/14/08 13:43
34	P2.101408.134923	WG284928-14	CCV		1		10/14/08 13:49
35	P2.101408.135445	WG284928-15	CCB		1		10/14/08 13:54
36	P2.101408.140100	WG284664-04	Matrix Spike	50/50	2	L08100306-02	10/14/08 14:01
37	P2.101408.140719	WG284664-05	Matrix Spike Duplica	50/50	2	L08100306-02	10/14/08 14:07

Approved: October 16, 2008

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Instrument Run Log

Instrument: PE-ICP2 Dataset: 101408H.CSV

Analyst1: JYH Analyst2: ED

Method: 6010B SOP: ME600E Rev: 8

Maintenance Log ID: 26187

Calibration Std: STD29127 ICV/CCV Std: STD29146 Post Spike: STD27612

ICSA: STD29188 ICSAB: STD29044

Workgroups: 284730,284810,284732,284871,284872,284874,284877

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
38	P2.101408.141333	L08100306-10	LTL-G-MWL5B-DIS	50/50	2		10/14/08 14:13
39	P2.101408.141959	L08100306-12	LTL-G-MWL5B-DUP-DIS	50/50	2		10/14/08 14:19
40	P2.101408.142623	WG284795-02	Method/Prep Blank	50/50	1		10/14/08 14:26
41	P2.101408.143237	WG284795-03	Laboratory Control S	50/50	1		10/14/08 14:32
42	P2.101408.143948	L08100378-01	0810-059-1	50/50	1		10/14/08 14:39
43	P2.101408.144612	L08100378-02	0810-059-2	50/50	1		10/14/08 14:46
44	P2.101408.145226	L08100378-03	0810-059-3	50/50	1		10/14/08 14:52
45	P2.101408.145847	L08100378-04	0810-059-4	50/50	1		10/14/08 14:58
46	P2.101408.150507	WG284928-16	CCV		1		10/14/08 15:05
47	P2.101408.151029	WG284928-17	CCB		1		10/14/08 15:10
48	P2.101408.151647	L08100378-05	0810-107-1	50/50	1		10/14/08 15:16
49	P2.101408.152307	L08100378-06	0810-107-2	50/50	1		10/14/08 15:23
50	P2.101408.152921	L08100378-07	0810-107-3	50/50	1		10/14/08 15:29
51	P2.101408.153539	L08100378-08	0810-107-4	50/50	1		10/14/08 15:35
52	P2.101408.154200	L08100378-09	0810-096-1	50/50	1		10/14/08 15:42
53	P2.101408.154717	L08100378-10	0810-098-1	50/50	1		10/14/08 15:47
54	P2.101408.155342	L08100378-11	0810-109-1	50/50	1		10/14/08 15:53
55	P2.101408.160003	L08100378-12	0810-109-2	50/50	1		10/14/08 16:00
56	P2.101408.160618	L08100378-13	0810-109-3	50/50	1		10/14/08 16:06
57	P2.101408.161143	WG284795-01	Reference Sample		1	L08100378-14	10/14/08 16:11
58	P2.101408.161803	WG284928-18	CCV		1		10/14/08 16:18
59	P2.101408.162325	WG284928-19	CCB		1		10/14/08 16:23
60	P2.101408.162940	WG284871-01	Post Digestion Spike		1	L08100378-14	10/14/08 16:29
61	P2.101408.163601	WG284871-02	Serial Dilution		5	L08100378-14	10/14/08 16:36
62	P2.101408.164215	WG284795-04	Matrix Spike	50/50	1	L08100378-14	10/14/08 16:42
63	P2.101408.164836	WG284795-05	Matrix Spike Duplica	50/50	1	L08100378-14	10/14/08 16:48
64	P2.101408.165457	WG284872-02	Serial Dilution	50/50	1	L08100299-01	10/14/08 16:54
65	P2.101408.170110	WG284872-03	Louisville Chem Requ	50/50	1		10/14/08 17:01
66	P2.101408.170731	L08100275-01	100608GWMST276-O-U	50/50	1		10/14/08 17:07
67	P2.101408.171349	L08100275-02	100608GWMST276-O-F	50/50	1		10/14/08 17:13
68	P2.101408.172014	L08100275-03	100608GWMMW010-O-U	50/50	1		10/14/08 17:20
69	P2.101408.172632	L08100275-04	100608GWMMW010-O-F	50/50	1		10/14/08 17:26
70	P2.101408.173257	WG284928-20	CCV		1		10/14/08 17:32
71	P2.101408.173818	WG284928-21	CCB		1		10/14/08 17:38
72	P2.101408.174434	L08100275-05	100708GWMMW026-O-U	50/50	1	WG284505-04	10/14/08 17:44
73	P2.101408.175102	L08100275-06	100708GWMMW026-O-F	50/50	1		10/14/08 17:51
74	P2.101408.175719	WG284794-01	Reference Sample		1	L08100299-01	10/14/08 17:57

Approved: October 16, 2008

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Instrument Run Log

Instrument: PE-ICP2 Dataset: 101408H.CSV

Analyst1: JYH Analyst2: ED

Method: 6010B SOP: ME600E Rev: 8

Maintenance Log ID: 26187

Calibration Std: STD29127 ICV/CCV Std: STD29146 Post Spike: STD27612

ICSA: STD29188 ICSAB: STD29044

Workgroups: 284730,284810,284732,284871,284872,284874,284877

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
75	P2.101408.180340	WG284872-01	Post Digestion Spike		1	L08100299-01	10/14/08 18:03
76	P2.101408.181001	WG284872-02	Serial Dilution		5	L08100299-01	10/14/08 18:10
77	P2.101408.181623	WG284794-04	Matrix Spike	50/50	1	L08100299-01	10/14/08 18:16
78	P2.101408.182237	WG284794-05	Matrix Spike Duplica	50/50	1	L08100299-01	10/14/08 18:22
79	P2.101408.182858	L08100299-02	10-021-08	50/50	1		10/14/08 18:28
80	P2.101408.183422	L08100299-03	10-021-08	50/50	1		10/14/08 18:34
81	P2.101408.183939	L08100299-04	10-022-08	50/50	1		10/14/08 18:39
82	P2.101408.184557	WG284928-22	CCV		1		10/14/08 18:45
83	P2.101408.185119	WG284928-23	CCB		1		10/14/08 18:51
84	P2.101408.185735	L08100299-05	10-022-08	50/50	1		10/14/08 18:57
85	P2.101408.190354	L08100335-01	SE-3037P	50/50	1		10/14/08 19:03
86	P2.101408.191019	L08100360-22	AV-NCB-AS-AC1-EQB	50/50	1		10/14/08 19:10
87	P2.101408.191634	L08100367-01	15802-W2095	50/50	1		10/14/08 19:16
88	P2.101408.192254	L08100367-02	15802-W2097	50/50	1		10/14/08 19:22
89	P2.101408.192915	L08100367-03	15805-W2098	50/50	1		10/14/08 19:29
90	P2.101408.193529	L08100367-04	15808-W2099	50/50	1		10/14/08 19:35
91	P2.101408.194149	L08100367-05	15811-W2100	50/50	1		10/14/08 19:41
92	P2.101408.194810	L08100367-06	15821-W2096	50/50	1		10/14/08 19:48
93	P2.101408.195425	WG284796-02	Method/Prep Blank	50/50	1		10/14/08 19:54
94	P2.101408.200045	WG284928-24	CCV		1		10/14/08 20:00
95	P2.101408.200607	WG284928-25	CCB		1		10/14/08 20:06
96	P2.101408.201222	WG284796-03	Laboratory Control S	50/50	1		10/14/08 20:12
97	P2.101408.201843	L08100338-01	FQC-EB100908-001	50/50	1		10/14/08 20:18
98	P2.101408.202504	L08100338-02	FQC-EB100908-002	50/50	1	WG284635-03	10/14/08 20:25
99	P2.101408.203119	L08100338-07	FQC-EB100908-003	50/50	1		10/14/08 20:31
100	P2.101408.203737	L08100338-08	MP3B-ST14-109	50/50	1		10/14/08 20:37
101	P2.101408.204359	L08100338-09	MP3A-ST14-109	50/50	1		10/14/08 20:43
102	P2.101408.205015	L08100362-01	MW301AB-NF		1		10/14/08 20:50
103	P2.101408.205640	L08100362-02	MW322B2-NF		1		10/14/08 20:56
104	P2.101408.210306	L08100362-03	MW437B-NF		1		10/14/08 21:03
105	P2.101408.210926	L08100362-04	MW322B1-NF		1		10/14/08 21:09
106	P2.101408.211556	WG284928-26	CCV		1		10/14/08 21:15
107	P2.101408.212117	WG284928-27	CCB		1		10/14/08 21:21
108	P2.101408.212733	L08100362-05	MW321B1-DF		1		10/14/08 21:27
109	P2.101408.213258	L08100362-06	MW321B1-NF		1		10/14/08 21:32
110	P2.101408.213825	L08100362-07	MW321B2-NF		1		10/14/08 21:38
111	P2.101408.214443	WG284796-01	Reference Sample		1	L08100363-01	10/14/08 21:44

Approved: October 16, 2008

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Instrument Run Log

Instrument: PE-ICP2 Dataset: 101408H.CSV
Analyst1: JYH Analyst2: ED
Method: 6010B SOP: ME600E Rev: 8
Maintenance Log ID: 26187

Calibration Std: STD29127 ICV/CCV Std: STD29146 Post Spike: STD27612
ICSA: STD29188 ICSAB: STD29044

Workgroups: 284730,284810,284732,284871,284872,284874,284877

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
112	P2.101408.215103	WG284874-01	Post Digestion Spike		1	L08100363-01	10/14/08 21:51
113	P2.101408.215719	WG284874-02	Serial Dilution		5	L08100363-01	10/14/08 21:57
114	P2.101408.220334	WG284796-04	Matrix Spike	50/50	1	L08100363-01	10/14/08 22:03
115	P2.101408.220951	WG284796-05	Matrix Spike Duplica	50/50	1	L08100363-01	10/14/08 22:09
116	P2.101408.221608	L08100380-08	14253-W0001	50/50	1		10/14/08 22:16
117	P2.101408.222223	L08100380-38	14308-W0002	50/50	1		10/14/08 22:22
118	P2.101408.222838	WG284928-28	CCV		1		10/14/08 22:28
119	P2.101408.223354	WG284928-29	CCB		1		10/14/08 22:33
120	P2.101408.224005	L08100381-17	1732-W0001	50/50	1		10/14/08 22:40
121	P2.101408.224620	L08100382-10	1758-W0001	50/50	1		10/14/08 22:46
122	P2.101408.225235	WG284797-01	Method/Prep Blank		1		10/14/08 22:52
123	P2.101408.225852	WG284797-02	Laboratory Control S		1		10/14/08 22:58
124	P2.101408.230508	WG284797-03	Laboratory Control S		1		10/14/08 23:05
125	P2.101408.231124	L08100352-01	A1		1		10/14/08 23:11
126	P2.101408.231744	WG284877-01	Post Digestion Spike		1	L08100352-01	10/14/08 23:17
127	P2.101408.232403	WG284877-02	Serial Dilution		5	L08100352-01	10/14/08 23:24
128	P2.101408.233023	L08100352-02	A2		1		10/14/08 23:30
129	P2.101408.233639	L08100352-03	A3		1		10/14/08 23:36
130	P2.101408.234255	WG284928-30	CCV		1		10/14/08 23:42
131	P2.101408.234811	WG284928-31	CCB		1		10/14/08 23:48
132	P2.101408.235422	L08100352-04	A4		1		10/14/08 23:54
133	P2.101508.000038	L08100352-05	A5		1		10/15/08 00:00
134	P2.101508.000654	L08100352-06	A6		1		10/15/08 00:06
135	P2.101508.001310	L08100352-07	10/7 A		1		10/15/08 00:13
136	P2.101508.001929	L08100352-08	10/7 B		1		10/15/08 00:19
137	P2.101508.002546	L08100352-09	10/7 C		1		10/15/08 00:25
138	P2.101508.003204	L08100352-10	10/7 D		1		10/15/08 00:32
139	P2.101508.003820	L08100352-11	10/7 E		1		10/15/08 00:38
140	P2.101508.004436	L08100352-12	10/7 F		1		10/15/08 00:44
141	P2.101508.005052	L08100352-13	10/7 G		1		10/15/08 00:50
142	P2.101508.005708	WG284928-32	CCV		1		10/15/08 00:57
143	P2.101508.010224	WG284928-33	CCB		1		10/15/08 01:02
144	P2.101508.010835	L08100352-14	10/7 H		1		10/15/08 01:08
145	P2.101508.011451	L08100352-15	10/7 K		1		10/15/08 01:14
146	P2.101508.012111	L08100352-16	10/8 A		1		10/15/08 01:21
147	P2.101508.012731	L08100352-17	10/8 B		1		10/15/08 01:27
148	P2.101508.013348	L08100352-18	10/8 C		1		10/15/08 01:33

 Approved: October 16, 2008

Maren Berry

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Instrument Run Log

Instrument: PE-ICP2 Dataset: 101408H.CSV

Analyst1: JYH Analyst2: ED

Method: 6010B SOP: ME600E Rev: 8

Maintenance Log ID: 26187

Calibration Std: STD29127 ICV/CCV Std: STD29146 Post Spike: STD27612

ICSA: STD29188 ICSAB: STD29044

Workgroups: 284730,284810,284732,284871,284872,284874,284877

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
149	P2.101508.014005	L08100352-19	10/8 D		1		10/15/08 01:40
150	P2.101508.014621	L08100352-20	10/8 E		1		10/15/08 01:46
151	P2.101508.015237	WG284928-34	CCV		1		10/15/08 01:52
152	P2.101508.015753	WG284928-35	CCB		1		10/15/08 01:57

Approved: October 16, 2008

Maren Berry

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Data Checklist

Date: 13-OCT-2008
Analyst: KHR
Analyst: NA
Method: 6010B
Instrument: IRIS-ICP
Curve Workgroup: 284736
Runlog ID: 24656
Analytical Workgroups: 284518, 284673, 284675, 284676

Calibration/Linearity	X
ICV/CCV	X
ICB/CCB	X
ICSA/ICSAB	X
CRI	
Blank/LCS	X
MS/MSD	X
Post Spike/Serial Dilution	X
Upload Results	X
Data Qualifiers	
Generate PDF Instrument Data	X
Sign/Annotate PDF Data	X
Upload Curve Data	X
Workgroup Forms	
Case Narrative	X
Client Forms	X
Level X	
Level 3	257
Level 4	272, 288
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Primary Reviewer	KHR
Secondary Reviewer	MMB
Comments	

Primary Reviewer:
14-OCT-2008
Kim H. Rhoden

Secondary Reviewer:
15-OCT-2008
Maren Berry

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Microbac Laboratories Inc.

Data Checklist

Date: 14-OCT-2008
Analyst: JYH
Analyst: ED
Method: 6010B
Instrument: PE-ICP2
Curve Workgroup: WG284928
Runlog ID: 24696
Analytical Workgroups: 284730,284810,284732,284871,284872,284874,284877

Calibration/Linearity	X
ICV/CCV	X
ICB/CCB	X
ICSA/ICSAB	X
CRI	
Blank/LCS	X
MS/MSD	X
Post Spike/Serial Dilution	X
Upload Results	X
Data Qualifiers	
Generate PDF Instrument Data	X
Sign/Annotate PDF Data	X
Upload Curve Data	X
Workgroup Forms	X
Case Narrative	294,257,295,302,306,,378,275,299
	335,360,367,338,362,363,380,381
	382
Client Forms	X
Level X	
Level 3	257,362
Level 4	275,299,360,367,338,380,381,382
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Primary Reviewer	ED
Secondary Reviewer	MMB
Comments	

Primary Reviewer:
15-OCT-2008
Emily Decker

Secondary Reviewer:
16-OCT-2008
Maren Beery

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HOLDING TIMES
EQUIVALENT TO AFCEE FORM 9

00074010

Analytical Method: 6010B

AAB#: WG284673

Login Number: L08100257

Client ID	Date Collected	Date Received	Date Extracted	Max Hold Time Ext.	Time Held Ext.	Date Analyzed	Max Hold Time Anal	Time Held Anal.	Q
S49BS100908	10/09/08	10/09/08	10/10/08	180	0.972	10/13/08	180	3.13	

* EXT = SEE PROJECT QAPP REQUIREMENTS
*ANAL = SEE PROJECT QAPP REQUIREMENTS

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HOLDING TIMES
EQUIVALENT TO AFCEE FORM 9

00074011

Analytical Method: 6010B

AAB#: WG284810

Login Number: L08100257

Client ID	Date Collected	Date Received	Date Extracted	Max Hold Time Ext.	Time Held Ext.	Date Analyzed	Max Hold Time Anal	Time Held Anal.	Q
S49WC100808	10/08/08	10/09/08	10/14/08	180	5.80	10/14/08	180	0.210	

* EXT = SEE PROJECT QAPP REQUIREMENTS
*ANAL = SEE PROJECT QAPP REQUIREMENTS

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00074012

METHOD BLANK SUMMARY

Login Number:	L08100257	Work Group:	WG284673
Blank File ID:	IR.101308.111400	Blank Sample ID:	WG284491-02
Prep Date:	10/10/08 08:30	Instrument ID:	IRIS-ICP
Analyzed Date:	10/13/08 11:14	Method:	6010B
Analyst:	KHR		

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG284491-03	IR.101308.112100	10/13/08 11:21	01
S49BS100908	L08100257-02	IR.101308.112700	10/13/08 11:27	01

Report Name: BLANK_SUMMARY
PDF File ID: 1219970
Report generated 10/13/2008 14:45

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00074013

METHOD BLANK SUMMARY

Login Number:	L08100257	Work Group:	WG284810
Blank File ID:	P2.101408.113558	Blank Sample ID:	WG284791-02
Prep Date:	10/14/08 06:52	Instrument ID:	PE-ICP2
Analyzed Date:	10/14/08 11:35	Method:	6010B
Analyst:	JYH		

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG284791-03	P2.101408.114213	10/14/08 11:42	01
S49WC100808	L08100257-01	P2.101408.115450	10/14/08 11:54	01

Report Name: BLANK_SUMMARY
PDF File ID: 1222120
Report generated 10/15/2008 05:23

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00074014

METHOD BLANK REPORT

Login Number: L08100257 Prep Date: 10/10/08 08:30 Sample ID: WG284491-02
Instrument ID: IRIS-ICP Run Date: 10/13/08 11:14 Prep Method: 3051
File ID: IR.101308.111400 Analyst: KHR Method: 6010B
Workgroup (AAB#): WG284673 Matrix: Soil Units: mg/kg
Contract #: DACA56-94-D-0020 Cal ID: IRIS-I-13-OCT-08

Analytes	SDL	PQL	Concentration	Dilution	Qualifier
Silver, Total	0.250	2.00	0.250	1	U
Barium, Total	0.100	0.500	0.100	1	U
Cadmium, Total	0.0500	0.500	0.0565	1	J
Chromium, Total	0.120	1.00	0.120	1	U
Lead, Total	0.500	5.00	0.500	1	U

SDL Method Detection Limit
PQL Reporting/Practical Quantitation Limit
ND Analyte Not detected at or above reporting limit
* |Analyte concentration| > RL

Report Name:BLANK
PDF ID: 1219971
13-OCT-2008 14:45

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00074015

METHOD BLANK REPORT

Login Number: L08100257 Prep Date: 10/14/08 06:52 Sample ID: WG284791-02
Instrument ID: PE-ICP2 Run Date: 10/14/08 11:35 Prep Method: 3015
File ID: P2.101408.113558 Analyst: JYH Method: 6010B
Workgroup (AAB#): WG284810 Matrix: Leachate Units: mg/L
Contract #: DACA56-94-D-0020 Cal ID: PE-ICP-14-OCT-08

Analytes	SDL	PQL	Concentration	Dilution	Qualifier
Silver, TCLP	0.0500	0.100	0.0500	1	U
Arsenic, TCLP	0.100	1.00	0.100	1	U
Barium, TCLP	0.0250	5.00	0.0250	1	U
Cadmium, TCLP	0.0250	0.100	0.0250	1	U
Chromium, TCLP	0.0250	0.200	0.0250	1	U
Lead, TCLP	0.100	1.00	0.100	1	U
Selenium, TCLP	0.500	0.800	0.500	1	U

SDL Method Detection Limit
PQL Reporting/Practical Quantitation Limit
ND Analyte Not detected at or above reporting limit
* |Analyte concentration| > RL

Report Name:BLANK
PDF ID: 1222121
15-OCT-2008 05:23

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LABORATORY CONTROL SAMPLE (LCS)

00074016

Login Number: L08100257 Run Date: 10/13/2008 Sample ID: WG284491-03
Instrument ID: IRIS-ICP Run Time: 11:21 Prep Method: 3051
File ID: IR.101308.112100 Analyst: KHR Method: 6010B
Workgroup (AAB#): WG284673 Matrix: Soil Units: mg/kg
QC Key: STD Lot#: MI0058-81 Cal ID: IRIS-I-13-OCT-08

Analytes	Expected	Found	% Rec	LCS Limits	Q
Silver, Total	10.0	9.74	97.4	80 - 120	
Barium, Total	25.0	25.6	103	80 - 120	
Cadmium, Total	1.25	1.32	106	80 - 120	
Chromium, Total	12.5	12.9	103	80 - 120	
Lead, Total	12.5	12.9	104	80 - 120	

LCS - Modified 03/06/2008
PDF File ID: 1219972
Report generated: 10/13/2008 14:45

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LABORATORY CONTROL SAMPLE (LCS)

00074017

Login Number: L08100257 Run Date: 10/14/2008 Sample ID: WG284791-03
Instrument ID: PE-ICP2 Run Time: 11:42 Prep Method: 3015
File ID: P2.101408.114213 Analyst: JYH Method: 6010B
Workgroup (AAB#): WG284810 Matrix: Leachate Units: mg/L
QC Key: STD Lot#: MI0058-81 Cal ID: PE-ICP-14-OCT-08

Analytes	Expected	Found	% Rec	LCS Limits	Q
Silver, TCLP	0.200	0.199	99.4	80 - 120	
Arsenic, TCLP	0.200	0.192	96.1	80 - 120	
Barium, TCLP	0.500	0.500	100	80 - 120	
Cadmium, TCLP	0.0250	0.0234	93.6	80 - 120	
Chromium, TCLP	0.250	0.251	100	80 - 120	
Lead, TCLP	0.250	0.247	98.7	80 - 120	
Selenium, TCLP	0.200	0.188	94.2	80 - 120	

LCS - Modified 03/06/2008
PDF File ID: 1222122
Report generated: 10/15/2008 05:23

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MATRIX SPIKE AND MATRIX SPIKE DUP (MS/MSD)

00074018

Loginnum:L08100257 Cal ID: IRIS-ICP- Worknum:WG284673

Instrument ID:IRIS-ICP Contract #:DACA56-94-D-0020 Method:6010B

Parent ID:WG284491-01 File ID:IR.101308.123400 Dil:1 Matrix:SOLID

Sample ID:WG284491-04 MS File ID:IR.101308.124000 Dil:1 Units:mg/kg

Sample ID:WG284491-05 MSD File ID:IR.101308.124600 Dil:1 Percent Solid:79.6

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Barium	66.8	22.5	115	214	22.5	158	403	31.3	80 - 120	20	*#
Cadmium	0.406	1.13	1.48	95.8	1.13	1.67	113	12.0	80 - 120	20	
Chromium	14.7	11.3	29.0	126	11.3	26.2	102	10.1	80 - 120	20	*
Lead	11.1	11.3	22.8	104	11.3	22.1	97.8	3.36	80 - 120	20	
Silver	ND	9.01	8.58	95.1	9.01	8.53	94.6	0.548	80 - 120	20	

* FAILS %REC LIMIT

FAILS RPD LIMIT

NOTE: This is an internal quality control sample.

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MATRIX SPIKE AND MATRIX SPIKE DUP (MS/MSD)

00074019

Loginnum:L08100257 Cal ID: PE-ICP2- Worknum:WG284810

Instrument ID:PE-ICP2 Contract #:DACA56-94-D-0020 Method:6010B

Parent ID:WG284791-01 File ID:P2.101408.115450 Dil:1 Matrix:TCLP

Sample ID:WG284791-04 MS File ID:P2.101408.121351 Dil:1 Units:mg/L

Sample ID:WG284791-05 MSD File ID:P2.101408.122013 Dil:1

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Arsenic, TCLP	ND	2.00	1.92	95.9	2.00	1.92	96.1	0.196	80 - 120	20	
Barium, TCLP	1.20	5.00	6.20	100	5.00	6.19	99.8	0.197	80 - 120	20	
Cadmium, TCLP	ND	0.250	0.239	95.5	0.250	0.236	94.5	1.07	80 - 120	20	
Chromium, TCLP	ND	2.50	2.56	102	2.50	2.54	101	1.02	80 - 120	20	
Lead, TCLP	ND	2.50	2.50	99.9	2.50	2.49	99.7	0.247	80 - 120	20	
Selenium, TCLP	ND	2.00	1.98	99.2	2.00	2.00	100	0.967	80 - 120	20	
Silver, TCLP	ND	2.00	2.00	100	2.00	1.99	99.4	0.823	80 - 120	20	

* FAILS %REC LIMIT

FAILS RPD LIMIT

NOTE: This is an internal quality control sample.

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Serial Dilution Report

Login: L08100257 **Worknum:** WG284673
Instrument: IRIS-ICP **Method:** 6010B
Serial Dil: WG284673-02 **File ID:** IR.101308.120300 **Dil:** 5 **Units:** mg/L
Sample: L08100272-02 **File ID:** IR.101308.115100 **Dil:** 1

Analyte	Sample	Qual	Serial Dil	Qual	% Diff	Q
Barium	.798		.815		2.13	
Cadmium	.00975	F	.01475	F	51.30	
Chromium	.338		.3495		3.40	
Lead	.259	X	.2805	F	8.30	
Silver	ND	U	ND	U		

U = Result is below MDL.
F = Result is greater than or equal to MDL and less than the RL.
X = Result is greater than or equal to RL and less than 50 times the MDL.
E = %D exceeds control limit of 10% and initial sample result is greater than or equal to 50 times the MDL.

Microbac Laboratories Inc.
Serial Dilution Report

Login: L08100257 **Worknum:** WG284810
Instrument: PE-ICP2 **Method:** 6010B
Serial Dil: WG284810-02 **File ID:** P2.101408.120735 **Dil:** 5 **Units:** mg/L
Sample: L08100257-01 **File ID:** P2.101408.115450 **Dil:** 1

Analyte	Sample	Qual	Serial Dil	Qual	% Diff	Q
Arsenic	ND	U	ND	U		
Barium	.12	F	.121	F	0.83	
Cadmium	ND	U	ND	U		
Chromium	ND	U	ND	U		
Lead	ND	U	ND	U		
Selenium	ND	U	ND	U		
Silver	ND	U	ND	U		

U = Result is below MDL.
F = Result is greater than or equal to MDL and less than the RL.
X = Result is greater than or equal to RL and less than 50 times the MDL.
E = %D exceeds control limit of 10% and initial sample result is greater than or equal to 50 times the MDL.

Microbac Laboratories Inc.
POST SPIKE REPORT

Sample Login ID: L08100257 **Worknum:** WG284673
Instrument ID: IRIS-ICP **Method:** 6010B
Post Spike ID: WG284673-01 **File ID:** IR.101308.115700 **Dil:** 1 **Units:** mg/L
Sample ID: L08100272-02 **File ID:** IR.101308.115100 **Dil:** 1 **Matrix:** Soil

Analyte	Post Spike Result	C	Sample Result	C	Spike Added(SA)	% R	Control Limit %R	Q
BARIUM	1.22		0.798		.5	100.5	75 - 125	
CADMIUM	0.0354		0.00975	F	.025	106.6	75 - 125	
CHROMIUM	0.573		0.338		.25	107.6	75 - 125	
LEAD	0.507		0.259		.25	109.6	75 - 125	
SILVER	0.189		0	U	.2	94.6	75 - 125	

N = % Recovery exceeds control limits
F = Result is between MDL and RL
U = Sample result is below MDL. A value of zero is used in the calculation

POST_SPIKE - Modified 03/06/2008
PDF File ID: 1219968
Report generated: 10/13/2008 14:45

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Microbac Laboratories Inc.
POST SPIKE REPORT

Sample Login ID: L08100257 **Worknum:** WG284810
Instrument ID: PE-ICP2 **Method:** 6010B
Post Spike ID: WG284810-01 **File ID:** P2.101408.120114 **Dil:** 1 **Units:** mg/L
Sample ID: L08100257-01 **File ID:** P2.101408.115450 **Dil:** 1 **Matrix:** Leachate

Analyte	Post Spike Result	C	Sample Result	C	Spike Added(SA)	% R	Control Limit %R	Q
ARSENIC	0.198		0	U	.2	99.0	75 - 125	
BARIUM	0.611		0.120	F	.5	100.5	75 - 125	
CADMIUM	0.0238		0	U	.025	95.1	75 - 125	
CHROMIUM	0.256		0	U	.25	102.5	75 - 125	
LEAD	0.253		0	U	.25	101.1	75 - 125	
SELENIUM	0.200		0	U	.2	100.1	75 - 125	
SILVER	0.202		0	U	.2	100.9	75 - 125	

N = % Recovery exceeds control limits
F = Result is between MDL and RL
U = Sample result is below MDL. A value of zero is used in the calculation

POST_SPIKE - Modified 03/06/2008
PDF File ID: 1222118
Report generated: 10/15/2008 05:23

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Microbac Laboratories Inc.
Initial Calibration Summary

00074024

Login:	**L08100257**	Workgroup (AAB#):	**WG284673**
Analytical Method:	**6010B**	Instrument ID:	**IRIS-ICP**
ICAL Worknum:	**WG284736**	Initial Calibration Date:	**13-OCT-2008 09:56**

	WG284736-01		WG284736-02		WG284736-03		WG284736-04		WG284736-05		WG284736-06			
	Conc	INT	Conc	INT	Conc	INT	Conc	INT	Conc	INT	Conc	INT	R	Q
BARIUM	0	0.159	.01	1.98	.02	3.89	.5	92.1	1	188	2	378	.9999627	
CADMIUM	0	0.285	NA	NA	.001	0.333	.025	1.53	.05	2.93	.1	5.81	.9993384	
CHROMIUM	0	0.257	.005	0.442	.01	0.674	.25	10.1	.5	21.2	1	43.7	.9994231	
LEAD	0	0.0178	NA	NA	.01	0.0646	.25	0.998	.5	2.11	1	4.38	.9993298	
SILVER	0	-0.0978	NA	NA	.008	0.00370	.2	2.51	.4	5.32	.8	11.0	.9997455	

INT = Instrument intensity
R = Coefficient of correlation
Q = Data Qualifier
*** = Out of Compliance; R < 0.995**

Microbac Laboratories Inc.
Initial Calibration Summary

00074025

Login:	**L08100257**	Workgroup (AAB#):	**WG284810**
Analytical Method:	**6010B**	Instrument ID:	**PE-ICP2**
ICAL Worknum:	**WG284928**	Initial Calibration Date:	**14-OCT-2008 10:51**

	WG284928-01		WG284928-02		WG284928-03		WG284928-04		WG284928-05			
	Conc	INT	Conc	INT	Conc	INT	Conc	INT	Conc	INT	R	Q
ARSENIC	0	-5.10	NA	NA	.008	6.40	.4	223	.8	442	.999985	
BARIUM	0	-155	.01	663	.02	1320	1	63400	2	127000	1	
CADMIUM	0	65.5	.0005	16.6	.001	34.9	.05	1540	.1	3080	.999999	
CHROMIUM	0	46.5	.005	155	.01	307	.5	14800	1	29600	1	
LEAD	0	32.2	.005	15.2	.01	20.7	.5	1270	1	2520	.999995	
SELENIUM	0	6.00	NA	NA	.008	0.339	.4	116	.8	232	.999966	
SILVER	0	-955	.004	433	.008	885	.4	36400	.8	72900	.999997	

INT = Instrument intensity
R = Coefficient of correlation
Q = Data Qualifier
*** = Out of Compliance; R < 0.995**

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00074026

Microbac Laboratories Inc.
INITIAL CALIBRATION BLANK (ICB)

Login Number: L08100257 | Run Date: 10/13/2008 | Sample ID: WG284736-08
Instrument ID: IRIS-ICP | Run Time: 10:09 | Method: 6010
File ID: IR.101308.100900 | Analyst: KHR | Units: mg/L
Workgroup (AAB#): WG284673 | Cal ID: IRIS-ICP - 13-OCT-08
Matrix: SOIL

Analytes	MDL	RDL	Concentration	Qualifier
BARIUM	.002	.01	.002	U
CADMIUM	.001	.01	.001	U
CHROMIUM	.0024	.02	.0024	U
LEAD	.01	.1	.01	U
SILVER	.005	.04	.00612	F

ICB - Modified 03/06/2008
PDF File ID: 1219978
Report generated 10/13/2008 14:45

Microbac

00074027

Microbac Laboratories Inc.
INITIAL CALIBRATION BLANK (ICB)

Login Number: L08100257 | Run Date: 10/14/2008 | Sample ID: WG284928-07
Instrument ID: PE-ICP2 | Run Time: 11:02 | Method: 6010
File ID: P2.101408.110234 | Analyst: JYH | Units: mg/L
Workgroup (AAB#): WG284810 | Cal ID: PE-ICP2 - 14-OCT-08
Matrix: LEACHATE

Analytes	MDL	RDL	Concentration	Qualifier
ARSENIC	.01	.1	.01	U
BARIUM	.0025	.5	.0025	U
CADMIUM	.0025	.01	.0025	U
CHROMIUM	.0025	.02	.0025	U
LEAD	.01	.1	.01	U
SELENIUM	.05	.08	.05	U
SILVER	.005	.01	.005	U

ICB - Modified 03/06/2008
PDF File ID: 1222128
Report generated 10/15/2008 05:23

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CONTINUING CALIBRATION BLANK (CCB)

00074028

Login Number: L08100257 Run Date: 10/13/2008 Sample ID: WG284736-12
Instrument ID: IRIS-ICP Run Time: 10:33 Method: 6010B
File ID: IR.101308.103300 Analyst: KHR Units: mg/L
Workgroup (AAB#): WG284673 Cal ID: IRIS-I - 13-OCT-08
Matrix: SOIL

Analytes	MDL	RDL	Concentration	Qualifier
Silver	0.00500	0.0400	0.00500	U
Barium	0.00200	0.0100	0.00200	U
Cadmium	0.00100	0.0100	0.00100	U
Chromium	0.00240	0.0200	0.00240	U
Lead	0.0100	0.100	0.0100	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.

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00074029

Login Number: L08100257 Run Date: 10/13/2008 Sample ID: WG284736-14
Instrument ID: IRIS-ICP Run Time: 11:05 Method: 6010B
File ID: IR.101308.110500 Analyst: KHR Units: mg/L
Workgroup (AAB#): WG284673 Cal ID: IRIS-I - 13-OCT-08
Matrix: SOIL

Analytes	MDL	RDL	Concentration	Qualifier
Silver	0.00500	0.0400	0.00826	F
Barium	0.00200	0.0100	0.00200	U
Cadmium	0.00100	0.0100	0.00100	U
Chromium	0.00240	0.0200	0.00240	U
Lead	0.0100	0.100	0.0100	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.

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00074030

Login Number: L08100257 Run Date: 10/13/2008 Sample ID: WG284736-16
Instrument ID: IRIS-ICP Run Time: 12:21 Method: 6010B
File ID: IR.101308.122100 Analyst: KHR Units: mg/L
Workgroup (AAB#): WG284673 Cal ID: IRIS-I - 13-OCT-08
Matrix: SOIL

Analytes	MDL	RDL	Concentration	Qualifier
Silver	0.00500	0.0400	0.00500	U
Barium	0.00200	0.0100	0.00200	U
Cadmium	0.00100	0.0100	0.00100	U
Chromium	0.00240	0.0200	0.00240	U
Lead	0.0100	0.100	0.0100	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.

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00074031

Login Number: L08100257 Run Date: 10/13/2008 Sample ID: WG284736-18
Instrument ID: IRIS-ICP Run Time: 13:34 Method: 6010B
File ID: IR.101308.133400 Analyst: KHR Units: mg/L
Workgroup (AAB#): WG284673 Cal ID: IRIS-I - 13-OCT-08
Matrix: SOIL

Analytes	MDL	RDL	Concentration	Qualifier
Silver	0.00500	0.0400	0.00500	U
Barium	0.00200	0.0100	0.00200	U
Cadmium	0.00100	0.0100	0.00100	U
Chromium	0.00240	0.0200	0.00240	U
Lead	0.0100	0.100	0.0100	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.

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00074032

Login Number: L08100257 Run Date: 10/14/2008 Sample ID: WG284928-11
Instrument ID: PE-ICP2 Run Time: 11:24 Method: 6010B
File ID: P2.101408.112453 Analyst: JYH Units: mg/L
Workgroup (AAB#): WG284810 Cal ID: PE-ICP - 14-OCT-08
Matrix: LEACHATE

Analytes	MDL	RDL	Concentration	Qualifier
Silver	0.00500	0.0100	0.00500	U
Arsenic	0.0100	0.100	0.0100	U
Barium	0.00250	0.500	0.00250	U
Cadmium	0.00250	0.0100	0.00250	U
Chromium	0.00250	0.0200	0.00250	U
Lead	0.0100	0.100	0.0100	U
Selenium	0.0500	0.0800	0.0500	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.

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00074033

Login Number: L08100257 Run Date: 10/14/2008 Sample ID: WG284928-13
Instrument ID: PE-ICP2 Run Time: 12:38 Method: 6010B
File ID: P2.101408.123819 Analyst: JYH Units: mg/L
Workgroup (AAB#): WG284810 Cal ID: PE-ICP - 14-OCT-08
Matrix: LEACHATE

Analytes	MDL	RDL	Concentration	Qualifier
Silver	0.00500	0.0100	0.00500	U
Arsenic	0.0100	0.100	0.0100	U
Barium	0.00250	0.500	0.00250	U
Cadmium	0.00250	0.0100	0.00250	U
Chromium	0.00250	0.0200	0.00250	U
Lead	0.0100	0.100	0.0100	U
Selenium	0.0500	0.0800	0.0500	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.

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00074034

Login Number: L08100257 Run Date: 10/13/2008 Sample ID: WG284736-07
Instrument ID: IRIS-ICP Run Time: 10:03 Method: 6010B
File ID: IR.101308.100300 Analyst: KHR Units: mg/L
Workgroup (AAB#): WG284673 Cal ID: IRIS-I - 13-OCT-08
QC Key: STD

Analyte		Expected	Found	%REC	LIMITS	Q
Silver		.4	0.399	99.8	90 - 110	
Barium		1	1.02	102	90 - 110	
Cadmium		.05	0.0510	102	90 - 110	
Chromium		.5	0.508	102	90 - 110	
Lead		.5	0.504	101	90 - 110	

* Exceeds LIMITS Limit

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INITIAL CALIBRATION VERIFICATION (ICV)
(Alternate Source)

00074035

Login Number: L08100257 Run Date: 10/14/2008 Sample ID: WG284928-06
Instrument ID: PE-ICP2 Run Time: 10:57 Method: 6010B
File ID: P2.101408.105711 Analyst: JYH Units: mg/L
Workgroup (AAB#): WG284810 Cal ID: PE-ICP - 14-OCT-08
QC Key: STD

Analyte		Expected	Found	%REC	LIMITS	Q
Silver		.4	0.422	105	90 - 110	
Arsenic		.4	0.412	103	90 - 110	
Barium		1	1.03	103	90 - 110	
Cadmium		.05	0.0508	102	90 - 110	
Chromium		.5	0.519	104	90 - 110	
Lead		.5	0.512	102	90 - 110	
Selenium		.4	0.418	105	90 - 110	

* Exceeds LIMITS Limit

ICV - Modified 03/06/2008
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CONTINUING CALIBRATION VERIFICATION (CCV)

00074036

Login Number: L08100257 Run Date: 10/13/2008 Sample ID: WG284736-11

Instrument ID: IRIS-ICP Run Time: 10:27 Method: 6010B

File ID: IR.101308.102700 Analyst: KHR QC Key: STD

Workgroup (AAB#): WG284673 Cal ID: IRIS-I - 13-OCT-08

Matrix: SOIL

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Silver		0.400	0.404	mg/L	101	90 - 110		
Barium		1.00	1.01	mg/L	101	90 - 110		
Cadmium		0.0500	0.0515	mg/L	103	90 - 110		
Chromium		0.500	0.512	mg/L	102	90 - 110		
Lead		0.500	0.507	mg/L	101	90 - 110		

* Exceeds LIMITS Criteria

CCV - Modified 03/05/2008

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CONTINUING CALIBRATION VERIFICATION (CCV)

00074037

Login Number: L08100257 Run Date: 10/13/2008 Sample ID: WG284736-13

Instrument ID: IRIS-ICP Run Time: 10:59 Method: 6010B

File ID: IR.101308.105900 Analyst: KHR QC Key: STD

Workgroup (AAB#): WG284673 Cal ID: IRIS-I - 13-OCT-08

Matrix: SOIL

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Silver		0.400	0.401	mg/L	100	90 - 110		
Barium		1.00	1.01	mg/L	101	90 - 110		
Cadmium		0.0500	0.0493	mg/L	98.6	90 - 110		
Chromium		0.500	0.495	mg/L	98.9	90 - 110		
Lead		0.500	0.486	mg/L	97.3	90 - 110		

* Exceeds LIMITS Criteria

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CONTINUING CALIBRATION VERIFICATION (CCV)

00074038

Login Number: L08100257 Run Date: 10/13/2008 Sample ID: WG284736-15

Instrument ID: IRIS-ICP Run Time: 12:15 Method: 6010B

File ID: IR.101308.121500 Analyst: KHR QC Key: STD

Workgroup (AAB#): WG284673 Cal ID: IRIS-I - 13-OCT-08

Matrix: SOIL

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Silver		0.400	0.401	mg/L	100	90 - 110		
Barium		1.00	1.02	mg/L	102	90 - 110		
Cadmium		0.0500	0.0525	mg/L	105	90 - 110		
Chromium		0.500	0.521	mg/L	104	90 - 110		
Lead		0.500	0.519	mg/L	104	90 - 110		

* Exceeds LIMITS Criteria

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CONTINUING CALIBRATION VERIFICATION (CCV)

00074039

Login Number: L08100257 Run Date: 10/13/2008 Sample ID: WG284736-17

Instrument ID: IRIS-ICP Run Time: 13:28 Method: 6010B

File ID: IR.101308.132800 Analyst: KHR QC Key: STD

Workgroup (AAB#): WG284673 Cal ID: IRIS-I - 13-OCT-08

Matrix: SOIL

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Silver		0.400	0.407	mg/L	102	90 - 110		
Barium		1.00	1.03	mg/L	103	90 - 110		
Cadmium		0.0500	0.0523	mg/L	105	90 - 110		
Chromium		0.500	0.526	mg/L	105	90 - 110		
Lead		0.500	0.530	mg/L	106	90 - 110		

* Exceeds LIMITS Criteria

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CONTINUING CALIBRATION VERIFICATION (CCV)

00074040

Login Number: L08100257 Run Date: 10/14/2008 Sample ID: WG284928-10

Instrument ID: PE-ICP2 Run Time: 11:19 Method: 6010B

File ID: P2.101408.111933 Analyst: JYH QC Key: STD

Workgroup (AAB#): WG284810 Cal ID: PE-ICP - 14-OCT-08

Matrix: LEACHATE

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Silver		0.400	0.419	mg/L	105	90 - 110		
Arsenic		0.400	0.403	mg/L	101	90 - 110		
Barium		1.00	1.04	mg/L	104	90 - 110		
Cadmium		0.0500	0.0506	mg/L	101	90 - 110		
Chromium		0.500	0.523	mg/L	105	90 - 110		
Lead		0.500	0.513	mg/L	103	90 - 110		
Selenium		0.400	0.415	mg/L	104	90 - 110		

* Exceeds LIMITS Criteria

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CONTINUING CALIBRATION VERIFICATION (CCV)

00074041

Login Number: L08100257 Run Date: 10/14/2008 Sample ID: WG284928-12

Instrument ID: PE-ICP2 Run Time: 12:32 Method: 6010B

File ID: P2.101408.123259 Analyst: JYH QC Key: STD

Workgroup (AAB#): WG284810 Cal ID: PE-ICP - 14-OCT-08

Matrix: LEACHATE

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Silver		0.400	0.414	mg/L	104	90 - 110		
Arsenic		0.400	0.407	mg/L	102	90 - 110		
Barium		1.00	1.03	mg/L	103	90 - 110		
Cadmium		0.0500	0.0492	mg/L	98.4	90 - 110		
Chromium		0.500	0.515	mg/L	103	90 - 110		
Lead		0.500	0.509	mg/L	102	90 - 110		
Selenium		0.400	0.426	mg/L	107	90 - 110		

* Exceeds LIMITS Criteria

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INTERFERENCE CHECK SAMPLES

00074042

Login number: L08100257 **Workgroup (AAB#):** WG284673
Instrument ID: IRIS-ICP **Method:** 6010B
Sol. A : WG284736-09 **File ID:** IR.101308.101500 **Units:** mg/L
Sol. AB : WG284736-10 **File ID:** IR.101308.102100

	Sol. A			Sol. AB			
ANALYTE	True	Found	%Recovery	True	Found	%Recovery	Q
Barium	NS	-0.000230	NS	0.250	0.244	97.6	
Cadmium	NS	0.000480	NS	0.500	0.446	89.2	
Chromium	NS	0.000170	NS	0.250	0.242	96.8	
Lead	NS	0.00796	NS	0.500	0.506	101	
Silver	NS	0.00224	NS	0.500	0.486	97.2	

NS = Not spiked
*** = Recovery of spiked element is outside acceptance limit of 80% - 120% of true value.**
 # = Result for unspiked element is outside the acceptance limits of (+/-) the project reporting limit (RL).

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INTERFERENCE CHECK SAMPLES

00074043

Login number: L08100257 **Workgroup (AAB#):** WG284810
Instrument ID: PE-ICP2 **Method:** 6010B
Sol. A : WG284928-08 **File ID:** P2.101408.110853 **Units:** mg/L
Sol. AB : WG284928-09 **File ID:** P2.101408.111413

	Sol. A			Sol. AB			
ANALYTE	True	Found	%Recovery	True	Found	%Recovery	Q
Arsenic	NS	0.00128	NS	0.250	0.243	97.2	
Barium	NS	0.00201	NS	0.250	0.249	99.6	
Cadmium	NS	-0.000130	NS	0.500	0.445	89.0	
Chromium	NS	0.000890	NS	0.250	0.251	100	
Lead	NS	0.00253	NS	0.500	0.496	99.2	
Selenium	NS	-0.0000400	NS	0.250	0.243	97.2	
Silver	NS	0.000640	NS	0.500	0.516	103	

NS = Not spiked
*** = Recovery of spiked element is outside acceptance limit of 80% - 120% of true value.**
 # = Result for unspiked element is outside the acceptance limits of (+/-) the project reporting limit (RL).

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INTERELEMENT CORRECTION FACTORS (ANNUALLY)

Login Number: L08100257 **Date:** 01/17/2008
Insturment ID: IRIS-ICP **Method:** 6010B

Analyte	Wave Length	AL	AS	B	BA	BE
ALUMINUM	308.20	0	0	0	0	0
ANTIMONY	206.80	-0.0000840	-0.00000300	0	0	0
ARSENIC	189.00	0.0000100	0	0	0	0
BARIUM	455.40	0	0	0	0	0
BERYLLIUM	313.00	0	0	0	0	0
BORON	249.70	0	0	0	0	0
CADMIUM	228.80	0.0000110	0.0116	0	-0.00130	0
CALCIUM	373.70	0	0	0	0	0
CHROMIUM	267.70	0	0	0	0	0
COBALT	228.60	0	0	0	0	0
COPPER	324.70	0	0	0	0	0
IRON	271.40	0	0	0	0	0
LEAD	220.30	0.000410	0	0	0	0
LITHIUM	670.80	0	0	0	0	0
MAGNESIUM	277.90	0	-0.0743	0	0	0
MANGANESE	257.60	0	0	0	0	0
MOLYBDENUM	202.03	0	0	0	0	0
NICKEL	231.60	0	0	0	0	0.00830
POTASSIUM	766.40	0	0	0	-0.0346	0
SELENIUM	196.00	0.0000300	0.000198	0	0	0
SILICON	251.60	0	0	-0.0157	0	0
SILVER	328.00	0	0	0	0	0
SODIUM	589.50	0	0	0	0	0
STRONTIUM	215.20	0	0	0	0	0
THALLIUM	190.80	-0.0000630	0	0	0	0
TIN	189.90	0	0	0	0	0
TITANIUM	334.90	0	0	0	0	0
VANADIUM	310.20	-0.0000340	0	0	0	0.00900
ZINC	213.80	0.00000100	0	0	0	0

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00074045

Microbac Laboratories Inc.
INTERELEMENT CORRECTION FACTORS (ANNUALLY)

Login Number: L08100257 **Date:** 01/17/2008
Insturment ID: IRIS-ICP **Method:** 6010B

Analyte	Wave Length	CA	CO	CR	CU	FE
ALUMINUM	308.20	0	-0.00524	0	0	0
ANTIMONY	206.80	0	0	0.0183	0	0.00000500
ARSENIC	189.00	0	0	0.000280	0	-0.000110
BARIUM	455.40	0	0	0	0	0
BERYLLIUM	313.00	0	0	0	0	0
BORON	249.70	0.0000440	0.00160	0	0	0.0000250
CADMIUM	228.80	0	0.0000780	0	0	0.00000300
CALCIUM	373.70	0	0	0	0	0.00329
CHROMIUM	267.70	0	0	0	0	-0.0000100
COBALT	228.60	0	0	0.0000450	0	0.0000410
COPPER	324.70	0	0	-0.000150	0	0.0000350
IRON	271.40	0.00000600	0.0844	0	0	0
LEAD	220.30	0	-0.000300	-0.000220	0	0.0000500
LITHIUM	670.80	-0.0000500	0	0	0	0
MAGNESIUM	277.90	0	0	-0.0330	0	0.00135
MANGANESE	257.60	0	0	0	0	-0.0000340
MOLYBDENUM	202.03	0	0	0	0	0
NICKEL	231.60	0	0.000400	0	0	0.00000100
POTASSIUM	766.40	0	0	0	0	0
SELENIUM	196.00	0	0.00541	0	0	-0.000230
SILICON	251.60	0	0	0	0	0
SILVER	328.00	0	0	-0.0000420	0	-0.00000400
SODIUM	589.50	0	0	0	0	0
STRONTIUM	215.20	0	0.000500	0	0	-0.000200
THALLIUM	190.80	0	0.00708	0.000190	0	-0.000110
TIN	189.90	0	0	0	0	0
TITANIUM	334.90	-0.0000300	0	0.000300	0	0
VANADIUM	310.20	0	0	-0.000646	0	-0.00000600
ZINC	213.80	0	0.000312	0	0.000523	0.0000600

CORR_FACTORS - Modified 03/05/2008
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00074046

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INTERELEMENT CORRECTION FACTORS (ANNUALLY)

Login Number: L08100257 **Date:** 01/17/2008
Insturment ID: IRIS-ICP **Method:** 6010B

Analyte	Wave Length	LI	MG	MN	MO	NA
ALUMINUM	308.20	0	0	0.00180	0.0228	0
ANTIMONY	206.80	0	0	0	-0.00800	0
ARSENIC	189.00	0	0	0	0.00108	0
BARIUM	455.40	0	0	0	0	0
BERYLLIUM	313.00	0	0	0	-0.0000500	0
BORON	249.70	0	0	0	0	0
CADMIUM	228.80	0	0	0	0	0
CALCIUM	373.70	0	0	0.00160	0	0
CHROMIUM	267.70	0	0	0.000510	0	0
COBALT	228.60	0	0	0	0	0
COPPER	324.70	0	0	0	0.000424	0
IRON	271.40	0	0	-0.000500	-0.00740	0
LEAD	220.30	0	0	0	-0.00300	0
LITHIUM	670.80	0	0	0	0	0
MAGNESIUM	277.90	0	0	0.00132	0.0452	0
MANGANESE	257.60	0	0.0000190	0	0	0
MOLYBDENUM	202.03	0	0	0	0	0
NICKEL	231.60	0	0	0	0	0
POTASSIUM	766.40	0	0	0	0	0
SELENIUM	196.00	0	0	0.00145	0.00147	0
SILICON	251.60	0	0	0	0.00800	0
SILVER	328.00	0	0	0.0000600	-0.000290	0
SODIUM	589.50	0	0	0	0	0
STRONTIUM	215.20	0	0	0	0.000500	0
THALLIUM	190.80	0	0	0.000110	-0.00710	0
TIN	189.90	0	0	0	0	0
TITANIUM	334.90	-0.00250	0	0	0	0
VANADIUM	310.20	0	-0.00000400	0	0	0
ZINC	213.80	0	0.0000180	0.000279	0	0.000186

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00074047

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INTERELEMENT CORRECTION FACTORS (ANNUALLY)

Login Number: L08100257 **Date:** 01/17/2008
Insturment ID: IRIS-ICP **Method:** 6010B

Analyte	Wave Length	NI	SB	SN	SR	TI
ALUMINUM	308.20	0	0	0	0	-0.00200
ANTIMONY	206.80	-0.000100	0	0	0	0.000620
ARSENIC	189.00	0	-0.000420	0	0	0
BARIUM	455.40	0	0	0	0	0
BERYLLIUM	313.00	0	0	0	0	0
BORON	249.70	0	0	0	0	0
CADMIUM	228.80	-0.0000710	0	0	0	0
CALCIUM	373.70	0.00195	0	0	0	0
CHROMIUM	267.70	0	0	0	0	0
COBALT	228.60	0	0	-0.00386	0	0.00180
COPPER	324.70	0	0	0	0	-0.000950
IRON	271.40	-0.000613	0	0	-0.00410	0
LEAD	220.30	0.000489	0	0	0	0
LITHIUM	670.80	0	0	0	0	0
MAGNESIUM	277.90	0	0	0.0347	0	0
MANGANESE	257.60	0	0	0	0	0
MOLYBDENUM	202.03	0	0	0	0	0
NICKEL	231.60	0	0	0	0	0
POTASSIUM	766.40	0	0	0	0	0
SELENIUM	196.00	0.0000180	0	0	0	0
SILICON	251.60	0	0	0	0	0.00665
SILVER	328.00	0	0	0	0	0.000978
SODIUM	589.50	0	0	0	0	0
STRONTIUM	215.20	0	0	0	0	0
THALLIUM	190.80	0	-0.000146	0	0	0.00180
TIN	189.90	0	0	0	0	0
TITANIUM	334.90	0	0	0	0	0
VANADIUM	310.20	0	0	0	0	0
ZINC	213.80	0.00507	0	0	0	0

CORR_FACTORS - Modified 03/05/2008
PDF File ID: 1219975
Report generated: 10/13/2008 14:44

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Microbac Laboratories Inc.
INTERELEMENT CORRECTION FACTORS (ANNUALLY)

Login Number: L08100257 **Date:** 01/17/2008
Insturment ID: IRIS-ICP **Method:** 6010B

Analyte	Wave Length	V	ZN
ALUMINUM	308.20	0.0299	0
ANTIMONY	206.80	0.0000700	0
ARSENIC	189.00	0	0
BARIUM	455.40	0	0
BERYLLIUM	313.00	0.00139	0
BORON	249.70	0	0
CADMIUM	228.80	0.0000850	0
CALCIUM	373.70	0	0
CHROMIUM	267.70	0.000100	0
COBALT	228.60	0	-0.00100
COPPER	324.70	-0.00203	0
IRON	271.40	-0.0775	0
LEAD	220.30	0	0
LITHIUM	670.80	0	0
MAGNESIUM	277.90	0.0180	0
MANGANESE	257.60	-0.0000750	0
MOLYBDENUM	202.03	-0.000247	0.00200
NICKEL	231.60	0	0
POTASSIUM	766.40	0	0
SELENIUM	196.00	0.000152	0.0180
SILICON	251.60	0	0
SILVER	328.00	-0.0211	-0.000144
SODIUM	589.50	0	0
STRONTIUM	215.20	-0.0000400	-0.000400
THALLIUM	190.80	0.00321	0
TIN	189.90	0	0
TITANIUM	334.90	0	0
VANADIUM	310.20	0	0
ZINC	213.80	0.000220	0

CORR_FACTORS - Modified 03/05/2008
PDF File ID: 1219975
Report generated: 10/13/2008 14:44

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00074049

Microbac Laboratories Inc.
INTERELEMENT CORRECTION FACTORS (ANNUALLY)

Login Number: L08100257 **Date:** 01/16/2008
Insturment ID: PE-ICP2 **Method:** 6010B

Analyte	Wave Length	AG	AL	AS	B	BA
ALUMINUM	396.15	0	0	0.206	0	0
ANTIMONY	206.84	0	0	-0.740	0	0
ARSENIC	188.98	0	0.0499	0	0	0
BARIUM	233.53	0	0	0	0	0
BERYLLIUM	234.86	0	0	0	0	0
BORON	249.68	0	0	0	0	0
CADMIUM	228.80	0	-0.000200	0.0000100	0	0
CALCIUM	227.55	0	-0.370	0.0414	0	0
CHROMIUM	267.72	0	0	0	0	0
COBALT	228.62	0	0	0	0	-0.0647
COPPER	327.39	0	0	0	0	0
IRON	239.56	0	0	0	0	0
LEAD	220.35	0	-0.104	0	0	0
LITHIUM	670.78	0	0	0	0	0
MAGNESIUM	279.08	0	0	0	0	0
MANGANESE	257.61	-0.185	0	-0.231	-0.0949	-0.230
MOLYBDENUM	202.03	0	0	0	0	0
NICKEL	231.60	0	0	0	0	0
POTASSIUM	766.49	0	0	0	0	0
SELENIUM	196.03	0	0.0669	0	0	0
SILICON	251.61	0	0	0	0	0
SILVER	328.07	0	0	0	0	0
SODIUM	589.59	0	0	0	0	0
STRONTIUM	407.77	0	0	0	0	0
THALLIUM	190.80	0	0	0	0	0
TIN	189.93	0	0	0	0	0
TITANIUM	334.94	0	0	0	0	0
VANADIUM	290.88	0	0	0.200	0	-0.190
ZINC	206.20	0	0	0	0	0

CORR_FACTORS - Modified 03/05/2008
PDF File ID: 1222125
Report generated: 10/15/2008 05:23

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00074050

Microbac Laboratories Inc.
INTERELEMENT CORRECTION FACTORS (ANNUALLY)

Login Number: L08100257 **Date:** 01/16/2008
Insturment ID: PE-ICP2 **Method:** 6010B

Analyte	Wave Length	BE	CA	CD	CO	CR
ALUMINUM	396.15	0	0.274	0	0	0
ANTIMONY	206.84	0	0	0	0	19.8
ARSENIC	188.98	0	-0.00673	-0.0875	0	-3.78
BARIUM	233.53	0	0	0	0	0
BERYLLIUM	234.86	0	0	0	0	-0.0105
BORON	249.68	0	0.0238	50.1	3.51	1.50
CADMIUM	228.80	0	0	0	-8.00	0
CALCIUM	227.55	0	0	0	174	-21.8
CHROMIUM	267.72	0	0	0	0	0
COBALT	228.62	0	0	0	0	0.436
COPPER	327.39	0	-0.0137	0	0.380	-0.0467
IRON	239.56	0	0.0227	0	1.91	0.331
LEAD	220.35	0	-0.0188	0	0.666	-0.0700
LITHIUM	670.78	0	0	0	0	0
MAGNESIUM	279.08	0	0.638	0	0	0
MANGANESE	257.61	-1.04	-0.00790	-0.755	-0.0418	-0.110
MOLYBDENUM	202.03	0	0	0	0	0
NICKEL	231.60	0	0	0	1.20	0
POTASSIUM	766.49	0	0	0	0	0
SELENIUM	196.03	0	0.117	0	-0.382	0
SILICON	251.61	0	0	0	0	0
SILVER	328.07	0	0	0	0	0
SODIUM	589.59	0	0	0	0	0
STRONTIUM	407.77	0	0	0	0	0
THALLIUM	190.80	0	-0.0100	0	6.00	0
TIN	189.93	0	0	0	0	0
TITANIUM	334.94	0	-0.0233	0	0	0.297
VANADIUM	290.88	0	0.00100	0	0	0
ZINC	206.20	0	0.000000100	0	0	-5.00

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Report generated: 10/15/2008 05:23

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Microbac Laboratories Inc.
INTERELEMENT CORRECTION FACTORS (ANNUALLY)

Login Number: L08100257 **Date:** 01/16/2008
Insturment ID: PE-ICP2 **Method:** 6010B

Analyte	Wave Length	CU	FE	K	LI	MG
ALUMINUM	396.15	0	0.108	0	0	0
ANTIMONY	206.84	0	0	0	0	0
ARSENIC	188.98	0	-0.130	0	0	0
BARIUM	233.53	0	0.0211	0	0	0
BERYLLIUM	234.86	0	0.163	0	0	0
BORON	249.68	0	-4.02	0	0	0
CADMIUM	228.80	0	-0.00172	0	0	0
CALCIUM	227.55	-2.44	-8.15	0	0	0.104
CHROMIUM	267.72	0	-0.0180	0	0	0
COBALT	228.62	0	0	0	0	0
COPPER	327.39	0	-0.0128	0	0	0
IRON	239.56	0	0	0	0	0.0276
LEAD	220.35	0.341	0.0593	0	0	0
LITHIUM	670.78	0	0	0	0	0
MAGNESIUM	279.08	0	0.174	0	0	0
MANGANESE	257.61	-0.0457	-0.0659	-0.0181	-0.794	0.0147
MOLYBDENUM	202.03	0	-0.0342	0	11.9	0
NICKEL	231.60	0	0	0	0	0
POTASSIUM	766.49	0	3.00	0	0	0
SELENIUM	196.03	0	-0.700	0	0	-0.0113
SILICON	251.61	0	0	0	0	0
SILVER	328.07	0.0717	-0.0248	0	0	0
SODIUM	589.59	0	0	0	0	0
STRONTIUM	407.77	0	0.00120	0	0	0
THALLIUM	190.80	0	0	0	0	0
TIN	189.93	0	0	0	0	0
TITANIUM	334.94	0	0	0	0	0
VANADIUM	290.88	0	-0.100	0	0	-0.0400
ZINC	206.20	-0.200	0.117	0	0	0

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Report generated: 10/15/2008 05:23

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Microbac Laboratories Inc.
INTERELEMENT CORRECTION FACTORS (ANNUALLY)

Login Number: L08100257 **Date:** 01/16/2008
Insturment ID: PE-ICP2 **Method:** 6010B

Analyte	Wave Length	MN	MO	NA	NI	PB
ALUMINUM	396.15	0	51.0	0	0	0
ANTIMONY	206.84	0	-17.4	0	0	0
ARSENIC	188.98	0	3.15	0	0	0
BARIUM	233.53	0	-0.740	0	0	0
BERYLLIUM	234.86	-0.131	-0.545	0	-0.00974	0
BORON	249.68	0	-2.08	0	0	0
CADMIUM	228.80	0	0	0	-0.0990	0
CALCIUM	227.55	0	-25.0	0	-1100	0
CHROMIUM	267.72	0.800	-0.00100	0	0	0
COBALT	228.62	0	-0.668	0	0.129	0
COPPER	327.39	0	-0.519	0	-0.0905	-0.0630
IRON	239.56	-1.38	0	0	0	0
LEAD	220.35	0.260	-2.35	0	0	0
LITHIUM	670.78	0	0	0	0	0
MAGNESIUM	279.08	0	-5.58	0	0	0.0252
MANGANESE	257.61	0	-0.0482	-0.00916	-0.0340	-0.0413
MOLYBDENUM	202.03	-0.209	0	0	0.134	0
NICKEL	231.60	0	0	0	0	0
POTASSIUM	766.49	0	0	1.00	0	0
SELENIUM	196.03	1.11	0.199	0	-0.202	0
SILICON	251.61	0	12.9	0	0	0
SILVER	328.07	0.130	0.0781	0	0	0
SODIUM	589.59	0	0	0	0	0
STRONTIUM	407.77	0	0	0	0	0
THALLIUM	190.80	-0.00100	1.20	0	0	0
TIN	189.93	0	0	0	0	0
TITANIUM	334.94	0	0	0	0	0
VANADIUM	290.88	0	0.578	0	0	0
ZINC	206.20	0	3.00	0	-0.200	-0.100

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Microbac Laboratories Inc.
INTERELEMENT CORRECTION FACTORS (ANNUALLY)

Login Number: L08100257 **Date:** 01/16/2008
Insturment ID: PE-ICP2 **Method:** 6010B

Analyte	Wave Length	SB	SE	SI	SN	SR
ALUMINUM	396.15	0	0	0	0	0
ANTIMONY	206.84	0	0	0	-7.64	0
ARSENIC	188.98	0	0	0	0	0
BARIUM	233.53	0	0	0	0	0
BERYLLIUM	234.86	0	0	0	0	0
BORON	249.68	0	0	0	0	0
CADMIUM	228.80	0	0	0	0	0
CALCIUM	227.55	0	0	2.79	0	0
CHROMIUM	267.72	0	0	0	0	0
COBALT	228.62	0	0	0	0	0
COPPER	327.39	0	0	0	0	0
IRON	239.56	0	0	0	0	0
LEAD	220.35	-0.0100	0	0	0	0
LITHIUM	670.78	0	0	0	0	0
MAGNESIUM	279.08	0	-0.0924	0	0	0
MANGANESE	257.61	-0.0505	-0.0281	-0.185	-0.0445	-0.625
MOLYBDENUM	202.03	0	0	0	0	0
NICKEL	231.60	-0.0500	-0.0100	0	0	0
POTASSIUM	766.49	0	0	0	0	0
SELENIUM	196.03	0	0	0	0	0
SILICON	251.61	0	0	0	0	0
SILVER	328.07	0	0	0	0	0.200
SODIUM	589.59	0	0	0	0	0
STRONTIUM	407.77	0	0	0	0	0
THALLIUM	190.80	0	0	0	0	0
TIN	189.93	0	0	0	0	0
TITANIUM	334.94	0	0	0	0	0
VANADIUM	290.88	0	0	0	0	0
ZINC	206.20	-0.300	0	0	0	0

CORR_FACTORS - Modified 03/05/2008
PDF File ID: 1222125
Report generated: 10/15/2008 05:23

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00074054

Microbac Laboratories Inc.
INTERELEMENT CORRECTION FACTORS (ANNUALLY)

Login Number: L08100257 **Date:** 01/16/2008
Insturment ID: PE-ICP2 **Method:** 6010B

Analyte	Wave Length	TI	TL	V	ZN
ALUMINUM	396.15	0	0	0	0
ANTIMONY	206.84	0	0	-3.59	0
ARSENIC	188.98	0	0	0.0930	0
BARIUM	233.53	0	0	-2.27	0
BERYLLIUM	234.86	0	0	0	0
BORON	249.68	0	0	0	0
CADMIUM	228.80	0	0	0.0940	0
CALCIUM	227.55	0	0	11.3	0
CHROMIUM	267.72	0	0	-0.300	-0.0400
COBALT	228.62	2.07	0	0	0
COPPER	327.39	-1.79	0	-0.842	-0.0613
IRON	239.56	0	0	0	0
LEAD	220.35	-0.750	0	-0.150	0
LITHIUM	670.78	0	0	0	0
MAGNESIUM	279.08	0	0	-0.0280	0
MANGANESE	257.61	-0.227	-0.0414	-0.0601	-0.0553
MOLYBDENUM	202.03	0	0	-0.288	0
NICKEL	231.60	0	0.150	0	0
POTASSIUM	766.49	0	0	0	0
SELENIUM	196.03	0	0	0.593	0
SILICON	251.61	0	0	0	0
SILVER	328.07	0	0	-6.38	0
SODIUM	589.59	0	0	0	0
STRONTIUM	407.77	0	0	0	0
THALLIUM	190.80	-4.00	0	0	0
TIN	189.93	0	0	0	0
TITANIUM	334.94	0	0	0	0
VANADIUM	290.88	0	0	0	0
ZINC	206.20	0	0	-0.100	0

CORR_FACTORS - Modified 03/05/2008
PDF File ID: 1222125
Report generated: 10/15/2008 05:23

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Microbac Laboratories Inc.
LINEAR RANGE (QUARTERLY)

Login Number: L08100257 **Date:** 09/10/2008
Insturment ID: IRIS-ICP **Method:** 6010B

Analyte	Integration Time (Sec.)	Concentration (mg/L)
Aluminum	10.00	630.0
Antimony	55.00	45.0
Arsenic	55.00	90.0
Barium	10.00	16.2
Beryllium	10.00	3.6
Boron	55.00	72.0
Cadmium	55.00	9.0
Calcium	10.00	450.0
Chromium	55.00	18.0
Cobalt	55.00	90.0
Copper	10.00	45.0
Iron	55.00	720.0
Lead	55.00	180.0
Lithium	10.00	9.0
Magnesium	55.00	900.0
Manganese	55.00	16.2
Molybdenum	55.00	27.0
Nickel	55.00	72.0
Potassium	10.00	180.0
Selenium	55.00	18.0
Silicon	55.00	45.0
Silver	10.00	3.6
Sodium	10.00	135.0
Strontium	55.00	27.0
Thallium	55.00	18.0
Tin	55.00	27.0
Titanium	10.00	22.5
Vanadium	10.00	90.0
Zinc	55.00	18.0

Comments:
All analytes passed acceptance criteria at the specified concentration.

Microbac Laboratories Inc.
LINEAR RANGE (QUARTERLY)

Login Number: L08100257 **Date:** 09/11/2008
Insturment ID: PE-ICP2 **Method:** 6010B

Analyte	Integration Time (Sec.)	Concentration (mg/L)
Aluminum	10.00	450.0
Antimony	10.00	36.0
Arsenic	10.00	9.0
Barium	10.00	9.0
Beryllium	10.00	1.8
Boron	10.00	18.0
Cadmium	10.00	2.7
Calcium	10.00	450.0
Chromium	10.00	45.0
Cobalt	10.00	45.0
Copper	10.00	45.0
Iron	10.00	450.0
Lead	10.00	90.0
Lithium	10.00	1.6
Magnesium	10.00	450.0
Manganese	10.00	27.0
Molybdenum	10.00	45.0
Nickel	10.00	45.0
Potassium	10.00	72.0
Selenium	10.00	45.0
Silicon	10.00	9.0
Silver	10.00	9.0
Sodium	10.00	180.0
Strontium	10.00	4.5
Thallium	10.00	45.0
Tin	10.00	45.0
Titanium	10.00	45.0
Vanadium	10.00	45.0
Zinc	10.00	45.0

Comments:
All analytes passed acceptance criteria at the specified concentration.

2.1.2 Metals ICP-MS Data

2.1.2.1 Summary Data

LABORATORY REPORT

00074059

L08100257

10/17/08 08:46

Submitted By

Microbac Laboratories Inc.
158 Starlite Drive
Marietta , OH 45750
(740) 373 - 4071

For

Account Name: Shaw E & I, Inc.
ABB Lummus Biulding
3010 Briarpark Drive Suite 4N
Houston, TX 77042
Attention: Larry Duty

Project Number: 2773.025
Project: Longhorn AAP
Site: LONGHORN AAP KARNACK TX

P.O. Number: 389869/ 390836(GWTP)

Sample Analysis Summary

Client ID	Lab ID	Method	Dilution	Date Received
S49BS100908	L08100257-02	6020	1	09-OCT-08

Report Number: **L08100257**
Report Date : **October 17, 2008**

00074060

Sample Number: **L08100257-02**
Client ID: **S49BS100908**
Matrix: **Soil**
Workgroup Number: **WG284512**
Collect Date: **10/09/2008 09:00**
Sample Tag: **01**

PrePrep Method: **NONE**
Prep Method: **3051**
Analytical Method: **6020**
Analyst: **JYH**
Dilution: **1**
Units: **mg/kg**

Instrument: **ELAN-ICP**
Prep Date: **10/09/2008 14:34**
Cal Date: **10/10/2008 12:09**
Run Date: **10/10/2008 17:42**
File ID: **EL.101008.174215**
Percent Solid: **91.5**

Analyte	CAS. Number	Result	Qual	PQL	SDL
Arsenic, Total	7440-38-2	0.597		0.316	0.0791
Selenium, Total	7782-49-2		U	0.211	0.105

U Not detected at or above adjusted sample detection limit

2.1.2.2 QC Summary Data

Example 6020 Calculations
Perkin Elmer ELAN 6100

1.0 Initial Calibration (ICAL) Parameters
The system performs linear regression from data consisting of a blank and three standards.

2.0 Calculating the concentration (C) of an element in water using data from prep log, run log, and quantitation report (note:the data system performs this calculation automatically when correction factors have been entered):

$$Cx = Cs \times \frac{Vf}{Vi} \times D$$

Where:	**Example:**
Cs = Concentration computed by the data system (ug/L)	0.1
Vf = Final volume	100
Vi = Initial volume	40
D = Dilution factor as a multiplier (10X = 10)	1
Cx = Concentration of element in (ug/L)	0.25

3.0 Calculating the concentration (C) of an element in soil using data from prep log, run log, and quantitation report (note: the data system performs this calculation automatically when correction factors have been entered):

$$Cx = Cs \times \frac{Vf}{Vi} \times D$$

Where:	**Example:**
Cs = Concentration computed by the data system (ug/L)	0.1
Vf = Final volume	200
Vi = Initial volume	0.5
D = Dilution factor as a multiplier (10X = 10)	1
Cx = Concentration of element in (ug/kg)	40

4.0 Adjusting the concentration to dry weight:

$$Cdry = \frac{Cx \times 100}{Px}$$

Where:	**Example:**
Cx = Concentration calculated as received (wet basis)	40
Px = Percent solids of sample (%wt)	80
$Cdry$ = Concentration calculated as dry weight (ug/kg)	50

50 ug/kg = 0.050 mg/kg

Perkin Elmer ELAN ICP/MS

STANDARDS KEY

QC Std 1 - ICV
QC Std 2 - ICB
QC Std 3 - CRI - Soil
QC Std 4 - CRI - Water
QC Std 5 - ICSA
QC Std 6 - ICSAB
QC Std 7 - CCV
QC Std 8 - CCB

Calibration Solutions

Analyte	Stock Conc. (mg/L)	S1 (mg/L)	S2 (mg/L)	S3 (mg/L)	S4 (mg/L)
Al	10	0	0.0004	0.05	0.1
Sb	10	0	0.0004	0.05	0.1
As	10	0	0.0004	0.05	0.1
Ba	10	0	0.0004	0.05	0.1
Be	10	0	0.0004	0.05	0.1
Ca	1000	0	0.04	5	10
Cd	10	0	0.0004	0.05	0.1
Cr	10	0	0.0004	0.05	0.1
Co	10	0	0.0004	0.05	0.1
Cu	10	0	0.0004	0.05	0.1
Fe	1000	0	0.04	5	10
Pb	10	0	0.0004	0.05	0.1
Mg	1000	0	0.04	5	10
Mn	10	0	0.0004	0.05	0.1
Ni	10	0	0.0004	0.05	0.1
K	1000	0	0.04	5	10
Se	10	0	0.0004	0.05	0.1
Ag	10	0	0.0004	0.05	0.1
Na	1000	0	0.04	5	10
Tl	10	0	0.0004	0.05	0.1
V	10	0	0.0004	0.05	0.1
Zn	10	0	0.0004	0.05	0.1

00074064

Microbac Laboratories Inc.
Microwave Digestion Log

Workgroup: WG284433
Analyst: VC
Run Date: 10/09/2008 14:34
Method: 3051

SOP: ME406 Revison 11
Spike Solution: STD27101
Spike Witness: REK
HNO3 Lot #: COA13347
Digest tubes Lot #: COA13407

SAMPLE #	Type	Initial Amount	Final Volume	Initial Vessel Wt	Final Vessel Wt	Spike Amount	Due Date
WG284433-01	BLANK	.5 g	200 mL	173.856 g	173.86 g		
WG284433-02	LCS	.5 g	200 mL	173.648 g	173.629 g	.5 mL	
L08100145-01	SAMP	.52 g	200 mL	172.428 g	172.098 g		10/10/08
L08100145-02	SAMP	.507 g	200 mL	173.264 g	173.246 g		10/10/08
L08100145-03	SAMP	.512 g	200 mL	173.409 g	172.97 g		10/10/08
L08100145-04	SAMP	.515 g	200 mL	172.197 g	171.826 g		10/10/08
L08100145-05	SAMP	.5 g	200 mL	172.778 g	171.998 g		10/10/08
L08100145-06	SAMP	.502 g	200 mL	173.995 g	173.426 g		10/10/08
L08100145-07	SAMP	.51 g	200 mL	173.576 g	173.002 g		10/10/08
L08100145-08	SAMP	.511 g	200 mL	173.75 g	172.998 g		10/10/08
L08100145-09	SAMP	.5 g	200 mL	173.884 g	172.68 g		10/10/08
L08100145-10	SAMP	.52 g	200 mL	173.627 g	173.579 g		10/10/08
L08100145-11	SAMP	.506 g	200 mL	173.227 g	172.909 g		10/10/08
L08100145-12	SAMP	.516 g	200 mL	173.562 g	173.501 g		10/10/08
L08100145-13	SAMP	.5 g	200 mL	173.157 g	173.001 g		10/10/08
L08100145-14	SAMP	.504 g	200 mL	172.462 g	171.38 g		10/10/08
L08100145-15	SAMP	.521 g	200 mL	172.44 g	171.94 g		10/10/08
L08100145-16	SAMP	.511 g	200 mL	172.678 g	172.68 g		10/10/08
L08100145-17	SAMP	.5 g	200 mL	173.563 g	172.981 g		10/10/08
L08100145-18	SAMP	.514 g	200 mL	172.825 g	172.81 g		10/10/08
L08100235-01	SAMP	.501 g	200 mL	173.522 g	172.988 g		10/13/08
L08100257-02	SAMP	.518 g	200 mL	173.409 g	173.372 g		10/16/08
WG284433-03	LCS2	.5 g	200 mL	174.274 g	174.239 g	.5 mL	

Analyst: Vicki Collins

Reviewer:

MW_DIG - Modified 07/02/2008
PDF ID: 1217404
Report generated: 10/09/2008 15:17

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Instrument Run Log

Instrument: ELAN-ICP Dataset: 100908B.REP
Analyst1: JYH Analyst2: N/A
Method: 6020 SOP: ME700 Rev: 4
Maintenance Log ID: 25989

Calibration Std: STD28270 ICV/CCV Std: STD28972 Post Spike: STD27580
ICSA: STD28930 ICSAB: STD28983

Workgroups: 284441,284309,284241,283704

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
1	EL.100908.154019	Blank	Blank		1		10/09/08 15:40
2	EL.100908.154559	WG284533-01	Calibration Point		1		10/09/08 15:45
3	EL.100908.155139	WG284533-02	Calibration Point		1		10/09/08 15:51
4	EL.100908.155720	WG284533-03	Calibration Point		1		10/09/08 15:57
5	EL.100908.160302	WG284533-04	Calibration Point		1		10/09/08 16:03
6	EL.100908.160845	WG284533-05	Initial Calibration Verification		1		10/09/08 16:08
7	EL.100908.161426	WG284533-06	Initial Calib Blank		1		10/09/08 16:14
8	EL.100908.162009	WG284533-07	CRQL Check Solid		1		10/09/08 16:20
9	EL.100908.162555	WG284533-08	CRQL Check Water		1		10/09/08 16:25
10	EL.100908.163139	WG284533-09	Interference Check		1		10/09/08 16:31
11	EL.100908.163723	WG284533-10	Interference Check		1		10/09/08 16:37
12	EL.100908.164307	WG284533-11	CCV		1		10/09/08 16:43
13	EL.100908.164848	WG284533-12	CCB		1		10/09/08 16:48
14	EL.100908.165428	WG283561-02	Method/Prep Blank	40/100	1		10/09/08 16:54
15	EL.100908.170008	WG283561-03	Laboratory Control S	40/100	1		10/09/08 17:00
16	EL.100908.170548	L08090642-01	092308GWMMW020-O-U	40/100	1		10/09/08 17:05
17	EL.100908.171129	WG283561-01	Reference Sample		1	L08090642-02	10/09/08 17:11
18	EL.100908.171710	WG283561-04	Matrix Spike	40/100	1	L08090642-02	10/09/08 17:17
19	EL.100908.172252	WG283561-05	Matrix Spike Duplica	40/100	1	L08090642-02	10/09/08 17:22
20	EL.100908.172833	L08090642-03	092408GWMMW024-EQ-U	40/100	1		10/09/08 17:28
21	EL.100908.173416	WG284441-01	Post Digestion Spike		1	L08090642-03	10/09/08 17:34
22	EL.100908.173958	WG284441-02	Serial Dilution		5	L08090642-03	10/09/08 17:39
23	EL.100908.174541	L08090642-04	092408GWMMW024-EQ-F	40/100	1		10/09/08 17:45
24	EL.100908.175124	WG284533-13	CCV		1		10/09/08 17:51
25	EL.100908.175705	WG284533-14	CCB		1		10/09/08 17:57
26	EL.100908.180247	L08090642-05	092308GWMMW027-O-U	40/100	1		10/09/08 18:02
27	EL.100908.180830	L08090642-06	092308GWMMW027-O-F	40/100	1		10/09/08 18:08
28	EL.100908.181412	L08090642-07	092408GWMMW006-EQ-U	40/100	1		10/09/08 18:14
29	EL.100908.181953	L08090642-08	092408GWMMW006-EQ-F	40/100	1		10/09/08 18:19
30	EL.100908.182534	L08090667-02	PKR-GW-B119B	40/100	1		10/09/08 18:25
31	EL.100908.183115	L08090667-03	PKR-GW-B119C	40/100	1		10/09/08 18:31
32	EL.100908.183657	L08090667-04	PKR-GW-B119D	40/100	1		10/09/08 18:36
33	EL.100908.184239	L08090667-05	PKR-GW-B118B	40/100	1		10/09/08 18:42
34	EL.100908.184821	L08090667-06	PKR-GW-B118C	40/100	1		10/09/08 18:48
35	EL.100908.185404	L08090667-08	PKR-GW-B137B	40/100	1		10/09/08 18:54
36	EL.100908.185947	WG284533-15	CCV		1		10/09/08 18:59
37	EL.100908.190528	WG284533-16	CCB		1		10/09/08 19:05

Approved: October 10, 2008

Maren Berry

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Instrument Run Log

Instrument: ELAN-ICP Dataset: 100908B.REP
Analyst1: JYH Analyst2: N/A
Method: 6020 SOP: ME700 Rev: 4
Maintenance Log ID: 25989

Calibration Std: STD28270 ICV/CCV Std: STD28972 Post Spike: STD27580
ICSA: STD28930 ICSAB: STD28983

Workgroups: 284441,284309,284241,283704

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
38	EL.100908.191109	L08090667-09	PKR-GW-B138A	40/100	1		10/09/08 19:11
39	EL.100908.191653	L08090667-10	PKR-GW-B113A	40/100	1		10/09/08 19:16
40	EL.100908.192237	L08090667-11	PKR-GW-B139A	40/100	1		10/09/08 19:22
41	EL.100908.192821	L08090667-12	PKR-GW-B139B	40/100	1		10/09/08 19:28
42	EL.100908.193403	L08090667-13	PKR-GW-B139C	40/100	1		10/09/08 19:34
43	EL.100908.193944	L08090667-14	PKR-GW-B132	40/100	1		10/09/08 19:39
44	EL.100908.194527	WG283756-01	Reference Sample		10	L08100018-13	10/09/08 19:45
45	EL.100908.195111	WG283756-02	Reference Sample		10	L08100018-14	10/09/08 19:51
46	EL.100908.195654	WG283756-05	Matrix Spike	40/100	10	L08100018-13	10/09/08 19:56
47	EL.100908.200235	WG283756-07	Matrix Spike	40/100	10	L08100018-14	10/09/08 20:02
48	EL.100908.200817	WG284533-17	CCV		1		10/09/08 20:08
49	EL.100908.201359	WG284533-18	CCB		1		10/09/08 20:13
50	EL.100908.201939	WG283756-06	Matrix Spike Duplica	40/100	10	L08100018-13	10/09/08 20:19
51	EL.100908.202521	WG283756-08	Matrix Spike Duplica	40/100	10	L08100018-14	10/09/08 20:25
52	EL.100908.203104	L08100018-06	U1-1676-092908-GW-N	40/100	10		10/09/08 20:31
53	EL.100908.203646	L08100018-07	U1-1676-092908-GW-N	40/100	10		10/09/08 20:36
54	EL.100908.204230	L08100018-08	U1-1676-092908-GW-D	40/100	10		10/09/08 20:42
55	EL.100908.204813	L08100018-09	U1-1676-092908-GW-D	40/100	10		10/09/08 20:48
56	EL.100908.205357	L08100137-02	B11SB1112-093008	.5/200	100		10/09/08 20:53
57	EL.100908.205940	WG283523-03	Method/Prep Blank	40/100	1		10/09/08 20:59
58	EL.100908.210523	WG283523-04	Laboratory Control S	40/100	1		10/09/08 21:05
59	EL.100908.211106	WG283523-01	Reference Sample		1	L08090671-02	10/09/08 21:11
60	EL.100908.211649	WG284533-19	CCV		1		10/09/08 21:16
61	EL.100908.212231	WG284533-20	CCB		1		10/09/08 21:22
62	EL.100908.212812	WG283523-05	Matrix Spike	40/100	1	L08090671-02	10/09/08 21:28
63	EL.100908.213356	WG283523-06	Matrix Spike Duplica	40/100	1	L08090671-02	10/09/08 21:33
64	EL.100908.213940	L08090641-01	092308GWMPW019-O-U	40/100	1		10/09/08 21:39
65	EL.100908.214524	WG283704-03	Post Digestion Spike		1	L08090641-01	10/09/08 21:45
66	EL.100908.215109	WG283704-04	Serial Dilution		5	L08090641-01	10/09/08 21:51
67	EL.100908.215654	L08090641-02	092308GWMPW019-O-F	40/100	1		10/09/08 21:56
68	EL.100908.220239	L08090641-03	092308GWMPW023-O-U	40/100	1		10/09/08 22:02
69	EL.100908.220825	L08090641-04	092308GWMPW023-O-F	40/100	1		10/09/08 22:08
70	EL.100908.221411	L08090641-05	092308GWMMW017-O-U	40/100	1		10/09/08 22:14
71	EL.100908.221955	L08090641-06	092308GWMMW017-O-F	40/100	1		10/09/08 22:19
72	EL.100908.222538	WG284533-21	CCV		1		10/09/08 22:25
73	EL.100908.223120	WG284533-22	CCB		1		10/09/08 22:31
74	EL.100908.223702	L08090641-07	092308GWMMW018-O-U	40/100	1		10/09/08 22:37

Approved: October 10, 2008

Maren Berry

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Instrument Run Log

Instrument: ELAN-ICP Dataset: 100908B.REP
Analyst1: JYH Analyst2: N/A
Method: 6020 SOP: ME700 Rev: 4
Maintenance Log ID: 25989

Calibration Std: STD28270 ICV/CCV Std: STD28972 Post Spike: STD27580
ICSA: STD28930 ICSAB: STD28983

Workgroups: 284441,284309,284241,283704

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
75	EL.100908.224245	L08090641-08	092308GWMMW018-O-F	40/100	1		10/09/08 22:42
76	EL.100908.224828	L08090641-09	092408GWMPW022-O-U	40/100	1		10/09/08 22:48
77	EL.100908.225412	L08090641-10	092408GWMPW022-O-F	40/100	1		10/09/08 22:54
78	EL.100908.225956	WG284533-23	CCV		1		10/09/08 22:59
79	EL.100908.230538	WG284533-24	CCB		1		10/09/08 23:05

Approved: October 10, 2008
Maren Berry
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Instrument Run Log

Instrument: ELAN-ICP Dataset: 101008B.REP
Analyst1: JYH Analyst2: N/A
Method: 6020 SOP: ME700 Rev: 4
Maintenance Log ID: 25989

Calibration Std: STD28270 ICV/CCV Std: STD28972 Post Spike: STD27580
ICSA: STD28930 ICSAB: STD28983

Workgroups: 284441,283704,283946,284525,284309,284512,284566

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
1	EL.101008.114657	Blank	Blank		1		10/10/08 11:46
2	EL.101008.115237	WG284609-01	Calibration Point		1		10/10/08 11:52
3	EL.101008.115817	WG284609-02	Calibration Point		1		10/10/08 11:58
4	EL.101008.120359	WG284609-03	Calibration Point		1		10/10/08 12:03
5	EL.101008.120940	WG284609-04	Calibration Point		1		10/10/08 12:09
6	EL.101008.121523	WG284609-05	Initial Calibration Verification		1		10/10/08 12:15
7	EL.101008.122104	WG284609-06	Initial Calib Blank		1		10/10/08 12:21
8	EL.101008.122647	WG284609-07	CRQL Check Solid		1		10/10/08 12:26
9	EL.101008.123233	WG284609-08	CRQL Check Water		1		10/10/08 12:32
10	EL.101008.123817	WG284609-09	Interference Check		1		10/10/08 12:38
11	EL.101008.124401	WG284609-10	Interference Check		1		10/10/08 12:44
12	EL.101008.124945	WG284609-11	CCV		1		10/10/08 12:49
13	EL.101008.125526	WG284609-12	CCB		1		10/10/08 12:55
14	EL.101008.130106	L08090642-01	092308GWMMW020-O-U	40/100	10		10/10/08 13:01
15	EL.101008.130647	WG283561-01	Reference Sample		5	L08090642-02	10/10/08 13:06
16	EL.101008.131228	WG283561-04	Matrix Spike	40/100	5	L08090642-02	10/10/08 13:12
17	EL.101008.131810	WG283561-05	Matrix Spike Duplica	40/100	5	L08090642-02	10/10/08 13:18
18	EL.101008.132352	L08100045-04	MW8-092908		1		10/10/08 13:23
19	EL.101008.132934	L08100045-04	MW8-092908		10		10/10/08 13:29
20	EL.101008.133516	L08100045-05	MW8-092908-FD	40/100	1		10/10/08 13:35
21	EL.101008.134059	L08100045-05	MW8-092908-FD		10		10/10/08 13:40
22	EL.101008.134643	L08090642-05	092308GWMMW027-O-U	40/100	10		10/10/08 13:46
23	EL.101008.135226	L08090642-06	092308GWMMW027-O-F	40/100	10		10/10/08 13:52
24	EL.101008.135809	WG284609-13	CCV		1		10/10/08 13:58
25	EL.101008.140351	WG284609-14	CCB		1		10/10/08 14:03
26	EL.101008.140939	L08090667-02	PKR-GW-B119B	40/100	5		10/10/08 14:09
27	EL.101008.141521	L08090667-06	PKR-GW-B118C	40/100	5		10/10/08 14:15
28	EL.101008.142103	L08090667-13	PKR-GW-B139C	40/100	5		10/10/08 14:21
29	EL.101008.142751	L08090667-14	PKR-GW-B132	40/100	5		10/10/08 14:27
30	EL.101008.143343	WG283523-01	Reference Sample		10	L08090671-02	10/10/08 14:33
31	EL.101008.144206	WG283523-05	Matrix Spike	40/100	10	L08090671-02	10/10/08 14:42
32	EL.101008.144749	WG283523-06	Matrix Spike Duplica	40/100	10	L08090671-02	10/10/08 14:47
33	EL.101008.145334	L08090641-03	092308GWMPW023-O-U	40/100	10		10/10/08 14:53
34	EL.101008.145927	L08090641-04	092308GWMPW023-O-F	40/100	10		10/10/08 14:59
35	EL.101008.150539	WG284609-15	CCV		1		10/10/08 15:05
36	EL.101008.151121	WG284609-16	CCB		1		10/10/08 15:11
37	EL.101008.151745	WG283773-03	Method/Prep Blank	.5/200	1		10/10/08 15:17

Approved: October 14, 2008

Maren Berry

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Microbac Laboratories Inc.

Instrument Run Log

Instrument: ELAN-ICP Dataset: 101008B.REP
Analyst1: JYH Analyst2: N/A
Method: 6020 SOP: ME700 Rev: 4
Maintenance Log ID: 25989

Calibration Std: STD28270 ICV/CCV Std: STD28972 Post Spike: STD27580
ICSA: STD28930 ICSAB: STD28983

Workgroups: 284441,283704,283946,284525,284309,284512,284566

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
38	EL.101008.152326	WG283773-04	Laboratory Control S	.5/200	1		10/10/08 15:23
39	EL.101008.152906	WG283773-01	Reference Sample		1	L08100018-10	10/10/08 15:29
40	EL.101008.153447	WG283773-05	Matrix Spike	.515/200	1	L08100018-10	10/10/08 15:34
41	EL.101008.154028	WG283773-06	Matrix Spike Duplica	.515/200	1	L08100018-10	10/10/08 15:40
42	EL.101008.154610	L08100018-01	U1-1677-092908-SO	.542/200	1		10/10/08 15:46
43	EL.101008.155152	L08100018-04	U1-1676-092908-SO-N	.503/200	1		10/10/08 15:51
44	EL.101008.155734	WG284525-01	Post Digestion Spike		1	L08100018-04	10/10/08 15:57
45	EL.101008.160316	WG284525-02	Serial Dilution		5	L08100018-04	10/10/08 16:03
46	EL.101008.160859	L08100018-05	U1-1676-092908-SO-D	.532/200	1		10/10/08 16:08
47	EL.101008.161442	WG284609-17	CCV		1		10/10/08 16:14
48	EL.101008.162024	WG284609-18	CCB		1		10/10/08 16:20
49	EL.101008.162809	WG283773-02	Reference Sample		1	L08100031-01	10/10/08 16:28
50	EL.101008.163352	WG283773-07	Matrix Spike	.534/200	1	L08100031-01	10/10/08 16:33
51	EL.101008.163935	WG283773-08	Matrix Spike Duplica	.534/200	1	L08100031-01	10/10/08 16:39
52	EL.101008.164515	L08100031-02	SED-3-0006	.508/200	1		10/10/08 16:45
53	EL.101008.165056	L08100031-03	SED-2-0006	.512/200	1		10/10/08 16:50
54	EL.101008.165637	L08100031-04	SED-1-0006	.547/200	1		10/10/08 16:56
55	EL.101008.170219	L08100031-05	SED-DUP1	.503/200	1		10/10/08 17:02
56	EL.101008.170801	WG284433-01	Method/Prep Blank	.5/200	1		10/10/08 17:08
57	EL.101008.171344	WG284433-02	Laboratory Control S	.5/200	1		10/10/08 17:13
58	EL.101008.171926	WG284433-03	Laboratory Control S	.5/200	1		10/10/08 17:19
59	EL.101008.172509	WG284609-19	CCV		1		10/10/08 17:25
60	EL.101008.173050	WG284609-20	CCB		1		10/10/08 17:30
61	EL.101008.173632	L08100235-01	0810-87-001	.501/200	5		10/10/08 17:36
62	EL.101008.174215	L08100257-02	S49BS100908	.518/200	1	WG284523-01	10/10/08 17:42
63	EL.101008.174759	WG284512-01	Post Digestion Spike		1	L08100257-02	10/10/08 17:47
64	EL.101008.175343	WG284512-02	Serial Dilution		5	L08100257-02	10/10/08 17:53
65	EL.101008.175925	L08100145-01	092608VEBSM9-0	.52/200	10		10/10/08 17:59
66	EL.101008.180506	L08100145-02	092608VEBGM9-0	.507/200	10		10/10/08 18:05
67	EL.101008.181048	L08100145-03	092608VEBSM8-0	.512/200	10		10/10/08 18:10
68	EL.101008.181629	L08100145-04	092608VEBGM8-0	.515/200	10		10/10/08 18:16
69	EL.101008.182211	L08100145-05	092608VEBSM7-0	.5/200	10		10/10/08 18:22
70	EL.101008.182753	L08100145-06	092608VEBGM7-0	.502/200	10		10/10/08 18:27
71	EL.101008.183336	WG284609-21	CCV		1		10/10/08 18:33
72	EL.101008.183917	WG284609-22	CCB		1		10/10/08 18:39
73	EL.101008.184459	L08100145-07	092608VEBSM5-0	.51/200	10		10/10/08 18:44
74	EL.101008.185042	L08100145-08	092608VEBGM5-0	.511/200	10		10/10/08 18:50

Approved: October 14, 2008

Maren Berry

Microbac®

Microbac Laboratories Inc.

Instrument Run Log

Instrument: ELAN-ICP Dataset: 101008B.REP
Analyst1: JYH Analyst2: N/A
Method: 6020 SOP: ME700 Rev: 4
Maintenance Log ID: 25989

Calibration Std: STD28270 ICV/CCV Std: STD28972 Post Spike: STD27580
ICSA: STD28930 ICSAB: STD28983

Workgroups: 284441,283704,283946,284525,284309,284512,284566

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
75	EL.101008.185625	L08100145-09	092608VEBSM1-0	.5/200	10		10/10/08 18:56
76	EL.101008.190209	L08100145-10	092608VEBGM1-0	.52/200	10		10/10/08 19:02
77	EL.101008.190753	L08100145-11	092608VEBSM3-0	.506/200	10		10/10/08 19:07
78	EL.101008.191337	L08100145-12	092608VEBGM3-0	.516/200	10		10/10/08 19:13
79	EL.101008.191920	L08100145-13	092608VEBSM6-0	.5/200	10		10/10/08 19:19
80	EL.101008.192501	L08100145-14	092608VEBGM6-0	.504/200	10		10/10/08 19:25
81	EL.101008.193043	L08100145-15	092608VEBSM4-0	.521/200	10		10/10/08 19:30
82	EL.101008.193625	L08100145-16	092608VEBGM4-0	.511/200	10		10/10/08 19:36
83	EL.101008.194207	WG284609-23	CCV		1		10/10/08 19:42
84	EL.101008.194749	WG284609-24	CCB		1		10/10/08 19:47
85	EL.101008.195330	L08100145-17	092608VEBSM2-0	.5/200	10		10/10/08 19:53
86	EL.101008.195912	L08100145-18	092608VEBGM2-0	.514/200	10		10/10/08 19:59
87	EL.101008.200455	WG284476-03	Method/Prep Blank	40/100	1		10/10/08 20:04
88	EL.101008.201039	WG284476-04	Laboratory Control S	40/100	1		10/10/08 20:10
89	EL.101008.201622	L08100275-01	100608GWMST276-O-U	40/100	1		10/10/08 20:16
90	EL.101008.202206	L08100275-02	100608GWMST276-O-F	40/100	1		10/10/08 20:22
91	EL.101008.202751	L08100275-03	100608GWMMW010-O-U	40/100	1		10/10/08 20:27
92	EL.101008.203336	L08100275-04	100608GWMMW010-O-F	40/100	1		10/10/08 20:33
93	EL.101008.203919	L08100275-05	100708GWMMW026-O-U	40/100	1		10/10/08 20:39
94	EL.101008.204501	L08100275-06	100708GWMMW026-O-F	40/100	1		10/10/08 20:45
95	EL.101008.205043	WG284609-25	CCV		1		10/10/08 20:50
96	EL.101008.205624	WG284609-26	CCB		1		10/10/08 20:56
97	EL.101008.210205	L08100239-01	0810-77-001	40/100	1		10/10/08 21:02
98	EL.101008.210747	WG284566-01	Post Digestion Spike		1	L08100239-01	10/10/08 21:07
99	EL.101008.211330	WG284566-02	Serial Dilution		5	L08100239-01	10/10/08 21:13
100	EL.101008.211913	L08100270-01	OUTLET 003/COMP	40/100	1		10/10/08 21:19
101	EL.101008.212457	WG284476-01	Reference Sample		1	L08100270-02	10/10/08 21:24
102	EL.101008.213040	WG284476-05	Matrix Spike	40/100	1	L08100270-02	10/10/08 21:30
103	EL.101008.213624	WG284476-06	Matrix Spike Duplica	40/100	1	L08100270-02	10/10/08 21:36
104	EL.101008.214209	L08100270-03	OUTLET 003 BRANCH LEG	40/100	1		10/10/08 21:42
105	EL.101008.214754	L08100270-04	OUTLET 003 BRANCH LEG	40/100	1	WG284476-02	10/10/08 21:47
106	EL.101008.215339	WG284476-07	Duplicate	40/100	1	L08100270-04	10/10/08 21:53
107	EL.101008.215924	WG284609-27	CCV		1		10/10/08 21:59
108	EL.101008.220505	WG284609-28	CCB		1		10/10/08 22:05
109	EL.101008.221046	L08100270-05	OUTLET 003 BRANCH LEG	40/100	1		10/10/08 22:10
110	EL.101008.221629	L08100270-06	OUTLET 003 BRANCH LEG	40/100	1	WG284665-01	10/10/08 22:16
111	EL.101008.222212	L08100270-07	OUTLET 007/COMP	40/100	1	WG284479-01	10/10/08 22:22

Approved: October 14, 2008

Maren Berry

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Instrument Run Log

Instrument: ELAN-ICP Dataset: 101008B.REP
Analyst1: JYH Analyst2: N/A
Method: 6020 SOP: ME700 Rev: 4
Maintenance Log ID: 25989

Calibration Std: STD28270 ICV/CCV Std: STD28972 Post Spike: STD27580
ICSA: STD28930 ICSAB: STD28983

Workgroups: 284441,283704,283946,284525,284309,284512,284566

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
112	EL.101008.222755	L08100270-08	OUTLET 007/COMP	40/100	1		10/10/08 22:27
113	EL.101008.223339	L08100291-01	OUTFALL 002/COMP	40/100	2		10/10/08 22:33
114	EL.101008.223923	WG283591-03	Method/Prep Blank		1		10/10/08 22:39
115	EL.101008.224507	WG283591-04	Laboratory Control S		1		10/10/08 22:45
116	EL.101008.225052	L08090654-01	C7-092608-0T01		1		10/10/08 22:50
117	EL.101008.225637	WG284576-01	Post Digestion Spike		1	L08090654-01	10/10/08 22:56
118	EL.101008.230222	WG284576-02	Serial Dilution		5	L08090654-01	10/10/08 23:02
119	EL.101008.230806	WG284609-29	CCV		1		10/10/08 23:08
120	EL.101008.231348	WG284609-30	CCB		1		10/10/08 23:13
121	EL.101008.231931	L08090654-02	C7-092608-0T01-DIS		1		10/10/08 23:19
122	EL.101008.232517	L08090654-03	C5.8-092608-0T01		1		10/10/08 23:25
123	EL.101008.233101	L08090654-04	C5.8-092608-0T01-DIS		1		10/10/08 23:31
124	EL.101008.233644	L08090654-05	C5.8-092608-1T01		1		10/10/08 23:36
125	EL.101008.234228	L08090654-06	C5.8-092608-1T01-DIS		1		10/10/08 23:42
126	EL.101008.234811	WG283591-01	Reference Sample		1	L08090654-07	10/10/08 23:48
127	EL.101008.235355	WG283591-02	Reference Sample		1	L08090654-08	10/10/08 23:53
128	EL.101008.235939	WG283591-05	Matrix Spike		1	L08090654-09	10/10/08 23:59
129	EL.101108.000524	WG283591-07	Matrix Spike		1	L08090654-10	10/11/08 00:05
130	EL.101108.001109	WG283591-06	Matrix Spike Duplicate		1	L08090654-11	10/11/08 00:11
131	EL.101108.001653	WG284609-39	CCV		1		10/11/08 00:16
132	EL.101108.002235	WG284609-40	CCB		1		10/11/08 00:22
133	EL.101108.002818	WG283591-08	Matrix Spike Duplicate		1	L08090654-12	10/11/08 00:28
134	EL.101108.003403	L08090654-13	C6.8-092608-0T01		1		10/11/08 00:34
135	EL.101108.003929	L08090654-14	C6.8-092608-0T01-DIS		1		10/11/08 00:39
136	EL.101108.004311	L08100018-02	U1-1677-092908-GW	40/100	200		10/11/08 00:43
137	EL.101108.004650	L08100018-01	U1-1677-092908-SO	.542/200	20		10/11/08 00:46
138	EL.101108.005029	L08100018-04	U1-1676-092908-SO-N	.503/200	10		10/11/08 00:50
139	EL.101108.005407	WG284525-01	Post Digestion Spike		10		10/11/08 00:54
140	EL.101108.005746	WG284525-02	Serial Dilution		50		10/11/08 00:57
141	EL.101108.010125	L08100018-05	U1-1676-092908-SO-D	.532/200	10		10/11/08 01:01
142	EL.101108.010505	WG283773-01	Reference Sample		10	L08100018-10	10/11/08 01:05
143	EL.101108.010904	WG284609-33	CCV		1		10/11/08 01:09
144	EL.101108.011446	WG284609-34	CCB		1		10/11/08 01:14
145	EL.101108.012008	WG283773-05	Matrix Spike	.515/200	10	L08100018-11	10/11/08 01:20
146	EL.101108.012349	WG283773-06	Matrix Spike Duplicate	.515/200	10	L08100018-12	10/11/08 01:23
147	EL.101108.012729	WG283773-02	Reference Sample		10	L08100031-01	10/11/08 01:27
148	EL.101108.013110	WG283773-07	Matrix Spike	.534/200	10	L08100031-07	10/11/08 01:31

Approved: October 14, 2008

Maren Berry

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Instrument Run Log

Instrument: ELAN-ICP Dataset: 101008B.REP
Analyst1: JYH Analyst2: N/A
Method: 6020 SOP: ME700 Rev: 4
Maintenance Log ID: 25989

Calibration Std: STD28270 ICV/CCV Std: STD28972 Post Spike: STD27580
ICSA: STD28930 ICSAB: STD28983

Workgroups: 284441,283704,283946,284525,284309,284512,284566

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
149	EL.101108.013452	WG283773-08	Matrix Spike Duplicate	.534/200	10	L08100031-08	10/11/08 01:34
150	EL.101108.013833	L08100031-02	SED-3-0006	.508/200	10		10/11/08 01:38
151	EL.101108.014213	L08100031-03	SED-2-0006	.512/200	10		10/11/08 01:42
152	EL.101108.014552	L08100031-04	SED-1-0006	.547/200	10		10/11/08 01:45
153	EL.101108.014931	L08100031-05	SED-DUP1	.503/200	10		10/11/08 01:49
154	EL.101108.015330	WG284609-35	CCV		1		10/11/08 01:53
155	EL.101108.015911	WG284609-36	CCB		1		10/11/08 01:59
156	EL.101308.081653	WG284609-41	Interference Check		1		10/13/08 08:16
157	EL.101308.082237	WG284609-42	Interference Check		1		10/13/08 08:22

Approved: October 14, 2008

Maren Berry

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Data Checklist

Date: 09-OCT-2008
Analyst: JYH
Analyst: NA
Method: 6020
Instrument: ELAN
Curve Workgroup: 284533
Runlog ID: 24628
Analytical Workgroups: 284441,284309,284241,283704

Calibration/Linearity	X
ICV/CCV	X
ICB/CCB	X
ICSA/ICSAB	X
CRI	X
Blank/LCS	X
MS/MSD	X
Post Spike/Serial Dilution	X
Upload Results	X
Data Qualifiers	X
Generate PDF Instrument Data	X
Sign/Annotate PDF Data	X
Upload Curve Data	X
Workgroup Forms	
Case Narrative	642,667,137,018,641
Client Forms	X
Level X	
Level 3	667,137
Level 4	642,018,641
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Primary Reviewer	JYH
Secondary Reviewer	MMB
Comments	

Primary Reviewer:
10-OCT-2008

Secondary Reviewer:
10-OCT-2008

Microbac Laboratories Inc.

Data Checklist

Date: 10-OCT-2008
Analyst: JYH
Analyst: NA
Method: 6020
Instrument: ELAN
Curve Workgroup: 284609
Runlog ID: 24637
Analytical Workgroups: 284441,283704,283946,284525,284309,284512,284566

Calibration/Linearity	X
ICV/CCV	X
ICB/CCB	X
ICSA/ICSAB	X
CRI	X
Blank/LCS	X
MS/MSD	X
Post Spike/Serial Dilution	X
Upload Results	X
Data Qualifiers	
Generate PDF Instrument Data	X
Sign/Annotate PDF Data	X
Upload Curve Data	X
Workgroup Forms	X
Case Narrative	667,642,045,641,018,031,145,235,257
	239,270,275,291
Client Forms	X
Level X	
Level 3	667,045,031,257
Level 4	642,641,018,145,275
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Primary Reviewer	JYH
Secondary Reviewer	MMB
Comments	

Primary Reviewer:

Secondary Reviewer:
14-OCT-2008

Microbac Laboratories Inc.

HOLDING TIMES
EQUIVALENT TO AFCEE FORM 9

00074075

Analytical Method: 6020 **AAB#:** WG284512

Login Number: L08100257

Client ID	Date Collected	Date Received	Date Extracted	Max Hold Time Ext.	Time Held Ext.	Date Analyzed	Max Hold Time Anal	Time Held Anal.	Q
S49BS100908	10/09/08	10/09/08	10/09/08	180	0.233	10/10/08	180	1.13	

*** EXT = SEE PROJECT QAPP REQUIREMENTS**
***ANAL = SEE PROJECT QAPP REQUIREMENTS**

Microbac Laboratories Inc.

00074076

METHOD BLANK SUMMARY

Login Number:	L08100257	Work Group:	WG284512
Blank File ID:	EL.101008.170801	Blank Sample ID:	WG284433-01
Prep Date:	10/09/08 14:34	Instrument ID:	ELAN-ICP
Analyzed Date:	10/10/08 17:08	Method:	6020
Analyst:	JYH		

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG284433-02	EL.101008.171344	10/10/08 17:13	01
LCS2	WG284433-03	EL.101008.171926	10/10/08 17:19	01
S49BS100908	L08100257-02	EL.101008.174215	10/10/08 17:42	01

Report Name: BLANK_SUMMARY
PDF File ID: 1219281
Report generated 10/13/2008 10:49

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00074077

METHOD BLANK REPORT

Login Number: L08100257 Prep Date: 10/09/08 14:34 Sample ID: WG284433-01
Instrument ID: ELAN-ICP Run Date: 10/10/08 17:08 Prep Method: 3051
File ID: EL.101008.170801 Analyst: JYH Method: 6020
Workgroup (AAB#): WG284512 Matrix: Soil Units: mg/kg
Contract #: DACA56-94-D-0020 Cal ID: ELAN-I-10-OCT-08

Analytes	SDL	PQL	Concentration	Dilution	Qualifier
Arsenic, Total	0.0750	0.300	0.0750	1	U
Selenium, Total	0.100	0.200	0.100	1	U

SDL Method Detection Limit
PQL Reporting/Practical Quantitation Limit
ND Analyte Not detected at or above reporting limit
* |Analyte concentration| > RL

Report Name:BLANK
PDF ID: 1219282
13-OCT-2008 10:49

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LABORATORY CONTROL SAMPLE (LCS)

00074078

Login Number: L08100257 Analyst: JYH Prep Method: 3051
Instrument ID: ELAN-ICP Matrix: Soil Method: 6020
Workgroup (AAB#): WG284512 Units: mg/kg
QC Key: STD Lot #: STD27101

Sample ID: WG284433-02 LCS File ID: EL.101008.171344 Run Date: 10/10/2008 17:13
Sample ID: WG284433-03 LCS2 File ID: EL.101008.171926 Run Date: 10/10/2008 17:19

Analytes	LCS			LCS2			%RPD	%Rec Limits	RPD Lmt	Q
	Known	Found	% REC	Known	Found	% REC				
Arsenic, Total	10.0	9.83	98.3	10.0	9.82	98.2	0.110	80 - 120	20	
Selenium, Total	10.0	9.42	94.2	10.0	9.29	92.9	1.39	80 - 120	20	

LCS_LCS2 - Modified 03/06/2008
PDF File ID: 1219283
Report generated: 10/13/2008 10:49

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Serial Dilution Report

Login: L08100257 **Worknum:** WG284512
Instrument: ELAN-ICP **Method:** 6020
Serial Dil: WG284512-02 **File ID:** EL.101008.175343 **Dil:** 5 **Units:** ug/L
Sample: L08100257-02 **File ID:** EL.101008.174215 **Dil:** 1

Analyte	Sample	Qual	Serial Dil	Qual	% Diff	Q
Arsenic	1.42	X	1.455	F	2.46	
Selenium	ND	U	ND	U		

U = Result is below MDL.
F = Result is greater than or equal to MDL and less than the RL.
X = Result is greater than or equal to RL and less than 100 times the MDL.
E = %D exceeds control limit of 10% and initial sample result is greater than or equal to 100 times the MDL.

Microbac Laboratories Inc.
POST SPIKE REPORT

Sample Login ID: L08100257 **Worknum:** WG284512
Instrument ID: ELAN-ICP **Method:** 6020
Post Spike ID: WG284512-01 **File ID:** EL.101008.174759 **Dil:** 1 **Units:** ug/L
Sample ID: L08100257-02 **File ID:** EL.101008.174215 **Dil:** 1 **Matrix:** Soil

Analyte	Post Spike Result	C	Sample Result	C	Spike Added(SA)	% R	Control Limit %R	Q
ARSENIC	51.9		1.42		50	100.9	75 - 125	
SELENIUM	48.0		0	U	50	96.1	75 - 125	

N = % Recovery exceeds control limits
F = Result is between MDL and RL
U = Sample result is below MDL. A value of zero is used in the calculation

POST_SPIKE - Modified 03/06/2008
PDF File ID: 1219279
Report generated: 10/13/2008 10:49

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Initial Calibration Summary

00074081

Login:	**L08100257**	Workgroup (AAB#):	**WG284512**
Analytical Method:	**6020**	Instrument ID:	**ELAN-ICP**
ICAL Worknum:	**WG284609**	Initial Calibration Date:	**10-OCT-2008 12:09**

	WG284609-01		WG284609-02		WG284609-03		WG284609-04			
	Conc	INT	Conc	INT	Conc	INT	Conc	INT	R	Q
ARSENIC	0	-354	.4	500	50	88400	100	168000	.999984	
SELENIUM	0	-12.0	.4	80.5	50	7540	100	14200	.999958	

INT = Instrument intensity
R = Coefficient of correlation
Q = Data Qualifier
*** = Out of Compliance; R < 0.995**

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INITIAL CALIBRATION BLANK (ICB)

Login Number: L08100257
Run Date: 10/10/2008
Sample ID: WG284609-06
Instrument ID: ELAN-ICP
Run Time: 12:21
Method: 6020
File ID: EL.101008.122104
Analyst: JYH
Units: ug/L
Workgroup (AAB#): WG284512
Cal ID: ELAN-ICP - 10-OCT-08
Matrix: SOIL

Analytes	MDL	RDL	Concentration	Qualifier
ARSENIC	.1875	.75	.1875	U
SELENIUM	.25	.5	.25	U

ICB - Modified 03/06/2008
PDF File ID: 1219290
Report generated 10/13/2008 10:49

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CONTINUING CALIBRATION BLANK (CCB)

00074083

Login Number: L08100257 Run Date: 10/10/2008 Sample ID: WG284609-12
Instrument ID: ELAN-ICP Run Time: 12:55 Method: 6020
File ID: EL.101008.125526 Analyst: JYH Units: ug/L
Workgroup (AAB#): WG284512 Cal ID: ELAN-I - 10-OCT-08
Matrix: SOIL

Analytes	MDL	RDL	Concentration	Qualifier
Arsenic	0.188	0.750	0.188	U
Selenium	0.250	0.500	0.250	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.

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CONTINUING CALIBRATION BLANK (CCB)

00074084

Login Number: L08100257 Run Date: 10/10/2008 Sample ID: WG284609-18
Instrument ID: ELAN-ICP Run Time: 16:20 Method: 6020
File ID: EL.101008.162024 Analyst: JYH Units: ug/L
Workgroup (AAB#): WG284512 Cal ID: ELAN-I - 10-OCT-08
Matrix: SOIL

Analytes	MDL	RDL	Concentration	Qualifier
Arsenic	0.188	0.750	0.188	U
Selenium	0.250	0.500	0.250	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.

CCB - Modified 03/05/2008
PDF File ID: 1219293
Report generated 10/13/2008 10:49

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CONTINUING CALIBRATION BLANK (CCB)

00074085

Login Number: L08100257 Run Date: 10/10/2008 Sample ID: WG284609-20
Instrument ID: ELAN-ICP Run Time: 17:30 Method: 6020
File ID: EL.101008.173050 Analyst: JYH Units: ug/L
Workgroup (AAB#): WG284512 Cal ID: ELAN-I - 10-OCT-08
Matrix: SOIL

Analytes	MDL	RDL	Concentration	Qualifier
Arsenic	0.188	0.750	0.188	U
Selenium	0.250	0.500	0.250	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.

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CONTINUING CALIBRATION BLANK (CCB)

00074086

Login Number: L08100257 Run Date: 10/10/2008 Sample ID: WG284609-22
Instrument ID: ELAN-ICP Run Time: 18:39 Method: 6020
File ID: EL.101008.183917 Analyst: JYH Units: ug/L
Workgroup (AAB#): WG284512 Cal ID: ELAN-I - 10-OCT-08
Matrix: SOIL

Analytes	MDL	RDL	Concentration	Qualifier
Arsenic	0.188	0.750	0.188	U
Selenium	0.250	0.500	0.250	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.

CCB - Modified 03/05/2008
PDF File ID: 1219293
Report generated 10/13/2008 10:49

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INITIAL CALIBRATION VERIFICATION (ICV)
(Alternate Source)

00074087

Login Number: L08100257 Run Date: 10/10/2008 Sample ID: WG284609-05
Instrument ID: ELAN-ICP Run Time: 12:15 Method: 6020
File ID: EL.101008.121523 Analyst: JYH Units: ug/L
Workgroup (AAB#): WG284512 Cal ID: ELAN-I - 10-OCT-08
QC Key: STD

Analyte		Expected	Found	%REC	LIMITS	Q
Arsenic		50	49.1	98.2	90 - 110	
Selenium		50	50.3	101	90 - 110	

* Exceeds LIMITS Limit

ICV - Modified 03/06/2008
PDF File ID: 1219289
Report generated 10/13/2008 10:49

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CONTINUING CALIBRATION VERIFICATION (CCV)

00074088

Login Number: L08100257 Run Date: 10/10/2008 Sample ID: WG284609-11

Instrument ID: ELAN-ICP Run Time: 12:49 Method: 6020

File ID: EL.101008.124945 Analyst: JYH QC Key: STD

Workgroup (AAB#): WG284512 Cal ID: ELAN-I - 10-OCT-08

Matrix: SOIL

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Arsenic		50.0	48.6	ug/L	97.2	90 - 110		
Selenium		50.0	50.2	ug/L	100	90 - 110		

* Exceeds LIMITS Criteria

CCV - Modified 03/05/2008

PDF File ID: 1219292

Report generated 10/13/2008 10:49

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CONTINUING CALIBRATION VERIFICATION (CCV)

00074089

Login Number: L08100257 Run Date: 10/10/2008 Sample ID: WG284609-17

Instrument ID: ELAN-ICP Run Time: 16:14 Method: 6020

File ID: EL.101008.161442 Analyst: JYH QC Key: STD

Workgroup (AAB#): WG284512 Cal ID: ELAN-I - 10-OCT-08

Matrix: SOIL

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Arsenic		50.0	50.5	ug/L	101	90 - 110		
Selenium		50.0	50.7	ug/L	101	90 - 110		

* Exceeds LIMITS Criteria

CCV - Modified 03/05/2008

PDF File ID: 1219292

Report generated 10/13/2008 10:49

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CONTINUING CALIBRATION VERIFICATION (CCV)

00074090

Login Number: L08100257 Run Date: 10/10/2008 Sample ID: WG284609-19

Instrument ID: ELAN-ICP Run Time: 17:25 Method: 6020

File ID: EL.101008.172509 Analyst: JYH QC Key: STD

Workgroup (AAB#): WG284512 Cal ID: ELAN-I - 10-OCT-08

Matrix: SOIL

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Arsenic		50.0	49.5	ug/L	99.0	90 - 110		
Selenium		50.0	51.0	ug/L	102	90 - 110		

* Exceeds LIMITS Criteria

CCV - Modified 03/05/2008

PDF File ID: 1219292

Report generated 10/13/2008 10:49

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Microbac Laboratories Inc.

CONTINUING CALIBRATION VERIFICATION (CCV)

00074091

Login Number: L08100257 Run Date: 10/10/2008 Sample ID: WG284609-21

Instrument ID: ELAN-ICP Run Time: 18:33 Method: 6020

File ID: EL.101008.183336 Analyst: JYH QC Key: STD

Workgroup (AAB#): WG284512 Cal ID: ELAN-I - 10-OCT-08

Matrix: SOIL

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Arsenic		50.0	49.5	ug/L	99.1	90 - 110		
Selenium		50.0	50.7	ug/L	101	90 - 110		

* Exceeds LIMITS Criteria

CCV - Modified 03/05/2008

PDF File ID: 1219292

Report generated 10/13/2008 10:49

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Microbac Laboratories Inc.
INTERFERENCE CHECK SAMPLES

Login number: L08100257 **Workgroup (AAB#):** WG284512
Instrument ID: ELAN-ICP **Method:** 6020
Sol. A : WG284609-09 **File ID:** EL.101008.123817 **Units:** ug/L
Sol. AB : WG284609-10 **File ID:** EL.101008.124401

	Sol. A			Sol. AB			
ANALYTE	True	Found	%Recovery	True	Found	%Recovery	Q
Arsenic	NS	-0.0391	NS	100	101	101	
Selenium	NS	-0.171	NS	100	109	109	

NS = Not spiked
*** = Recovery of spiked element is outside acceptance limit of 80% - 120% of true value.**
 # = Result for unspiked element is outside the acceptance limits of (+/-) the project reporting limit (RL).

Microbac Laboratories Inc.

INTERNAL STANDARD REPORT

Login: L08100257 **Analytical Method:** 6020
Analytical Workgroup: WG284512 **Matrix:** 7
Instrument: ELAN-ICP **Analyst:** JYH
ICAL Date: 10-OCT-2008 11:52

			BISMUTH	GERMANIUM	INDIUM	TERBIUM
Sample	**Type**	**Run Date**	**% Rec**	**% Rec**	**% Rec**	**% Rec**
L08100257-02	SAMP	10-OCT-2008 17:42	99.179	103.864	103.583	104.051
WG284433-01	BLANK	10-OCT-2008 17:08	94.867	102.603	98.9	99.266
WG284433-02	LCS	10-OCT-2008 17:13	97.256	103.218	101.983	101.715
WG284433-03	LCS2	10-OCT-2008 17:19	98	103.158	101.338	101.401
WG284512-01	PSPK	10-OCT-2008 17:47	99.395	105.602	102.551	104.503
WG284512-02	SERIAL	10-OCT-2008 17:53	95.929	101.421	99.006	98.246
WG284609-05	ICV	10-OCT-2008 12:15	97.514	91.788	95.164	100.397
WG284609-06	ICB	10-OCT-2008 12:21	97.429	91.069	95.207	98.889
WG284609-11	CCV	10-OCT-2008 12:49	99.837	102.531	99.454	101.545
WG284609-12	CCB	10-OCT-2008 12:55	98.994	99.979	99.846	99.947
WG284609-17	CCV	10-OCT-2008 16:14	92.248	81.629	85.995	95.379
WG284609-18	CCB	10-OCT-2008 16:20	92.808	82.989	86.83	94.229
WG284609-19	CCV	10-OCT-2008 17:25	95.324	97.763	96.661	98.638
WG284609-20	CCB	10-OCT-2008 17:30	94.517	97.811	96.634	96.949
WG284609-21	CCV	10-OCT-2008 18:33	94.472	97.322	96.748	98.203
WG284609-22	CCB	10-OCT-2008 18:39	95.402	98.159	97.3	97.455

Acceptance criteria: 30% - 120%
Underlined recoveries are out of range

INT_STD_ICPMS - Modified 03/05/2008
PDF File ID: 1219287
Report generated: 10/13/2008 10:49

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Microbac Laboratories Inc.
LINEAR RANGE (QUARTERLY)

Login Number: L08100257 **Date:** 09/11/2008
Insturment ID: ELAN-ICP **Method:** 6020

Analyte	Integration Time (Sec.)	Concentration (ug/L)
Antimony	1.00	100.0
Arsenic	1.00	100.0
Barium	1.00	100.0
Cadmium	1.00	100.0
Chromium	1.00	100.0
Cobalt	1.00	100.0
Copper	1.00	100.0
Lead	1.00	100.0
Manganese	1.00	100.0
Nickel	1.00	100.0
Selenium	1.00	100.0
Silver	1.00	100.0
Thallium	1.00	100.0
Vanadium	1.00	100.0
Zinc	1.00	100.0

Comments:
All analytes passed acceptance criteria at the specified concentration.

2.1.3 Metals CVAA Data (Mercury)

2.1.3.1 Summary Data

LABORATORY REPORT

00074097

L08100257

10/17/08 08:46

Submitted By

Microbac Laboratories Inc.
158 Starlite Drive
Marietta , OH 45750
(740) 373 - 4071

For

Account Name: Shaw E & I, Inc.
ABB Lummus Biulding
3010 Briarpark Drive Suite 4N
Houston, TX 77042
Attention: Larry Duty

Project Number: 2773.025
Project: Longhorn AAP
Site: LONGHORN AAP KARNACK TX

P.O. Number: 389869/ 390836(GWTP)

Sample Analysis Summary

Client ID	Lab ID	Method	Dilution	Date Received
S49WC100808	L08100257-01	7470A	1	09-OCT-08
S49BS100908	L08100257-02	7471A	1	09-OCT-08

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Microbac Laboratories Inc.

Report Number: **L08100257**
Report Date : **October 17, 2008**

00074098

Sample Number:	L08100257-01	PrePrep Method:	1311	Instrument:	HYDRA
Client ID:	S49WC100808	Prep Method:	METHOD	Prep Date:	10/14/2008 10:17
Matrix:	Leachate	Analytical Method:	7470A	Cal Date:	10/15/2008 16:12
Workgroup Number:	WG284986	Analyst:	SLP	Run Date	10/15/2008 16:23
Collect Date:	10/08/2008 11:45	Dilution:	1	File ID:	HY.101508.162311
Sample Tag:	01	Units:	mg/L		

Analyte	CAS.Number	Result	Qual	PQL	SDL	EPA HW#	Reg. Limit
Mercury, TCLP	7439-97-6		U	.005	.001	D009	0.2

U Not detected at or above adjusted sample detection limit

Microbac®

Report Number: **L08100257**
Report Date : **October 17, 2008**

00074099

Sample Number:	L08100257-02	PrePrep Method:	NONE	Instrument:	HYDRA
Client ID:	S49BS100908	Prep Method:	METHOD	Prep Date:	10/10/2008 07:12
Matrix:	Soil	Analytical Method:	7471A	Cal Date:	10/11/2008 16:15
Workgroup Number:	WG284628	Analyst:	SLP	Run Date:	10/11/2008 16:31
Collect Date:	10/09/2008 09:00	Dilution:	1	File ID:	HY.101108.163146
Sample Tag:	01	Units:	mg/kg	Percent Solid:	91.5

Analyte	CAS. Number	Result	Qual	PQL	SDL
Mercury, Total	7439-97-6		U	0.269	0.0108

U Not detected at or above adjusted sample detection limit

2.1.3.2 QC Summary Data

Example Cold Vapor Mercury Calculations
Hydra AA Mercury Analyzer

1.0 Initial Calibration (ICAL) Parameters
The system performs linear regression from data consisting of a blank and five standards.

2.0 Calculating the concentration (C) of an element in water using data from run log and quantitation report (note:the data system performs this calculation automatically when correction factors have been entered):

$$Cx = Cs \times \frac{Vf}{Vi} \times D$$

Where:	**Example:**
Cs = Concentration computed by the data system (ug/L)	0.1
Vf = Diluted to Volume (mL)	40
Vi = Aliquot Volume (mL)	40
D = Manual dilution factor, if required (10X = 10)	1
Cx = Concentration of element in ppb (ug/L)	0.1

3.0 Calculating the concentration (C) of an element in soil using data from prep log and quantitation report (note: the data system performs this calculation automatically when correction factors have been entered):

$$Cx = Cs \times \frac{Vf}{Ws} \times D$$

Where:	**Example:**
Cs = Concentration computed by the data system (ug/L)	0.1
Vf = Diluted to volume (mL)	40
Ws = Aliquot weight (g)	0.6
D = Manual dilution factor	1
Cx = Concentration of element in ug/kg	6.67

4.0 Adjusting the concentration to dry weight:

$$Cdry = \frac{Cx \times 100}{Px}$$

1 Cx = Concentration calculated as received (wet basis)	6.67
Px = Percent solids of sample (%wt)	80
$Cdry$ = Concentration calculated as dry weight (ug/kg)	8.33

8.33 ug/kg = 0.00833 mg/kg

TCLP Non-Volatile

Analyst(s): RWC
Date: 10-13-08

Analyst/Date		Analyst/Date	
RWC 10-13-08		TDH 10-14-08	
Time On	Temp On °C	Time Off	Temp Off °C
1200	23	0510	23

Jug #	Sample #	Tests	Method	Fluid #	Matrix*	%Solid	Size Reduction Yes	Size Reduction No	Int. Wt. (g)	Fluid Vol. (mL)
G 7	10-0272-03	ME 8082 PAH	1312	SFI-307	S/S	100		✓	110.01	2200
G 1	05								110.00	
G 4	07	MS 8270RS							110.08	
G 17	09	MS MS MS							110.07	
G 29	11	SD SD SD							110.05	
G 2	13								110.07	
G 26	15								110.02	
G 3	17								110.05	
G 10	19								110.03	
N/A	FBLK	8082 PAH			N/A	N/A			2200	
G-11	10-261-02	DRO GRO	WET-DI	DI	S/S	100			100.00	2000
G 5	04								100.00	
G 12	06								100.07	
G 18	08								100.05	
G 6	13								100.04	
G-31	15								100.08	
G 23	19								100.00	
G 30	21								100.00	
G 19	10-329-20								100.05	
G 15	22								100.00	
G 25	24								100.02	
G 32	26								100.05	
G 8	30								100.01	
G 9	32								100.06	
G 27	35								100.08	
G 14	37								100.02	
G 16	39								100.07	
G 22	41								100.00	
N/A	FBLK				N/A	N/A			2000	
D	10-257-01	ME	1311	FI-725	S/S	100			100.00	
N/A	FBLK				N/A	N/A		✓	2000	

*Matrix Code = (S-solid) (SS-sand, soil or sludge) (P-paint) (O-organic) (W-water or waste)
Agitator speed is 30 ± 2 rpm unless otherwise noted.

Comments: RWC 10-13-08

Peer Review By: _____ Supervisor Review: _____

00074103

Microbac Laboratories Inc.
Metals Digest Log

Workgroup: WG284838
Analyst: REK
Method: METHOD
Run Date: 10/14/2008 10:17
Hotblock Start Temp: 94.4 @ 10:05
Hotblock End Temp: 96.1 @ 12:05

SOP: ME404 Revison 11
Spike Solution: STD29236
Spike Witness: SDL
H2SO4 Lot #: COA13254
HNO3 Lot #: COA13347
Digest tubes Lot #: COA13407
KMnO4 1:1 Lot #: RGT13170
K2S2O8 1:1 Lot #: RGT13197
Mercury Water ICV Lot #: STD29238
HG H2O STDS 10PPM Lot #: STD29244

	SAMPLE #	Type	Matrix	Initial Amount	Final Volume	Spike Amount	Due Date
1	WG284838-02	BLANK	1	40 mL	40 mL		
2	WG284699-01	FBLK	18	40 mL	40 mL		
3	WG284725-01	FBLK	17	4 mL	40 mL		
4	WG284838-03	LCS	1	40 mL	40 mL	4 mL	
5	L08100257-01	SAMP	17	4 mL	40 mL		10/16/08
6	L08100272-03	SAMP	18	40 mL	40 mL		10/20/08
7	L08100272-05	SAMP	18	40 mL	40 mL		10/20/08
8	WG284838-01	REF	18	40 mL	40 mL		
9	L08100272-07	RS02	18	40 mL	40 mL		10/20/08
10	WG284838-04	MS	18	36 mL	40 mL	4 mL	
11	L08100272-09	MS02	18	36 mL	40 mL	4 mL	10/20/08
12	WG284838-05	MSD	18	36 mL	40 mL	4 mL	
13	L08100272-11	SD02	18	36 mL	40 mL	4 mL	10/20/08
14	L08100272-13	SAMP	18	40 mL	40 mL		10/20/08
15	L08100272-15	SAMP	18	40 mL	40 mL		10/20/08
16	L08100272-17	SAMP	18	40 mL	40 mL		10/20/08
17	L08100272-19	SAMP	18	40 mL	40 mL		10/20/08
18	L08100360-22	SAMP	1	40 mL	40 mL		10/24/08
19	L08100378-01	SAMP	2	40 mL	40 mL		10/17/08
20	L08100378-02	SAMP	2	40 mL	40 mL		10/17/08
21	L08100378-03	SAMP	2	40 mL	40 mL		10/17/08
22	L08100378-04	SAMP	2	40 mL	40 mL		10/17/08
23	L08100378-05	SAMP	2	40 mL	40 mL		10/17/08
24	L08100378-06	SAMP	2	40 mL	40 mL		10/17/08
25	L08100378-07	SAMP	2	40 mL	40 mL		10/17/08
26	L08100378-08	SAMP	2	40 mL	40 mL		10/17/08
27	L08100378-14	SAMP	2	40 mL	40 mL		10/17/08

Analyst: _____

Reviewer: _____

BLOCK_DIG - Modified 07/22/2008
PDF ID: 1221214
Report generated: 10/14/2008 12:27

Microbac®

00074104

Microbac Laboratories Inc.
Metals Digest Log

Workgroup: WG284475
Analyst: REK
Method: METHOD
Run Date: 10/10/2008 07:12
Hotblock Start Temp: 93 @ 07:30
Hotblock End Temp: 93.2 @ 08:00

SOP: ME405 Revison 8
Spike Solution: STD29177
Spike Witness: SDL
HNO3 Lot #: COA13347
hcl Lot #: COA13324
Digest tubes Lot #: COA13407
KMnO4 1:1 Lot #: RGT13170
HG SOIL STD 10PPM Lot #: STD29184
HG SOILS ICV Lot #: STD29185

	SAMPLE #	Type	Matrix	Initial Amount	Final Volume	Spike Amount	Due Date
1	WG284475-02	BLANK	7	.6 g	40 mL		
2	WG284475-03	LCS	7	.6 g	40 mL	4 mL	
3	L08100257-02	SAMP	7	.609 g	40 mL		10/16/08
4	L08100267-01	SAMP	7	.642 g	40 mL		10/16/08
5	L08100267-02	SAMP	7	.612 g	40 mL		10/16/08
6	L08100267-03	SAMP	7	.647 g	40 mL		10/16/08
7	L08100272-02	SAMP	7	.603 g	40 mL		10/20/08
8	L08100272-04	SAMP	7	.608 g	40 mL		10/20/08
9	WG284475-01	REF	7	.624 g	40 mL		
10	L08100272-06	RS01	7	.624 g	40 mL		10/20/08
11	WG284475-04	MS	7	.624 g	40 mL	4 mL	
12	L08100272-08	MS01	7	.624 g	40 mL	4 mL	10/20/08
13	WG284475-05	MSD	7	.624 g	40 mL	4 mL	
14	L08100272-10	SD01	7	.624 g	40 mL	4 mL	10/20/08
15	L08100272-12	SAMP	7	.633 g	40 mL		10/20/08
16	L08100272-14	SAMP	7	.638 g	40 mL		10/20/08
17	L08100272-16	SAMP	7	.612 g	40 mL		10/20/08
18	L08100272-18	SAMP	7	.634 g	40 mL		10/20/08

Analyst: 

Reviewer: 

BLOCK_DIG - Modified 07/22/2008
PDF ID: 1217469
Report generated: 10/10/2008 08:14

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Microbac Laboratories Inc.

Instrument Run Log

Instrument: HYDRA Dataset: 101108A.PRN
Analyst1: KHR Analyst2: ADC
Method: 7471A SOP: 405 Rev: 8
Maintenance Log ID: 26181

Calibration Std: STD29184 ICV/CCV Std: STD29185 Post Spike: STD29184
ICSA: N/A ICSAB: N/A

Workgroups: 284628

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
1	HY.101108.160456	WG284883-01	Calibration Point		1		10/11/08 16:04
2	HY.101108.160658	WG284883-02	Calibration Point		1		10/11/08 16:06
3	HY.101108.160902	WG284883-03	Calibration Point		1		10/11/08 16:09
4	HY.101108.161130	WG284883-04	Calibration Point		1		10/11/08 16:11
5	HY.101108.161335	WG284883-05	Calibration Point		1		10/11/08 16:13
6	HY.101108.161521	WG284883-06	Calibration Point		1		10/11/08 16:15
7	HY.101108.161717	WG284883-07	Initial Calibration Verification		1		10/11/08 16:17
8	HY.101108.161904	WG284883-08	Initial Calib Blank		1		10/11/08 16:19
9	HY.101108.162232	WG284883-09	CCV		1		10/11/08 16:22
10	HY.101108.162420	WG284883-10	CCB		1		10/11/08 16:24
11	HY.101108.162637	WG284475-02	Method/Prep Blank	.6/40	1		10/11/08 16:26
12	HY.101108.162850	WG284475-03	Laboratory Control Sample	.6/40	1		10/11/08 16:28
13	HY.101108.163146	L08100257-02	S49BS100908	.609/40	1	WG284523-01	10/11/08 16:31
14	HY.101108.163349	WG284628-01	Post Digestion Spike		1		10/11/08 16:33
15	HY.101108.163531	L08100267-01	WR-10 COMP 1	.642/40	1	WG284559-01	10/11/08 16:35
16	HY.101108.163753	WG284628-02	Post Digestion Spike		1		10/11/08 16:37
17	HY.101108.164048	L08100267-02	WR-10 COMP 2	.612/40	1		10/11/08 16:40
18	HY.101108.164236	L08100267-03	WR-10 COMP 3	.647/40	1	WG284559-02	10/11/08 16:42
19	HY.101108.164421	L08100272-02	AV-NCB-AS-RR12-17.5-19.5	.603/40	1		10/11/08 16:44
20	HY.101108.164608	WG284628-03	Post Digestion Spike		1		10/11/08 16:46
21	HY.101108.164801	WG284883-11	CCV		1		10/11/08 16:48
22	HY.101108.164958	WG284883-12	CCB		1		10/11/08 16:49
23	HY.101108.165150	L08100272-04	AV-NCB-AS-RR12-19.5-21-G	.608/40	1		10/11/08 16:51
24	HY.101108.165353	L08100272-06	AV-NCB-AS-VIS-RR10-16.5-	.624/40	1		10/11/08 16:53
25	HY.101108.165556	L08100272-08	AV-NCB-AS-VIS-RR10-16.5-	.624/40	1		10/11/08 16:55
26	HY.101108.165741	L08100272-10	AV-NCB-AS-VIS-RR10-16.5-	.624/40	1		10/11/08 16:57
27	HY.101108.170003	L08100272-12	AV-NCB-AS-VIS-RR10-18.5-	.633/40	1		10/11/08 17:00
28	HY.101108.170342	L08100272-14	AV-NCB-AS-VIS-RR10-25-D	.638/40	1		10/11/08 17:03
29	HY.101108.170554	L08100272-16	AV-NCB-AS-AC1-RR08-17-1	.612/40	1		10/11/08 17:05
30	HY.101108.170806	L08100272-18	AV-NCB-AS-AC1-RR08-19-1	.634/40	1		10/11/08 17:08
31	HY.101108.170948	WG284883-13	CCV		1		10/11/08 17:09
32	HY.101108.171245	WG284883-14	CCB		1		10/11/08 17:12

Approved: October 15, 2008

Maren Berry

Microbac®

Microbac Laboratories Inc.

Instrument Run Log

Instrument: HYDRA Dataset: 101508A.PRN
Analyst1: KHR Analyst2: ADC
Method: 7470A SOP: 404 Rev: 11
Maintenance Log ID: 26213

Calibration Std: STD29244 ICV/CCV Std: STD29238 Post Spike: STD29244
ICSA: N/A ICSAB: N/A

Workgroups: 284986

Comments: No results are reported after CCV/CCB WG285186-14/15 due to failure of CCV\ WG285186-16. Samples were reanalyzed under a new calibration with compliant results.

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
1	HY.101508.112704	WG285186-01	Calibration Point		1		10/15/08 11:27
2	HY.101508.112857	WG285186-02	Calibration Point		1		10/15/08 11:28
3	HY.101508.113144	WG285186-03	Calibration Point		1		10/15/08 11:31
4	HY.101508.113341	WG285186-04	Calibration Point		1		10/15/08 11:33
5	HY.101508.113605	WG285186-05	Calibration Point		1		10/15/08 11:36
6	HY.101508.113801	WG285186-06	Calibration Point		1		10/15/08 11:38
7	HY.101508.114049	WG285186-07	Initial Calibration Verification		1		10/15/08 11:40
8	HY.101508.114242	WG285186-08	Initial Calibration Verification		1		10/15/08 11:42
9	HY.101508.114435	WG285186-09	Initial Calib Blank		1		10/15/08 11:44
10	HY.101508.114702	WG285186-10	CCV		1		10/15/08 11:47
11	HY.101508.114905	WG285186-11	CCB		1		10/15/08 11:49
12	HY.101508.115138	WG284838-02	Method/Prep Blank	40/40	1		10/15/08 11:51
13	HY.101508.115342	WG284699-01	Fluid Blank		1		10/15/08 11:53
14	HY.101508.115523	WG284725-01	Fluid Blank		1		10/15/08 11:55
15	HY.101508.115820	WG284838-03	Laboratory Control S	40/40	1		10/15/08 11:58
16	HY.101508.120045	L08100360-22	AV-NCB-AS-AC1-EQB	40/40	1		10/15/08 12:00
17	HY.101508.120226	L08100378-01	0810-059-1	40/40	1		10/15/08 12:02
18	HY.101508.120441	WG284986-01	Post Digestion Spike		1	L08100378-01	10/15/08 12:04
19	HY.101508.120623	L08100378-02	0810-059-2	40/40	1		10/15/08 12:06
20	HY.101508.120818	L08100378-03	0810-059-3	40/40	1		10/15/08 12:08
21	HY.101508.121041	L08100378-04	0810-059-4	40/40	1		10/15/08 12:10
22	HY.101508.121235	WG285186-12	CCV		1		10/15/08 12:12
23	HY.101508.121438	WG285186-13	CCB		1		10/15/08 12:14
24	HY.101508.121625	L08100378-05	0810-107-1	40/40	1		10/15/08 12:16
25	HY.101508.121827	L08100378-06	0810-107-2	40/40	1		10/15/08 12:18
26	HY.101508.122033	L08100378-07	0810-107-3	40/40	1		10/15/08 12:20
27	HY.101508.122251	L08100378-08	0810-107-4	40/40	1		10/15/08 12:22
28	HY.101508.122446	L08100378-14	0810-110-1	40/40	1	WG284795-01	10/15/08 12:24
29	HY.101508.122638	WG285186-14	CCV		1		10/15/08 12:26
30	HY.101508.122820	WG285186-15	CCB		1		10/15/08 12:28
31	HY.101508.123005	L08100257-01	S49WC100808		1	WG284791-01	10/15/08 12:30
32	HY.101508.123157	WG284986-02	Post Digestion Spike		1	L08100257-01	10/15/08 12:31
33	HY.101508.123341	L08100272-03	AV-NCB-AS-STO-RR12-17.5		1		10/15/08 12:33
34	HY.101508.123526	WG284986-03	Post Digestion Spike		1	L08100272-07	10/15/08 12:35
35	HY.101508.123723	WG285186-16	CCV		1		10/15/08 12:37
36	HY.101508.124121	WG285186-17	CCV		1		10/15/08 12:41
37	HY.101508.124314	WG285186-18	CCB		1		10/15/08 12:43

Approved: October 16, 2008

Maren Berry

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Instrument Run Log

Instrument: HYDRA Dataset: 101508A.PRN
Analyst1: KHR Analyst2: ADC
Method: 7470A SOP: 404 Rev: 11
Maintenance Log ID: 26213

Calibration Std: STD29244 ICV/CCV Std: STD29238 Post Spike: STD29244
ICSA: N/A ICSAB: N/A

Workgroups: 284986

Comments: No results are reported after CCV/CCB WG285186-14/15 due to failure of CCV\ WG285186-16. Samples were reanalyzed under a new calibration with compliant results.

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
38	HY.101508.130334	L08100257-01	S49WC100808		1	WG284791-01	10/15/08 13:03
39	HY.101508.130532	WG284986-02	Post Digestion Spike		1		10/15/08 13:05
40	HY.101508.130715	L08100272-03	AV-NCB-AS-STO-RR12-17.5		1		10/15/08 13:07
41	HY.101508.130901	TEST RINSE	TEST RINSE		1		10/15/08 13:09
42	HY.101508.131046	L08100272-05	AV-NCB-AS-STO-RR12-19.5		1		10/15/08 13:10
43	HY.101508.131241	L08100272-07	AV-NCB-AS-VIS-RR10-16.5-		1		10/15/08 13:12
44	HY.101508.131426	L08100272-07	AV-NCB-AS-VIS-RR10-16.5-		1		10/15/08 13:14
45	HY.101508.131608	WG284986-03	Post Digestion Spike		1		10/15/08 13:16
46	HY.101508.131844	TEST RINSE	TEST RINSE		1		10/15/08 13:18
47	HY.101508.132036	WG285186-19	CCV		1		10/15/08 13:20
48	HY.101508.132219	WG285186-20	CCB		1		10/15/08 13:22
49	HY.101508.132401	L08100272-09	AV-NCB-AS-VIS-RR10-16.5-		1		10/15/08 13:24

Comments

Seq.	Rerun	Dil.	Reason	Analytes
7	X			HG
Reanalyzed due to non-compliant results.				

Approved: October 16, 2008

Maren Berry

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Instrument Run Log

Instrument: HYDRA Dataset: 101508B.PRN
Analyst1: KHR Analyst2: ADC
Method: 7470A SOP: 404 Rev: 11
Maintenance Log ID: 26213

Calibration Std: STD29244 ICV/CCV Std: STD29238 Post Spike: STD29244
ICSA: N/A ICSAB: N/A

Workgroups: 284986

Comments: Samples reported from curve WG285154 due to CCV/CCB failure on WG285153.

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
1	HY.101508.150018	WG285153-01	Calibration Point		1		10/15/08 15:00
2	HY.101508.150251	WG285153-02	Calibration Point		1		10/15/08 15:02
3	HY.101508.150630	WG285153-03	Calibration Point		1		10/15/08 15:06
4	HY.101508.150813	WG285153-04	Calibration Point		1		10/15/08 15:08
5	HY.101508.151018	WG285153-05	Calibration Point		1		10/15/08 15:10
6	HY.101508.151217	WG285153-06	Calibration Point		1		10/15/08 15:12
7	HY.101508.151500	WG285153-07	Initial Calibration Verification		1		10/15/08 15:15
8	HY.101508.151715	WG285153-08	Initial Calib Blank		1		10/15/08 15:17
9	HY.101508.151900	WG285153-09	CCV		1		10/15/08 15:19
10	HY.101508.152126	WG285153-10	CCB		1		10/15/08 15:21
11	HY.101508.152319	L08100257-01	S49WC100808		1	WG284791-01	10/15/08 15:23
12	HY.101508.152505	WG284986-02	Post Digestion Spike		1	L08100257-01	10/15/08 15:25
13	HY.101508.152708	L08100272-03	AV-NCB-AS-STO-RR12-17.5		1		10/15/08 15:27
14	HY.101508.152911	TEST RINSE	TEST RINSE		1		10/15/08 15:29
15	HY.101508.153153	L08100272-05	AV-NCB-AS-STO-RR12-19.5		1		10/15/08 15:31
16	HY.101508.153348	L08100272-07	AV-NCB-AS-VIS-RR10-16.5-		1		10/15/08 15:33
17	HY.101508.153533	WG284986-03	Post Digestion Spike		1	L08100272-07	10/15/08 15:35
18	HY.101508.153715	TEST RINSE	TEST RINSE		1		10/15/08 15:37
19	HY.101508.153951	WG285153-11	CCV		1		10/15/08 15:39
20	HY.101508.154135	WG285153-12	CCB		1		10/15/08 15:41
21	HY.101508.154411	WG285153-13	CCV		1		10/15/08 15:44
22	HY.101508.154604	WG285153-14	CCB		1		10/15/08 15:46
23	HY.101508.155912	WG285154-01	Calibration Point		1		10/15/08 15:59
24	HY.101508.160056	WG285154-02	Calibration Point		1		10/15/08 16:00
25	HY.101508.160331	WG285154-03	Calibration Point		1		10/15/08 16:03
26	HY.101508.160710	WG285154-04	Calibration Point		1		10/15/08 16:07
27	HY.101508.161013	WG285154-05	Calibration Point		1		10/15/08 16:10
28	HY.101508.161240	WG285154-06	Calibration Point		1		10/15/08 16:12
29	HY.101508.161515	WG285154-07	Initial Calibration Verification		1		10/15/08 16:15
30	HY.101508.161708	WG285154-08	Initial Calib Blank		1		10/15/08 16:17
31	HY.101508.161910	WG285154-09	CCV		1		10/15/08 16:19
32	HY.101508.162057	WG285154-10	CCB		1		10/15/08 16:20
33	HY.101508.162311	L08100257-01	S49WC100808	4/40	1	WG284791-01	10/15/08 16:23
34	HY.101508.162605	WG284986-02	Post Digestion Spike		1	L08100257-01	10/15/08 16:26
35	HY.101508.162928	L08100272-03	AV-NCB-AS-STO-RR12-17.5	40/40	1		10/15/08 16:29
36	HY.101508.163136	TEST RINSE	TEST RINSE		1		10/15/08 16:31
37	HY.101508.163349	L08100272-05	AV-NCB-AS-STO-RR12-19.5	40/40	1		10/15/08 16:33

Approved: October 16, 2008

Maren Berry

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Instrument Run Log

Instrument: HYDRA Dataset: 101508B.PRN
Analyst1: KHR Analyst2: ADC
Method: 7470A SOP: 404 Rev: 11
Maintenance Log ID: 26213

Calibration Std: STD29244 ICV/CCV Std: STD29238 Post Spike: STD29244
ICSA: N/A ICSAB: N/A

Workgroups: 284986

Comments: Samples reported from curve WG285154 due to CCV/CCB failure on WG285153.

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
38	HY.101508.163555	L08100272-07	AV-NCB-AS-VIS-RR10-16.5-		1		10/15/08 16:35
39	HY.101508.163750	WG284986-03	Post Digestion Spike		1	L08100272-07	10/15/08 16:37
40	HY.101508.164013	TEST RINSE	TEST RINSE		1		10/15/08 16:40
41	HY.101508.164210	WG285154-11	CCV		1		10/15/08 16:42
42	HY.101508.164456	WG285154-12	CCB		1		10/15/08 16:44
43	HY.101508.164704	L08100272-09	AV-NCB-AS-VIS-RR10-16.5-	36/40	1		10/15/08 16:47
44	HY.101508.164909	L08100272-11	AV-NCB-AS-VIS-RR10-16.5-	36/40	1		10/15/08 16:49
45	HY.101508.165107	L08100272-13	AV-NCB-AS-VIS-RR10-18.5-	40/40	1		10/15/08 16:51
46	HY.101508.165401	L08100272-15	AV-NCB-AS-VIS-RR10-25-D	40/40	1		10/15/08 16:54
47	HY.101508.165707	L08100272-17	AV-NCB-AS-AC1-RR08-17-1	40/40	1		10/15/08 16:57
48	HY.101508.170046	L08100272-19	AV-NCB-AS-AC1-RR08-19-1	40/40	1		10/15/08 17:00
49	HY.101508.170244	WG285154-13	CCV		1		10/15/08 17:02
50	HY.101508.170536	WG285154-14	CCB		1		10/15/08 17:05

Approved: October 16, 2008
Maren Berry
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Microbac Laboratories Inc.

Data Checklist

Date: 11-OCT-2008
Analyst: KHR
Analyst: ADC
Method: 7471A
Instrument: HYDRA
Curve Workgroup: 284883
Runlog ID: 24684
Analytical Workgroups: 284628

Calibration/Linearity	X
ICV/CCV	X
ICB/CCB	X
ICSA/ICSAB	
CRI	
Blank/LCS	X
MS/MSD	X
Post Spike/Serial Dilution	X
Upload Results	X
Data Qualifiers	
Generate PDF Instrument Data	X
Sign/Annotate PDF Data	X
Upload Curve Data	X
Workgroup Forms	X
Case Narrative	0257, 0272
Client Forms	X
Level X	
Level 3	0257
Level 4	0272
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Primary Reviewer	ADC
Secondary Reviewer	MMB
Comments	

Primary Reviewer:
14-OCT-2008

Secondary Reviewer:
15-OCT-2008

Microbac Laboratories Inc.

Data Checklist

Date: 15-OCT-2008
Analyst: KHR
Analyst: ADC
Method: 7470A
Instrument: HYDRA
Curve Workgroup: 285186
Runlog ID: 24742
Analytical Workgroups: 284986

Calibration/Linearity	X
ICV/CCV	X
ICB/CCB	X
ICSA/ICSAB	
CRI	
Blank/LCS	X
MS/MSD	X
Post Spike/Serial Dilution	X
Upload Results	X
Data Qualifiers	
Generate PDF Instrument Data	X
Sign/Annotate PDF Data	X
Upload Curve Data	X
Workgroup Forms	X
Case Narrative	0360
Client Forms	X
Level X	
Level 3	
Level 4	0360
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Primary Reviewer	ADC
Secondary Reviewer	MMB
Comments	

Primary Reviewer:
16-OCT-2008

Secondary Reviewer:
16-OCT-2008

Microbac Laboratories Inc.

Data Checklist

Date: 15-OCT-2008
Analyst: KHR
Analyst: ADC
Method: 7470A
Instrument: HYDRA
Curve Workgroup: 285154
Runlog ID: 24735
Analytical Workgroups: 284986

Calibration/Linearity	X
ICV/CCV	X
ICB/CCB	X
ICSA/ICSAB	
CRI	
Blank/LCS	X
MS/MSD	X
Post Spike/Serial Dilution	X
Upload Results	X
Data Qualifiers	
Generate PDF Instrument Data	X
Sign/Annotate PDF Data	X
Upload Curve Data	X
Workgroup Forms	X
Case Narrative	0257, 0272
Client Forms	X
Level X	
Level 3	0257
Level 4	0272
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Primary Reviewer	ADC
Secondary Reviewer	MMB
Comments	

Primary Reviewer:
16-OCT-2008

Secondary Reviewer:
16-OCT-2008

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HOLDING TIMES
EQUIVALENT TO AFCEE FORM 9

00074113

Analytical Method: 7471A

AAB#: WG284628

Login Number: L08100257

Client ID	Date Collected	Date Received	Date Extracted	Max Hold Time Ext.	Time Held Ext.	Date Analyzed	Max Hold Time Anal	Time Held Anal.	Q
S49BS100908	10/09/08	10/09/08	10/10/08	28	0.926	10/11/08	28	1.39	

* EXT = SEE PROJECT QAPP REQUIREMENTS
*ANAL = SEE PROJECT QAPP REQUIREMENTS

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HOLDING TIMES
EQUIVALENT TO AFCEE FORM 9

00074114

Analytical Method: 7470A

AAB#: WG284986

Login Number: L08100257

Client ID	Date Collected	Date Received	Date Extracted	Max Hold Time Ext.	Time Held Ext.	Date Analyzed	Max Hold Time Anal	Time Held Anal.	Q
S49WC100808	10/08/08	10/09/08	10/14/08	28	5.94	10/15/08	28	1.25	

* EXT = SEE PROJECT QAPP REQUIREMENTS
*ANAL = SEE PROJECT QAPP REQUIREMENTS

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METHOD BLANK SUMMARY

Login Number: L08100257
Work Group: WG284628
Blank File ID: HY.101108.162637
Blank Sample ID: WG284475-02
Prep Date: 10/10/08 07:12
Instrument ID: HYDRA
Analyzed Date: 10/11/08 16:26
Method: 7471A
Analyst: SLP

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG284475-03	HY.101108.162850	10/11/08 16:28	01
S49BS100908	L08100257-02	HY.101108.163146	10/11/08 16:31	01

Report Name: BLANK_SUMMARY
PDF File ID: 1221326
Report generated 10/14/2008 13:13

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METHOD BLANK SUMMARY

Login Number:	L08100257	Work Group:	WG284986
Blank File ID:	HY.101508.115138	Blank Sample ID:	WG284838-02
Prep Date:	10/14/08 10:17	Instrument ID:	HYDRA
Analyzed Date:	10/15/08 11:51	Method:	7470A
Analyst:	SLP		

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG284838-03	HY.101508.115820	10/15/08 11:58	01
S49WC100808	L08100257-01	HY.101508.162311	10/15/08 16:23	01

Report Name: BLANK_SUMMARY
PDF File ID: 1224105
Report generated 10/16/2008 17:38

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00074117

METHOD BLANK REPORT

Login Number: L08100257 Prep Date: 10/10/08 07:12 Sample ID: WG284475-02
Instrument ID: HYDRA Run Date: 10/11/08 16:26 Prep Method: METHOD
File ID: HY.101108.162637 Analyst: SLP Method: 7471A
Workgroup (AAB#): WG284628 Matrix: Soil Units: mg/kg
Contract #: DACA56-94-D-0020 Cal ID: HYDRA-11-OCT-08

Analytes	SDL	PQL	Concentration	Dilution	Qualifier
Mercury, Total	0.0100	0.250	0.0100	1	U

SDL Method Detection Limit
PQL Reporting/Practical Quantitation Limit
ND Analyte Not detected at or above reporting limit
* |Analyte concentration| > RL

Report Name:BLANK
PDF ID: 1221327
14-OCT-2008 13:13

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00074118

METHOD BLANK REPORT

Login Number: L08100257 Prep Date: 10/14/08 10:17 Sample ID: WG284838-02
Instrument ID: HYDRA Run Date: 10/15/08 11:51 Prep Method: METHOD
File ID: HY.101508.115138 Analyst: SLP Method: 7470A
Workgroup (AAB#): WG284986 Matrix: Leachate Units: mg/L
Contract #: DACA56-94-D-0020 Cal ID: HYDRA-15-OCT-08

Analytes	SDL	PQL	Concentration	Dilution	Qualifier
Mercury, TCLP	0.00100	0.00500	0.00100	1	U

SDL Method Detection Limit
PQL Reporting/Practical Quantitation Limit
ND Analyte Not detected at or above reporting limit
* |Analyte concentration| > RL

Report Name:BLANK
PDF ID: 1224106
16-OCT-2008 17:38

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LABORATORY CONTROL SAMPLE (LCS)

00074119

Login Number: L08100257 Run Date: 10/11/2008 Sample ID: WG284475-03
Instrument ID: HYDRA Run Time: 16:28 Prep Method: METHOD
File ID: HY.101108.162850 Analyst: SLP Method: 7471A
Workgroup (AAB#): WG284628 Matrix: Soil Units: mg/kg
QC Key: STD Lot#: MI-7470-01 Cal ID: HYDRA-11-OCT-08

Analytes	Expected	Found	% Rec	LCS Limits	Q
Mercury, Total	0.267	0.250	93.8	80 - 120	

LCS - Modified 03/06/2008
PDF File ID: 1221328
Report generated: 10/14/2008 13:13

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LABORATORY CONTROL SAMPLE (LCS)

00074120

Login Number: L08100257 Run Date: 10/15/2008 Sample ID: WG284838-03
Instrument ID: HYDRA Run Time: 11:58 Prep Method: METHOD
File ID: HY.101508.115820 Analyst: SLP Method: 7470A
Workgroup (AAB#): WG284986 Matrix: Leachate Units: mg/L
QC Key: STD Lot#: STD29236 Cal ID: HYDRA-15-OCT-08

Analytes	Expected	Found	% Rec	LCS Limits	Q
Mercury, TCLP	0.00400	0.00424	106	80 - 120	

LCS - Modified 03/06/2008
PDF File ID: 1224107
Report generated: 10/16/2008 17:38

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MATRIX SPIKE AND MATRIX SPIKE DUP (MS/MSD)

00074121

Loginnum:L08100257 Cal ID:HYDRA- Worknum:WG284628

Instrument ID:HYDRA Contract #:DACA56-94-D-0020 Method:7471A

Parent ID:WG284475-01 File ID:HY.101108.165353 Dil:1 Matrix:SOLID

Sample ID:WG284475-04 MS File ID:HY.101108.165556 Dil:1 Units:mg/kg

Sample ID:WG284475-05 MSD File ID:HY.101108.165741 Dil:1 Percent Solid:79.6

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Mercury, Total	0.0160	0.322	0.328	96.8	0.322	0.335	99.0	2.19	75 - 125	25	

* FAILS %REC LIMIT

FAILS RPD LIMIT

NOTE: This is an internal quality control sample.

WG_MS_MSD_DRYWT - Modified 03/07/2008

PDF File ID: 1221329

Report generated 10/14/2008 13:13

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MATRIX SPIKE AND MATRIX SPIKE DUP (MS/MSD)

00074122

Loginnum:L08100257 Cal ID:HYDRA- Worknum:WG284986

Instrument ID:HYDRA Contract #:DACA56-94-D-0020 Method:7470A

Parent ID:WG284838-01 File ID:HY.101508.163555 Dil:1 Matrix:TCLP

Sample ID:WG284838-04 MS File ID:HY.101508.164704 Dil:1 Units:mg/L

Sample ID:WG284838-05 MSD File ID:HY.101508.164909 Dil:1

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Mercury, TCLP	ND	0.00444	0.00482	109	0.00444	0.00459	103	4.96	75 - 125	20	

* FAILS %REC LIMIT

FAILS RPD LIMIT

NOTE: This is an internal quality control sample.

WG_MS_MSD_DRYWT - Modified 03/07/2008

PDF File ID:1224108

Report generated 10/16/2008 17:38

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POST SPIKE REPORT

Sample Login ID: L08100257 **Worknum:** WG284628
Instrument ID: HYDRA **Method:** 7471A
Post Spike ID: WG284628-01 **File ID:** HY.101108.163349 **Dil:** 1 **Units:** ug/L
Sample ID: L08100257-02 **File ID:** HY.101108.163146 **Dil:** 1 **Matrix:** Soil

Analyte	Post Spike Result	C	Sample Result	C	Spike Added(SA)	% R	Control Limit %R	Q
MERCURY	1.11	F	0	U	1	111.0	85 - 115	

N = % Recovery exceeds control limits
F = Result is between MDL and RL
U = Sample result is below MDL. A value of zero is used in the calculation

Microbac Laboratories Inc.
POST SPIKE REPORT

Sample Login ID: L08100257 **Worknum:** WG284986
Instrument ID: HYDRA **Method:** 7470A
Post Spike ID: WG284986-02 **File ID:** HY.101508.162605 **Dil:** 1 **Units:** ug/L
Sample ID: L08100257-01 **File ID:** HY.101508.162311 **Dil:** 1 **Matrix:** Leachate

Analyte	Post Spike Result	C	Sample Result	C	Spike Added(SA)	% R	Control Limit %R	Q
MERCURY	1.01		0	U	1	101.0	85 - 115	

N = % Recovery exceeds control limits
F = Result is between MDL and RL
U = Sample result is below MDL. A value of zero is used in the calculation

POST_SPIKE - Modified 03/06/2008
PDF File ID: 1224103
Report generated: 10/16/2008 17:38

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Microbac Laboratories Inc.

INITIAL CALIBRATION SUMMARY

00074125

Login Number: L08100257
Analytical Method: 7471A
ICAL Worknum: WG284883

Workgroup (AAB#): WG284628
Instrument ID: HYDRA
Initial Calibration Date: 10/11/2008 16:15

Analyte	WG284883-01		WG284883-02		WG284883-03		WG284883-04		WG284883-05		WG284883-06	
	STD	INT	STD	INT	STD	INT	STD	INT	STD	INT	STD	INT
Mercury	0	5620	0.200	17828	1.00	82920	2.00	174563	5.00	423497	10.0	815369

INT = Instrument intensity
R = Coefficient of correlation
Q = Data Qualifier
* = Out of Compliance; R < 0.995

INT_CAL_HG_FU - Modified 03/06/2008
PDF File ID: 1221330
Report generated 10/14/2008 13:14

Microbac®

Microbac Laboratories Inc.

INITIAL CALIBRATION SUMMARY

00074126

Login Number: L08100257
Analytical Method: 7471A
ICAL Worknum: WG284883

Workgroup (AAB#): WG284628
Instrument ID: HYDRA
Initial Calibration Date: 10/11/2008 16:15

Analyte	R	Q
Mercury	1.000	

INT = Instrument intensity
R = Coefficient of correlation
Q = Data Qualifier
* = Out of Compliance; R < 0.995

Microbac®

Microbac Laboratories Inc.

INITIAL CALIBRATION SUMMARY

00074127

Login Number: L08100257
Analytical Method: 7470A
ICAL Worknum: WG285186

Workgroup (AAB#): WG284986
Instrument ID: HYDRA
Initial Calibration Date: 10/15/2008 11:38

Analyte	WG285186-01		WG285186-02		WG285186-03		WG285186-04		WG285186-05		WG285186-06	
	STD	INT	STD	INT	STD	INT	STD	INT	STD	INT	STD	INT
Mercury	0	-188	0.200	17556	1.00	64648	2.00	133175	5.00	335705	10.0	642607

INT = Instrument intensity
R = Coefficient of correlation
Q = Data Qualifier
* = Out of Compliance; R < 0.995

INT_CAL_HG_FU - Modified 03/06/2008
PDF File ID: 1224109
Report generated 10/16/2008 17:38

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Microbac Laboratories Inc.

INITIAL CALIBRATION SUMMARY

00074128

Login Number: L08100257
Analytical Method: 7470A
ICAL Worknum: WG285186

Workgroup (AAB#): WG284986
Instrument ID: HYDRA
Initial Calibration Date: 10/15/2008 11:38

Analyte	R	Q
Mercury	1.000	

INT = Instrument intensity
R = Coefficient of correlation
Q = Data Qualifier
*** = Out of Compliance; R < 0.995**

INT_CAL_HG_FU - Modified 03/06/2008
PDF File ID: 1224109
Report generated 10/16/2008 17:38

Microbac®

Microbac Laboratories Inc.

INITIAL CALIBRATION SUMMARY

00074129

Login Number: L08100257
Analytical Method: 7470A
ICAL Worknum: WG285154

Workgroup (AAB#): WG284986
Instrument ID: HYDRA
Initial Calibration Date: 10/15/2008 16:12

Analyte	WG285154-01		WG285154-02		WG285154-03		WG285154-04		WG285154-05		WG285154-06	
	STD	INT	STD	INT	STD	INT	STD	INT	STD	INT	STD	INT
Mercury	0	354	0.200	16062	1.00	78364	2.00	161859	5.00	393690	10.0	771517

INT = Instrument intensity
R = Coefficient of correlation
Q = Data Qualifier
*** = Out of Compliance; R < 0.995**

INT_CAL_HG_FU - Modified 03/06/2008
PDF File ID: 1224109
Report generated 10/16/2008 17:38

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Microbac Laboratories Inc.

INITIAL CALIBRATION SUMMARY

00074130

Login Number: L08100257
Analytical Method: 7470A
ICAL Worknum: WG285154

Workgroup (AAB#): WG284986
Instrument ID: HYDRA
Initial Calibration Date: 10/15/2008 16:12

Analyte	R	Q
Mercury	1.000	

INT = Instrument intensity
R = Coefficient of correlation
Q = Data Qualifier
* = Out of Compliance; R < 0.995

INT_CAL_HG_FU - Modified 03/06/2008
PDF File ID: 1224109
Report generated 10/16/2008 17:38

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Microbac Laboratories Inc.
INITIAL CALIBRATION BLANK (ICB)

Login Number: L08100257
Instrument ID: HYDRA
File ID: HY.101108.161904
Workgroup (AAB#): WG284628
Matrix: SOIL

Run Date: 10/11/2008
Run Time: 16:19
Analyst: SLP
Cal ID: HYDRA - 11-OCT-08

Sample ID: WG284883-08
Method: 7471
Units: ug/L

Analytes	MDL	RDL	Concentration	Qualifier
MERCURY	.15	3.75	.15	U

ICB - Modified 03/06/2008
PDF File ID: 1221332
Report generated 10/14/2008 13:14

Microbac Laboratories Inc.
INITIAL CALIBRATION BLANK (ICB)

Login Number: L08100257
Run Date: 10/15/2008
Sample ID: WG285186-09
Instrument ID: HYDRA
Run Time: 11:44
Method: 7471
File ID: HY.101508.114435
Analyst: SLP
Units: ug/L
Workgroup (AAB#): WG284986
Cal ID: HYDRA - 15-OCT-08
Matrix: LEACHATE

Analytes	MDL	RDL	Concentration	Qualifier
MERCURY	.1	.5	.1	U

ICB - Modified 03/06/2008
PDF File ID: 1224111
Report generated 10/16/2008 17:38

Microbac

00074133

Microbac Laboratories Inc.

INITIAL CALIBRATION BLANK (ICB)

Login Number: L08100257 Run Date: 10/15/2008 Sample ID: WG285154-08

Instrument ID: HYDRA Run Time: 16:17 Method: 7471

File ID: HY.101508.161708 Analyst: SLP Units: ug/L

Workgroup (AAB#): WG284986 Cal ID: HYDRA - 15-OCT-08

Matrix: LEACHATE

Analytes	MDL	RDL	Concentration	Qualifier
MERCURY	.1	.5	.1	U

ICB - Modified 03/06/2008

PDF File ID: 1224111

Report generated 10/16/2008 17:38

Microbac

Microbac Laboratories Inc.

CONTINUING CALIBRATION BLANK (CCB)

00074134

Login Number: L08100257 Run Date: 10/11/2008 Sample ID: WG284883-10
Instrument ID: HYDRA Run Time: 16:24 Method: 7471A
File ID: HY.101108.162420 Analyst: SLP Units: ug/L
Workgroup (AAB#): WG284628 Cal ID: HYDRA - 11-OCT-08
Matrix: SOIL

Analytes	MDL	RDL	Concentration	Qualifier
Mercury	0.150	3.75	0.150	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.

CCB - Modified 03/05/2008
PDF File ID: 1221334
Report generated 10/14/2008 13:14

Microbac®

Microbac Laboratories Inc.

CONTINUING CALIBRATION BLANK (CCB)

00074135

Login Number: L08100257 Run Date: 10/11/2008 Sample ID: WG284883-12
Instrument ID: HYDRA Run Time: 16:49 Method: 7471A
File ID: HY.101108.164958 Analyst: SLP Units: ug/L
Workgroup (AAB#): WG284628 Cal ID: HYDRA - 11-OCT-08
Matrix: SOIL

Analytes	MDL	RDL	Concentration	Qualifier
Mercury	0.150	3.75	0.150	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.

CCB - Modified 03/05/2008
PDF File ID: 1221334
Report generated 10/14/2008 13:14

Microbac®

Microbac Laboratories Inc.

CONTINUING CALIBRATION BLANK (CCB)

00074136

Login Number: L08100257 Run Date: 10/11/2008 Sample ID: WG284883-14
Instrument ID: HYDRA Run Time: 17:12 Method: 7471A
File ID: HY.101108.171245 Analyst: SLP Units: ug/L
Workgroup (AAB#): WG284628 Cal ID: HYDRA - 11-OCT-08
Matrix: SOIL

Analytes	MDL	RDL	Concentration	Qualifier
Mercury	0.150	3.75	0.150	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.

CCB - Modified 03/05/2008
PDF File ID: 1221334
Report generated 10/14/2008 13:14

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CONTINUING CALIBRATION BLANK (CCB)

00074137

Login Number: L08100257 Run Date: 10/15/2008 Sample ID: WG285186-11
Instrument ID: HYDRA Run Time: 11:49 Method: 7470A
File ID: HY.101508.114905 Analyst: SLP Units: ug/L
Workgroup (AAB#): WG284986 Cal ID: HYDRA - 15-OCT-08
Matrix: LEACHATE

Analytes	MDL	RDL	Concentration	Qualifier
Mercury	0.100	0.500	0.100	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.

CCB - Modified 03/05/2008
PDF File ID: 1224113
Report generated 10/16/2008 17:38

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Microbac Laboratories Inc.

CONTINUING CALIBRATION BLANK (CCB)

00074138

Login Number: L08100257 Run Date: 10/15/2008 Sample ID: WG285186-13
Instrument ID: HYDRA Run Time: 12:14 Method: 7470A
File ID: HY.101508.121438 Analyst: SLP Units: ug/L
Workgroup (AAB#): WG284986 Cal ID: HYDRA - 15-OCT-08
Matrix: LEACHATE

Analytes	MDL	RDL	Concentration	Qualifier
Mercury	0.100	0.500	0.145	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.

CCB - Modified 03/05/2008
PDF File ID: 1224113
Report generated 10/16/2008 17:38

Microbac Laboratories Inc.

CONTINUING CALIBRATION BLANK (CCB)

00074139

Login Number: L08100257 Run Date: 10/15/2008 Sample ID: WG285154-10
Instrument ID: HYDRA Run Time: 16:20 Method: 7470A
File ID: HY.101508.162057 Analyst: SLP Units: ug/L
Workgroup (AAB#): WG284986 Cal ID: HYDRA - 15-OCT-08
Matrix: LEACHATE

Analytes	MDL	RDL	Concentration	Qualifier
Mercury	0.100	0.500	0.100	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.

CCB - Modified 03/05/2008
PDF File ID: 1224113
Report generated 10/16/2008 17:38

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CONTINUING CALIBRATION BLANK (CCB)

00074140

Login Number: L08100257 Run Date: 10/15/2008 Sample ID: WG285154-12
Instrument ID: HYDRA Run Time: 16:44 Method: 7470A
File ID: HY.101508.164456 Analyst: SLP Units: ug/L
Workgroup (AAB#): WG284986 Cal ID: HYDRA - 15-OCT-08
Matrix: LEACHATE

Analytes	MDL	RDL	Concentration	Qualifier
Mercury	0.100	0.500	0.106	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.

CCB - Modified 03/05/2008
PDF File ID: 1224113
Report generated 10/16/2008 17:38

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CONTINUING CALIBRATION BLANK (CCB)

00074141

Login Number: L08100257 Run Date: 10/15/2008 Sample ID: WG285154-14
Instrument ID: HYDRA Run Time: 17:05 Method: 7470A
File ID: HY.101508.170536 Analyst: SLP Units: ug/L
Workgroup (AAB#): WG284986 Cal ID: HYDRA - 15-OCT-08
Matrix: LEACHATE

Analytes	MDL	RDL	Concentration	Qualifier
Mercury	0.100	0.500	0.100	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.

CCB - Modified 03/05/2008
PDF File ID: 1224113
Report generated 10/16/2008 17:38

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INITIAL CALIBRATION VERIFICATION (ICV)
(Alternate Source)

00074142

Login Number: L08100257 Run Date: 10/11/2008 Sample ID: WG284883-07
Instrument ID: HYDRA Run Time: 16:17 Method: 7471A
File ID: HY.101108.161717 Analyst: SLP Units: ug/L
Workgroup (AAB#): WG284628 Cal ID: HYDRA - 11-OCT-08
QC Key: STD

Analyte		Expected	Found	%REC	LIMITS	Q
Mercury		2	2.04	102	90 - 110	

* Exceeds LIMITS Limit

ICV - Modified 03/06/2008
PDF File ID: 1221331
Report generated 10/14/2008 13:14

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Microbac Laboratories Inc.

INITIAL CALIBRATION VERIFICATION (ICV)
(Alternate Source)

00074143

Login Number: L08100257 Run Date: 10/15/2008 Sample ID: WG285154-07
Instrument ID: HYDRA Run Time: 16:15 Method: 7470A
File ID: HY.101508.161515 Analyst: SLP Units: ug/L
Workgroup (AAB#): WG284986 Cal ID: HYDRA - 15-OCT-08
QC Key: STD

Analyte		Expected	Found	%REC	LIMITS	Q
Mercury		2	2.15	108	90 - 110	

* Exceeds LIMITS Limit

ICV - Modified 03/06/2008
PDF File ID: 1224110
Report generated 10/16/2008 17:38

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Microbac Laboratories Inc.

INITIAL CALIBRATION VERIFICATION (ICV)
(Alternate Source)

00074144

Login Number: L08100257 Run Date: 10/15/2008 Sample ID: WG285186-08
Instrument ID: HYDRA Run Time: 11:42 Method: 7470A
File ID: HY.101508.114242 Analyst: SLP Units: ug/L
Workgroup (AAB#): WG284986 Cal ID: HYDRA - 15-OCT-08
QC Key: STD

Analyte		Expected	Found	%REC	LIMITS	Q
Mercury		2	2.04	102	90 - 110	

* Exceeds LIMITS Limit

ICV - Modified 03/06/2008
PDF File ID: 1224110
Report generated 10/16/2008 17:38

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Microbac Laboratories Inc.

CONTINUING CALIBRATION VERIFICATION (CCV)

00074145

Login Number: L08100257 Run Date: 10/11/2008 Sample ID: WG284883-09

Instrument ID: HYDRA Run Time: 16:22 Method: 7471A

File ID: HY.101108.162232 Analyst: SLP QC Key: STD

Workgroup (AAB#): WG284628 Cal ID: HYDRA - 11-OCT-08

Matrix: SOIL

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Mercury, Total		0.00200	0.00204	mg/L	102	80 - 120		

* Exceeds LIMITS Criteria

CCV - Modified 03/05/2008

PDF File ID: 1221333

Report generated 10/14/2008 13:14

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Microbac Laboratories Inc.

CONTINUING CALIBRATION VERIFICATION (CCV)

00074146

Login Number: L08100257 Run Date: 10/11/2008 Sample ID: WG284883-11

Instrument ID: HYDRA Run Time: 16:48 Method: 7471A

File ID: HY.101108.164801 Analyst: SLP QC Key: STD

Workgroup (AAB#): WG284628 Cal ID: HYDRA - 11-OCT-08

Matrix: SOIL

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Mercury, Total		0.00200	0.00201	mg/L	101	80 - 120		

* Exceeds LIMITS Criteria

CCV - Modified 03/05/2008

PDF File ID: 1221333

Report generated 10/14/2008 13:14

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CONTINUING CALIBRATION VERIFICATION (CCV)

00074147

Login Number: L08100257 Run Date: 10/11/2008 Sample ID: WG284883-13

Instrument ID: HYDRA Run Time: 17:09 Method: 7471A

File ID: HY.101108.170948 Analyst: SLP QC Key: STD

Workgroup (AAB#): WG284628 Cal ID: HYDRA - 11-OCT-08

Matrix: SOIL

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Mercury, Total		0.00200	0.00201	mg/L	101	80 - 120		

* Exceeds LIMITS Criteria

CCV - Modified 03/05/2008

PDF File ID: 1221333

Report generated 10/14/2008 13:14

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CONTINUING CALIBRATION VERIFICATION (CCV)

00074148

Login Number: L08100257 Run Date: 10/15/2008 Sample ID: WG285186-10

Instrument ID: HYDRA Run Time: 11:47 Method: 7470A

File ID: HY.101508.114702 Analyst: SLP QC Key: STD

Workgroup (AAB#): WG284986 Cal ID: HYDRA - 15-OCT-08

Matrix: LEACHATE

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Mercury, Total		0.00200	0.00198	mg/L	99.0	80 - 120		

* Exceeds LIMITS Criteria

CCV - Modified 03/05/2008

PDF File ID: 1224112

Report generated 10/16/2008 17:38

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CONTINUING CALIBRATION VERIFICATION (CCV)

00074149

Login Number: L08100257 Run Date: 10/15/2008 Sample ID: WG285186-12

Instrument ID: HYDRA Run Time: 12:12 Method: 7470A

File ID: HY.101508.121235 Analyst: SLP QC Key: STD

Workgroup (AAB#): WG284986 Cal ID: HYDRA - 15-OCT-08

Matrix: LEACHATE

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Mercury, Total		0.00200	0.00215	mg/L	108	80 - 120		

* Exceeds LIMITS Criteria

CCV - Modified 03/05/2008

PDF File ID: 1224112

Report generated 10/16/2008 17:38

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CONTINUING CALIBRATION VERIFICATION (CCV)

00074150

Login Number: L08100257 Run Date: 10/15/2008 Sample ID: WG285154-09

Instrument ID: HYDRA Run Time: 16:19 Method: 7470A

File ID: HY.101508.161910 Analyst: SLP QC Key: STD

Workgroup (AAB#): WG284986 Cal ID: HYDRA - 15-OCT-08

Matrix: LEACHATE

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Mercury, Total		0.00200	0.00209	mg/L	105	80 - 120		

* Exceeds LIMITS Criteria

CCV - Modified 03/05/2008

PDF File ID: 1224112

Report generated 10/16/2008 17:38

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Microbac Laboratories Inc.

CONTINUING CALIBRATION VERIFICATION (CCV)

00074151

Login Number: L08100257 Run Date: 10/15/2008 Sample ID: WG285154-11

Instrument ID: HYDRA Run Time: 16:42 Method: 7470A

File ID: HY.101508.164210 Analyst: SLP QC Key: STD

Workgroup (AAB#): WG284986 Cal ID: HYDRA - 15-OCT-08

Matrix: LEACHATE

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Mercury, Total		0.00200	0.00220	mg/L	110	80 - 120		

* Exceeds LIMITS Criteria

CCV - Modified 03/05/2008

PDF File ID: 1224112

Report generated 10/16/2008 17:38

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Microbac Laboratories Inc.

CONTINUING CALIBRATION VERIFICATION (CCV)

00074152

Login Number: L08100257 Run Date: 10/15/2008 Sample ID: WG285154-13

Instrument ID: HYDRA Run Time: 17:02 Method: 7470A

File ID: HY.101508.170244 Analyst: SLP QC Key: STD

Workgroup (AAB#): WG284986 Cal ID: HYDRA - 15-OCT-08

Matrix: LEACHATE

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Mercury, Total		0.00200	0.00221	mg/L	111	80 - 120		

* Exceeds LIMITS Criteria

CCV - Modified 03/05/2008

PDF File ID: 1224112

Report generated 10/16/2008 17:38

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2.2 General Chemistry Data

2.2.1 Percent Solids Data

2.2.1.1 Raw Data

LABORATORY REPORT

00074156

L08100257

10/17/08 08:46

Submitted By

Microbac Laboratories Inc.
158 Starlite Drive
Marietta , OH 45750
(740) 373 - 4071

For

Account Name: Shaw E & I, Inc.
ABB Lummus Biulding
3010 Briarpark Drive Suite 4N
Houston, TX 77042
Attention: Larry Duty

Project Number: 2773.025
Project: Longhorn AAP
Site: LONGHORN AAP KARNACK TX

P.O. Number: 389869/ 390836(GWTP)

Sample Analysis Summary

Client ID	Lab ID	Method	Dilution	Date Received
S49BS100908	L08100257-02	D2216-90	1	09-OCT-08

Report Number: **L08100257**
Report Date : **October 17, 2008**

00074157

Sample Number: **L08100257-02**
Client ID: **S49BS100908**
Matrix: **Soil**
Workgroup Number: **WG284523**
Collect Date: **10/09/2008 09:00**
Sample Tag: **01**

PrePrep Method: **NONE**
Prep Method: **D2216-90**
Analytical Method: **D2216-90**
Analyst: **JDH**
Dilution: **1**
Units: **weight %**

Instrument: **BAL001**
Prep Date: **10/13/2008 08:43**
Cal Date:
Run Date: **10/13/2008 08:43**
File ID: **B1.284523-0101**

Analyte	CAS. Number	Result	Qual	PQL	SDL
Percent Solids	**10-02-6**	**91.5**		**1.00**	**1.00**

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Example Percent Solids Calculations

1.0 Calculating the percent solids of a sample.

$$\%Solids = \frac{WT3 - WT1}{WT2 - WT1} \times F$$

Where:

WT1 = Weight, in grams, of the empty container	1.30 g
WT2 = Weight, in grams, of the container and wet sample	21.274 g
WT3 = Weight, in grams, of the container and dried sample	5.21 g
F = Factor to get units as percent weight	100
%Solids = Percent solids present in sample.	19.58%

2.0 Calculating the percent moisture of a sample.

% Moisture = 100 - % Solids from 1.0 calculation

Microbac Laboratories Inc.

00074159

PERCENT SOLIDS

Workgroup (AAB#): WG284523 Analyst: JDH ADT(on): 10/10/2008 10:00

Method: D2216-90 Instrument: BAL001 ADT(off): 10/13/2008 08:43

SOP: K0003 Rev: 9

SAMPLE NUMBER	EMPTY PAN WT 1	WET WT 2	DRY WT 3A	DRY WT 3B	DRY WT 3C	PERCENT SOLID	PERCENT MOISTURE
L08100257-02	1.29	19.43	17.89			91.51	
L08100261-01	1.29	20.72	17.12			81.47	
L08100261-03	1.29	15.85	12.14			74.52	
L08100261-05	1.29	19.48	16.46			83.40	
L08100261-07	1.29	22.97	19.22			82.70	
L08100261-12	1.28	25.81	20.5			78.35	
L08100261-14	1.3	27.22	20.25			73.11	
L08100261-16	1.3	27.22	20.25			73.11	
L08100261-17	1.3	27.22	20.25			73.11	
L08100261-18	1.32	26.69	21.94			81.28	
L08100261-20	1.3	28.94	22.6			77.06	
L08100261-24	1.3	26.88	24.86			92.10	
L08100261-25	1.3	26.88	24.86			92.10	
L08100261-26	1.31	25.52	20.91			80.96	
L08100261-28	1.28	23.27	20.41			86.99	
L08100261-29	1.3	28.51	24.2			84.16	
L08100261-31	1.29	38.54	36.15			93.58	
L08100261-32	1.29	21.41	16.36			74.90	
L08100261-33	1.29	21.41	16.36			74.90	
L08100261-34	1.29	21.41	16.36			74.90	
L08100267-04	1.29	25.99	25.25			97.00	
L08100267-05	1.29	30.19	28.93			95.64	
L08100267-06	1.3	25.26	22.44			88.23	
L08100267-07	1.29	22.94	22.04			95.84	
L08100272-02	1.3	32.69	25.73			77.83	
L08100272-04	1.3	25.78	23			88.64	
L08100272-06	1.3	22.66	18.31			79.63	
L08100272-08	1.3	22.66	18.31			79.63	
L08100272-10	1.3	22.66	18.31			79.63	
L08100272-12	1.31	31.08	28.86			92.54	
L08100272-14	1.29	31.81	25.7			79.98	
L08100272-16	1.28	34.19	27.6			79.98	
L08100272-18	1.28	15.95	13.78			85.21	
WG284523-01	1.29	19.43	17.89			91.51	8.490
WG284523-02	1.29	21.41	16.36			74.90	25.10
WG284523-03	1.28	16.99	15.65			91.47	8.530
WG284523-04	1.27	18.75	14.1			73.40	26.60

Analyst: Justin Hasson

PERCENT_SOLIDS - Modified 04/24/2008

PDF ID: 1218644

Report generated: 10/17/2008 08:32

Microbac

3.0 Attachments

Microbac Laboratories Inc.
Analyst Listing
October 17, 2008

ADC – ANTHONY D. CANTER	AJF – AMANDA J. FICKIESEN	ALB – ANNIE L. BROWN
AM – ALISON J. MILLER	AML – ANTHONY M. LONG	BRG – BRENDA R. GREGORY
CAA – CASSIE A. AUGENSTEIN	CAF – CHERYL A. FLOWERS	CAH – CHARLES A. HALL
CEB – CHAD E. BARNES	CLC – CHRYS L. CRAWFORD	CLW – CHARISSA L. WINTERS
CMS – CRYSTAL M. STEPHENS	CPD – CHAD P. DAVIS	CSH – CHRIS S. HILL
CTB – CHRIS T. BUCINA	DDE – DEBRA D. ELLIOTT	DEL – DON E. LIGHTFRITZ
DEV – DAVID E. VANDENBERG	DGB – DOUGLAS G. BUTCHER	DIH – DEANNA I. HESSON
DLB – DAVID L. BUMGARNER	DLP – DOROTHY L. PAYNE	DLR – DIANNA L. RAUCH
DR – DEANNA ROBERTS	DSF – DEBRA S. FREDERICK	EAB – EDDIE A. BYERS
ECL – ERIC C. LAWSON	ED – EMILY E. DECKER	EDA – ERIN D. AGEE
EDH – ETHAN D. MORRIS	ERP – ERIN R. PORTER	FJB – FRANCES J. BOLDEN
HAV – HEMA VILASAGAR	HJR – HOLLY J. REED	JBK – JEREMY B. KINNEY
JC – JOHN L. CONLEY	JDH – JUSTIN D. HESSON	JKP – JACQUELINE K. PARSONS
JKT – JANE K. THOMPSON	JWR – JOHN W. RICHARDS	JWS – JACK W. SHEAVES
JYH – JI Y. HU	KEB – KATHRYN E. BARNES	KHR – KIM H. RHODES
KJW – KATIE J. WIEFERICH	KRA – KATHY R. ALBERTSON	LKN – LINDA K. NEDEFF
LSB – LESLIE S. BUCINA	MDA – MIKE D. ALBERTSON	MDC – MICHAEL D. COCHRAN
MES – MARY E. SCHILLING	MMB – MAREN M. BEERY	MRT – MICHELLE R. TAYLOR
MSW – MATT S. WILSON	NPM – NATHANIEL P. MILLER	PDM – PIERCE D. MORRIS
RAH – ROY A. HALSTEAD	RB – ROBERT BUCHANAN	REK – ROBERT E. KYER
RLK – ROBIN L. KLINGER	RWC – RODNEY W. CAMPBELL	SAV – SARAH A. VANDENBERG
SDH – SHANA D. HINYARD	SDL – SHELLY D. LENT	SLM – STEPHANIE L. MOSSBURG
SLP – SHERI L. PFALZGRAF	SMH – SHAUNA M. HYDE	TDH – TRICIA D. HUCK
TIP – TAE I. PARRISH	TMB – TIFFANY M. BAILEY	TMM – TAMMY M. MORRIS
VC – VICKI COLLIER	WTD – WADE T. DELONG	

00074162

Microbac Laboratories Inc.
List of Valid Qualifiers
October 17, 2008

Qualkey: STD

Qualifier	Description
*	Surrogate or spike compound out of range
+	Correlation coefficient for the MSA is less than 0.995
<	Result is less than the associated numerical value.
>	Result is greater than the associated numerical value.
A	See the report narrative
B	Analyte present in method blank
B3	Target analyte detected in calibration blank at or above the method reporting limit
C	Confirmed by GC/MS
CG	Confluent growth
D1	Sample required dilution due to matrix.
D2	Sample required dilution due to high concenration of target analyte.
DL	Surrogate or spike compound was diluted out
E	Estimated concentration due to sample matrix interference
E1	Concentration estimated. Analyte exceeded calibration range. Insufficient sample for reanalysis.
E2	Concentration estimated. Analyte exceeded calibration range. Reanalysis not performed due to matrix.
E3	Concentration estimated. Analyte exceeded calibration range. Reanalysis not performed due to holding time requirements
EDL	Elevated sample reporting limits, presence of non-target analytes
EMPC	Estimated Maximum Possible Concentration
F, S	Estimated result below quantitation limit; method of standard additions(MSA)
FL	Free Liquid
H1	Sample analysis performed past holding time.
I	Semiquantitative result (out of instrument calibration range)
J	The analyte was positively identified, but the quantitation was below the RL
J,B	Analyte detected in both the method blank and sample above the MDL.
J,P	Estimate; columns don't agree to within 40%
J,S	Estimated concentration; analyzed by method of standard addition (MSA)
L	Sample reporting limits elevated due to matrix interference
L1	The associated blank spike (LCS) recovery was above the laboratory acceptance limits.
L2	The associated blank spike (LCS) recovery was below the laboratory acceptance limits.
M	Matrix effect; the concentration is an estimate due to matrix effect.
M1	Matrix spike recovery was high; the assocated blank spike recovery was acceptable.
M2	Matrix spike recovery was low; the assocated blank spike recovery was acceptable.
M3	The spike recovery value is unusable since the analyte concentration is disproportionate to the spike level.
N	Tentatively identified compound(TIC)
NA	Not applicable
ND	Not detected at or above the reporting limit
ND, L	Not detected; sample reporting limit (RL) elevated due to interference
ND, S	Not detected; analyzed by method of standard addition (MSA)
NF	Not found by library search
NFL	No free liquid
NI	Non-ignitable
NR	Analyte is not required to be analyzed
NS	Not spiked
P	Concentrations >40% difference between the two GC columns
Q	One or more quality control criteria fail. See narrative.
Q1	Sample integraity was not maintained. See report narrative.
QNS	Quantity of sample not sufficient to perform analysis
R1	Duplicate RPD/RSD exceeded the method acceptance limit.
R2	Duplicate RPD/RSD exceeded the laboratory acceptance limit.
RA	Reanalysis confirms reported results
RE	Reanalysis confirms sample matrix interference
S	Analyzed by method of standard addition (MSA)
SMI	Sample matrix interference on surrogate
SP	Reported results are for spike compounds only
TIC	Library Search Compound
TNTC	Too numerous to count
U	Undetected; the concentration is below the reported MDL.
UJ	Undetected; the MDL and RL are estimated due to quality control discrepancies.
V1	CCV recovery was above method acceptance limits. This target analyte was not detected in the sample.
V2	CCV recovery was above method acceptance limits. Insufficient volume for sample reanalysis.
W	Post-digestion spike for furnace AA out of control limits
X	Exceeds regulatory limit
X, S	Exceeds regulatory limit; method of standard additions (MSA)
Z	Cannot be resolved from isomer - see below

*****Special Notes for Organic Analytes**

Microbac®

Microbac Laboratories Inc.
List of Valid Qualifiers
October 17, 2008

Qualkey: STD

1. Acrolein and acrylonitrile by method 624 are semi-quantitative screens only.
2. 1,2-Diphenylhydrazine is unstable and is reported as azobenzene.
3. N-nitrosodiphenylamine cannot be separated from diphenylamine.
4. 3-Methylphenol and 4-Methylphenol are unresolvable compounds.
5. m-Xylene and p-Xylene are unresolvable compounds.
6. The reporting limits for Appendix II/IX compounds by method 8270 are based on EPA estimated PQLs referenced in 40 CFR Part 264, Appendix IX. They are not always achievable for every compound an are matrix dependent.

00074164

Chain of Custody

NO. 5714

Shaw® Shaw Environmental & Infrastructure, Inc.
3010 Briarpark Drive, Suite 400
Houston, TX 77042
(713) 996-4400

Laboratory Name: Microbac | Address: 158 Starlite Dr. MARIETTA, OK | Contact: Stephanie Mossburg

Project Name: LHAAP | Project Location: Site 49 | Analysis and Method Desired (Indicate separate containers) | Remarks

Project No.: 117591.0006B350 | Project Contact: Jennifer Hoang | Project Telephone No.: 713-996-4408

Point of Contact: Jean Vangala | Project Manager/Supervisor: Praveen Srivastava

Telephone No.: 713-996-4459

Item No.	Sample Number	Date	Time	Comp	Grab	Matrix	Sample Description, Location	Number of Containers	TCLP RCRA Metals	RCRA Metals
1	S49NC100808	10-8-08	11:45	X		S	Soil	2	X	
2	S49BS100906	10-9-08	9:00			S	Soil	2		X
3										
4										
5										
6										
7										
8										
9										
10										

Transfers Relinquished By (signature)	Date/Time	Transfers Accepted By (signature)	Date/Time
Scott Beesinger	10/8/08 1:30		
		Laboratory Erin Porter	10-9-08 9:23

Special Instructions: STANDARD TAT

FedEx Airbill No.:

Sampler's Signature: Scott Beesinger

TAT: ✓ Standard ____ Rush Date ____ | Seals Intact? ____ Y ____ N | Received Good Condition ____ Y ____ N ____ Cold

White - Lab Copy Canary - Field Copy Pink - File Copy

Form Number: 433_2
Rev. 10-19-07

Microbac Laboratories, Inc.

SAMPLE RECEIPT FORM

00074165

158 Starlite Drive
Marietta, OH 45750
(740) 373-4071

Client:	SHAW longhorn
Workorder Number:	B
Date Received:	10-9-08
Delivered by:	( ) Fedx (✓) UPS ( ) Client ( ) Courier **Time:** 923
Opened by:	GRP
IR Temp Gun:	( ) D (✓) G
Logged by:	ERP/JKT/SIM L 0810025?

Cooler information

Cooler ID	Temp C	Airbill#	COC#	Other
3091	0	1Z66V 725 01 9395 7215		Soil

Inspection Checklist	Y	N	NA	Discrepancy ID
Were shipping coolers sealed?	✓			
Were custody seals intact?	✓			
Were cooler temperatures in range of 0 - 6?	✓			
Was ice present?	✓			
Were COC's received/ information complete/signed and dated?	✓			
Were sample containers and labels intact and match COC?	✓			
Were the correct containers and volumes received?	✓			
Were correct preservatives used? (water only)			✓	
Were pH ranges acceptable? (voa's excluded)			✓	
Were VOA samples free of headspace (< 6mm)?			✓	
Were samples received within EPA hold times?	✓			

Discrepancy/Comments/Other Problems

Distribution

Name of Microbac representative:	
Client/Company:	
Person Contacted:	
Date contacted:	

Resolution/other comments:

Microbac Laboratories Inc.

Internal Chain of Custody Report

Login: L08100257
Account: 2773
Project: 2773.025
Samples: 2
Due Date: 16-OCT-2008

Samplenum	Container ID	Products
L08100257-01	509599	

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish
1	LOGIN	COOLER	W1	09-OCT-2008 13:03	ERE	
2	PREP	W1	TCL	09-OCT-2008 13:07	RWC	RLK

Comments:Products cancelled.

3	STORE	TCL	A1	13-OCT-2008 08:37	JKT	RWC

Comments:Products cancelled.

Bottle: 2

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish
1	LOGIN	COOLER	W1	09-OCT-2008 13:03	ERE	
2	PREP	W1	TCL	09-OCT-2008 13:07	RWC	RLK

Comments:Products cancelled.

3	STORE	TCL	A1	13-OCT-2008 08:37	JKT	RWC

Comments:Products cancelled.

Samplenum	Container ID	Products
L08100257-01	509601	TC-EX

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish
1	LOGIN	COOLER		09-OCT-2008 13:05	ERE	

Bottle: 2

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish
1	LOGIN	COOLER		09-OCT-2008 13:05	ERE	

Samplenum	Container ID	Products
L08100257-04	509600	

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish
1	LOGIN	COOLER	W1	09-OCT-2008 13:04	ERE	

Bottle: 2

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish
1	LOGIN	COOLER	W1	09-OCT-2008 13:04	ERE	

A1 - Sample Archive (COLD)
A2 - Sample Archive (AMBIENT)
F1 - Volatiles Freezer in Login
V1 - Volatiles Refrigerator in Login
W1 - Walkin Cooler in Login

Microbac®

Microbac Laboratories Inc.

Internal Chain of Custody Report

Login: L08100257
Account: 2773
Project: 2773.025
Samples: 2
Due Date: 16-OCT-2008

Samplenum	Container ID	Products
L08100257-02	509602	AG AS-MS BA CD CR DIG-ICP HG PB SE-MS

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish
1	LOGIN	COOLER	W1	09-OCT-2008 13:05	ERE	
2	PREP	W1	DIG	09-OCT-2008 13:34	REK	RLK
3	EXTRACT	DIG	METALS	10-OCT-2008 07:07		REK
4	ANALYZ	V1	ORG4	10-OCT-2008 10:12	MRT	JKT
5	STORE	DIG	A1	10-OCT-2008 14:42	RLK	REK

Bottle: 2

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish
1	LOGIN	COOLER	W1	09-OCT-2008 13:05	ERE	
2	ANALYZ	W1	WET	10-OCT-2008 09:20	JDE	ERE

A1 - Sample Archive (COLD)
A2 - Sample Archive (AMBIENT)
F1 - Volatiles Freezer in Login
V1 - Volatiles Refrigerator in Login
W1 - Walkin Cooler in Login

Attachment 3

Waste Shipping Documents

00074169

WASTE MANAGEMENT

NON-HAZARDOUS WASTE MANIFEST

FOR OFFICE USE ONLY
Customer Acc. No. _____
Ticket No. _____

GENERATOR

WMI 850301

Name LONGHORN ARMY AMMUNITION PLANT
Address 4TH STREET, LHAAP
KARNACK TX 75661
Phone No. 479 635-0110

Generating Location MAIL TO: SHAW ENVIRONMENTAL
C/O:SCOTT BEESINGER; PO BOX 460; KARNACK, TX 75661
State Gen. ID No. 30990
Gen. US EPA ID No. TX6213820529

WASTE CODE	PROFILE NUMBER	WASTE DESCRIPTION	QUANTITY	UNITS
01 13 63 03 22	NB-105795TX	SOIL	25	Y
			21.57	T

CODES: D = DRUM; B = BAG; C = CARTON; P = POUND; Y = YARDS; 0 = OTHER

I hereby certify that the above listed material(s), is (are) not a hazardous waste as defined by 40 CFR Part 261 or any applicable state law. That each waste has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulations.

Rose M. Zeiler (PRINT) — AUTHORIZED AGENT'S NAME — 12/16/08 DATE — SIGNATURE

TRANSPORTER

Transporter's Name TRIAD TRANSPORTATION
Address PO BOX 818
MCALESTER, OK 74502
Phone No. (713)996-4472
Driver's name R GOETZ
Vehicle No. 2435 Box 504

I hereby certify that the above listed material was picked up at the Generator site listed above and delivered without incident to the disposal facility listed below.

12-18-08 SHIPMENT DATE — DRIVER'S SIGNATURE — 12-18-08 DELIVERY DATE — DRIVER'S SIGNATURE

DISPOSAL FACILITY

Site Name NEW BOSTON
Address 1030 HWY 82 W
Permit No. 576
Phone No. (903)628-6595
NEW BOSTON TX
Time _____

I hereby certify that the above listed material has been accepted and that information presented on this document is true and accurate.

Monty Cloud (PRINT) — NAME — 12/18/08 DATE — SIGNATURE

White - Original • Canary - Transporter • Pink - Disposal Facility • Goldenrod - Generator

00074170

WASTE MANAGEMENT

NON-HAZARDOUS WASTE MANIFEST

FOR OFFICE USE ONLY
Customer Acc. No. _____
Ticket No. _____

GENERATOR

WMI 850302

Name LONGHORN ARMY AMMUNITION PLANT
Address 4TH STREET, LHAAP
KARNACK TX 75661
Phone No. 479 635-0110

Generating Location MAIL TO: SHAW ENVIRONMENTAL
C/O:SCOTT BEESINGER; PO BOX 460; KARNACK, TX 75661
State Gen. ID No. 30990
Gen. US EPA ID No. TX6213820529

WASTE CODE	PROFILE NUMBER	WASTE DESCRIPTION	QUANTITY	UNITS
01363022	NB-105795TX	SOIL	25	Y
			886	T

CODES: D = DRUM; B = BAG; C = CARTON; P = POUND; Y = YARDS; 0 = OTHER

I hereby certify that the above listed material(s), is (are) not a hazardous waste as defined by 40 CFR Part 261 or any applicable state law. That each waste has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulations.

Rose M. Leiker — AUTHORIZED AGENT'S NAME (PRINT)
12/16/08 — DATE
Rose M. Leiker — SIGNATURE

TRANSPORTER

Transporter's Name TRIAD TRANSPORTATION
Address PO BOX 818
MCALESTER, OK 74502
Phone No. (713)996-4472
Driver's name R Goetz
Vehicle No. 2435 B-1120

I hereby certify that the above listed material was picked up at the Generator site listed above and delivered without incident to the disposal facility listed below.

12-18-08 — SHIPMENT DATE
R Goetz — DRIVER'S SIGNATURE
12-19-08 — DELIVERY DATE
R Goetz — DRIVER'S SIGNATURE

DISPOSAL FACILITY

Site Name NEW BOSTON
Address 1030 HWY 82 W
Permit No. 576
Phone No. (903)628-6595
NEW BOSTON TX
Time _____

I hereby certify that the above listed material has been accepted and that information presented on this document is true and accurate.

Monty Cloud — NAME (PRINT)
12/19/08 — DATE
Monty Cloud — SIGNATURE

White - Original • Canary - Transporter • Pink - Disposal Facility • Goldenrod - Generator

Appendix E

Soil-to-Groundwater Transport Modeling

Appendix E
Soil to Groundwater Transport Modeling

Purpose

The purpose of the calculations presented in this Appendix is to determine if lead and mercury concentrations observed at LHAAP-49 are protective of groundwater quality.

Model Selection

Shaw evaluated the Soil Attenuation Model (SAM) and VLEACH, a one-dimensional finite difference Vadose Zone Leaching Model, for predicting impacts of soil contamination on groundwater quality. Both models are described below.

SAM. SAM is an extension of the Soil Screening Level calculations presented in *Soil Screening Guidance: User's Guide*, Second Edition [U.S. Environmental Protection Agency (USEPA), 1996]. SAM is based on calculating the total mass of contaminant (in the liquid phase, solid phase, and gas phase) in the soil column:

$$M_T = V(\rho_b C_s + \theta_w C_w + \theta_a C_g) + I\,C_i - I\,C_w$$

Where

M_T = total mass
C_i = concentration in water infiltrating to the zone
C_g = gas phase concentration
C_s = concentration in soil (dry weight basis)
C_w = concentration in pore water
I = infiltration rate
V = volume of the soil column
ρ_b = bulk density
θ_a = air filled porosity
θ_w = water filled porosity

The total mass of contaminant is then redistributed using equilibrium conditions based on the adsorption coefficient and Henry's constant. The equilibrium equations are:

$$C_s = K_d C_w$$
$$C_g = K_H C_w$$

Where K_d is the distribution coefficient or adsorption coefficient, and K_H is dimensionless Henry's Law constant.

SAM model enhancement over USEPA's Soil Screening Levels is that the SAM model assumes a zone of contaminated soils overlying a zone of clean soil (zero concentration) within the vertical soil column. After soil contamination is introduced, SAM mixes two zones and predicts leachate at the bottom of the soil column to be in equilibrium with the

mixed soil column. Therefore, in the SAM model, the leachate concentration is calculated as follows:

$$C_w = C_s\left(\frac{\rho_b}{K_d + (\theta_w + \theta_a K_H)}\right)\left(\frac{L_1}{L_2}\right)$$

Or, alternately, the concentration in soil that will produce a given leachate concentration can be calculated as:

$$C_s = C_w\left(\frac{K_d + \theta_w + \theta_a K_H}{\rho_b}\right)\left(\frac{L_2}{L_1}\right)$$

Where L_1 is the vertical thickness of the total soil column and L_2 is the vertical thickness of the contaminated zone. The factor (L_2/L_1) is an enhancement in the SAM model over the Soil Screening Level Model by USEPA. A further dilution factor for leachate mixing with groundwater can be incorporated by using dilution factor:

$$DF = 1 + \frac{Kid}{IL}$$

Where

d = mixing zone depth
i = hydraulic gradient in aquifer
K = aquifer hydraulic conductivity
L = source length parallel to groundwater flow

VLEACH. VLEACH was initially developed for the USEPA in 1990. It has been updated since then, and the current version is V2.2. VLEACH is an extension of the equation used in the SAM model with the following enhancements:

- The vertical soil column is not limited to two zones. The user can specify the number of zones, each with its own initial soil concentration.
- Background soil concentration does not need to be zero.
- In each time step, total mass is calculated in the top zone including infiltrating water (at zero concentration). Once total mass is calculated, the equilibrium equation is used to distribute total mass into three phases (adsorbed to solids, liquid, and gas). The amount of infiltration received in one zone is discharged to the next zone with a concentration equal to the equilibrium liquid phase concentration. These calculations are repeated for each zone moving from top to bottom of the soil column. Leachate discharged from the bottom zone is considered to impact the groundwater.
- In addition to using equilibrium equations, the VLEACH model limits liquid phase concentration (C_w) to the saturation limit for the contaminant.

Both the SAM and VLEACH models ignore biodegradation and dispersion. VLEACH does not account for dilution of leachate as it mixes with groundwater. However, this can be added externally by using dilution factor calculations shown above.
VLEACH was selected for calculating soil to groundwater impact because of the enhancements listed above and its capability to handle non-zero background concentrations. The latter is important since most metals, including lead, occur naturally in soil.

Assumptions and Model Input Parameters

Although VLEACH is capable of simulating multiple soil columns with different initial soil concentrations (i.e., horizontal variation of contaminant concentration), this capability was not used in the calculations presented here. It was assumed that soils at the whole site are at the same concentration as at the location of the maximum lead or mercury concentration observed. This is a very conservative assumption. While the leachate concentration will also be diluted as it mixes with groundwater, no dilution factor has been used in the calculations presented here.

Since lead is not volatile, all parameters related to gas-phase concentrations were set to zero. Although mercury can volatilize, all parameters related to gas-phase concentrations for mercury were also set to zero to predict maximum impact on groundwater. The values used for the remaining model input parameters, and the basis for those values, are as follows:

1. **Recharge Rate** – It was estimated that recharge rate in conditions similar to the former Longhorn Army Ammunition Plant (LHAAP) would range from 10 to 15 inches per year. Higher recharge rate would result in earlier impact to groundwater. Therefore, the net recharge rate was assumed to be 15 inches per year or 1.25 feet per year for VLEACH calculations.
2. **Dry Bulk Density** – Dry bulk density was assumed to be 100 pounds per cubic feet which equates to 1.6 grams per cubic centimeter. This is a typical value for silty clayey sands.
3. **Water filled Porosity -** Water filled porosity is less than the total porosity in unsaturated soils above the water table. Water filled porosity was assumed to be 25 %.
4. **Concentration of Recharge Water –** Concentration of recharge water was set to zero to simulate rainfall containing no lead or mercury.
5. **Zone (or Cell) Thickness** – Smallest zone (cell) thickness that can be used within the model limitations should be used. Zone thickness of 0.1 feet was used.
6. **Soil Column Thickness** – The minimum depth to water table at LHAAP-49 is 15.7 feet. Therefore, the soil column thickness of 15.7 feet was used in the model.
7. **Time Step** – Time step for calculations should be small enough so that vertical migration of infiltration is less than the thickness of the zone (cell). For recharge

rate of 15 inches per year and zone (cell) thickness of 0.1 feet, time step should be less than 0.08 years. A time step of 0.05 years was used in the calculations.

8. **Maximum Time for Simulation** – VLEACH calculations were performed for 1,000 years for vertical migration. Calculations were performed at each time step and predicted leachate concentrations were printed out at 50 year time increments due to slow migration of lead.
9. **Initial Lead Concentrations** – Site analytical results show that lead contamination was limited primarily to surface soils. The maximum lead concentration [1,740 milligram per kilogram (mg/kg)] was detected in sample 49SB19 collected from 0 to 6 inches below ground surface (bgs). A sample collected from 1 to 2 feet bgs at the same location had a lead concentration of 44.9 mg/kg. It was conservatively assumed that the top 2 feet of the soil column was contaminated and lead concentration equals the maximum observed soil concentration. From 2 feet bgs to the water table (15.7 feet bgs), the lead concentration was assumed to be equal to the background soil concentration for the LHAAP. Both the mean concentration (7.81 mg/kg) and the 95% UCL concentration (8.29 mg/kg) in background soils (Shaw, 2004) were used. **Table E-1** shows initial lead concentrations used as model inputs.
10. **Initial Mercury Concentrations** – Site analytical results show that mercury contamination was limited primarily to surface soils. The maximum mercury concentration (778 mg/kg) was detected in sample 49SD65 collected from 0 to 6 inches bgs. It was conservatively assumed that the top 2 feet of the soil column was contaminated and mercury concentration equals the maximum observed soil concentration. From 2 feet bgs to the water table (15.7 feet bgs), the mercury concentration was assumed to be equal to the background soil concentration for the LHAAP. Both the mean concentration (0.0576 mg/kg) and the 95% UCL concentration (0.0714 mg/kg) in background soils were used. **Table E-2** shows initial mercury concentrations used as model inputs.
11. **Adsorption Coefficient for Lead** – The adsorption coefficient (K_d) for lead is pH dependent. The adsorption coefficient was calculated from site soil pH values and the equation presented in *Understanding Variation in Partition Coefficient, Kd, Values* (USEPA, 1999). The equation is as follows:

$$K_d \text{ (ml/g)} = 1639 - 902.4(\text{pH}) + 150.4(\text{pH})^2$$

K_d values for lead were calculated based on various measured values of both soil and groundwater pH as follows:

pH (su)	K_d (ml/g)	Remarks
5.2	1013	Average soil pH in background soils at LHAAP
5.72	1398	Average soil pH at LHAAP-49 site
6.75	2400	Groundwater pH at 49WW01 on October 23, 2007
6.98	2668	Groundwater pH at 49WW03 on October 23, 2007

K_d adsorption coefficient
ml/g milliliters per gram
su standard units

12. **Adsorption Coefficient for Mercury** – The adsorption coefficient for mercury is pH dependent. The K_d values as a function of pH are provided in 30 TAC §350.73(e)(1)(C). The K_d value corresponding to the average soil pH value at LHAAP-49 [5.7 standard unit (su)] is listed as 1.0 ml/g. Using this K_d value for the soil sample with the highest mercury concentration (778 mg/kg) results in equilibrium leachate concentration of 778 mg/L which is significantly higher than the solubility limit of 0.030 mg/L. For the background concentration of mercury in soil at LHAAP, this K_d value results in a groundwater concentration of 0.0576 mg/L [57.6 micrograms per liter (µg/L)] which is also greater than the solubility limit for mercury. According to 30 TAC §350.73(e)(1)(C), the K_d value based on the highest groundwater pH measured during sampling at 49WW03 on October 23, 2008, (6.98 su) is 82 ml/g. The predicted groundwater concentration for that K_d value (82 ml/g) and the average background soils concentration (0.0576 mg/kg) is 0.7 µg/L. In comparison, mercury has not been detected in any filtered groundwater background sample, and was detected in only one of 13 unfiltered background samples (Shaw, 2007). The single detection was an estimated concentration of 0.0793 µg/L; the remaining background results were non-detects with a method detection limit of 0.0472 µg/L and practical reporting limit of 0.2 µg/L. Because the observed concentrations differ significantly from predictions based on the K_d values from 30 TAC §350.73(e)(1)(C), the K_d values from 30 TAC were not considered applicable to LHAAP sites. The differences may be due to site-specific speciation of mercury or other geochemical conditions.

    An LHAAP site-specific K_d value was calculated using the equilibrium equation ($C_s = K_d C_w$ or $K_d = C_s/C_w$). The mean concentration in background soils (0.0576 mg/kg) and the practical reporting limit in groundwater (0.2 µg/L) were substituted into the equilibrium equation as C_s and C_w, respectively. The practical reporting limit (0.2 µg/L) was used for C_w because mercury was detected only once among 26 filtered and unfiltered results and that detection was well below 0.2 ug/L as noted in the previous paragraph. The resultant LHAAP site-specific minimum K_d value was 288 ml/g. This value is consistent with the lowest reported value of K_d in literature - 322 ml/g (Battelle, 1989). These two values of K_d (288 ml/g and 322 ml/g) provide reasonable to somewhat conservative results while the K_d values from 30 TAC §350.73(e)(1)(C) result in concentrations that appear to be overly conservative for conditions at LHAAP. Therefore the 288 ml/g and 322 ml/g values were used in the modeling as input values for the adsorption coefficient for mercury.

Model Results and Discussion

Lead

Four VLEACH simulations were performed to determine impacts of various input values. Leachate concentrations are most sensitive to the value of K_d and the background soil concentrations. Since value of lead K_d is sensitive to pH value, four values of soil pH were evaluated – the minimum soil pH measured in LHAAP-49 soils (5.72 su), the

average soil pH measured in background soil samples (5.2 su), groundwater pH at 49WW01 (6.75 su), and groundwater pH at 49WW03 (6.98 su). Initial soil lead concentrations at depths greater than 2 feet were set at the mean concentration (7.81 mg/kg) and the 95% UCL concentration (8.29 mg/kg) in the background soils.

Table E-1 provides a summary of VLEACH simulations for lead at LHAAP-49 Site. It shows that for all four simulations using measured soil pH values, the predicted initial leachate concentration just above the water table ranged from 5.60 µg/L to 8.20 µg/L. Groundwater samples were collected from three monitoring wells on the LHAAP-49 site. Both filtered and unfiltered groundwater samples were collected between May 2005 and October 2007. Lead concentrations in groundwater samples ranged from below MDL to 10.1 µg/L. The predicted concentrations based on soil pH values are consistent with the observed concentrations while predictions based on groundwater pH will result in under-predicting groundwater concentrations; therefore, soil pH was used as the basis for the K_d values in the VLEACH simulations.

Table E-1 also shows predicted maximum leachate concentration for the next 1,000 years to range from 5.60 µg/L to 8.20 µg/L as a result of contaminated soils left in place. This result indicates that there is no impact to groundwater for the next 1,000 years. Since the maximum measured and predicted lead concentrations are protective of groundwater to the Maximum Contaminant Level for drinking water (MCL) value of 15 µg/L for lead, it is not necessary to develop a remediation goal for lead.

Mercury

Four VLEACH simulations were performed to determine impacts of various input values. Leachate concentrations are most sensitive to the value of K_d and the background soil concentrations. The lowest value of K_d reported in the literature (322 ml/g) as well as the minimum site-specific K_d value (288 ml/g) were used in VLEACH simulations. Initial soil mercury concentrations at depths greater than 2 feet were set at the mean concentration (0.0576 mg/kg) and the 95% UCL concentration (0.0714 mg/kg) in the background soils.

Table E-2 provides a summary of VLEACH simulations for mercury at the LHAAP-49 Site. It shows that for all four simulations, the predicted initial leachate concentration ranged from 0.179 µg/L to 0.248 µg/L. When all soils are at background conditions, groundwater concentration will eventually be equal to the initial leachate concentration which is in equilibrium with the background soils. Therefore, predicted initial leachate concentrations are consistent with the site groundwater concentrations (non-detect with the maximum detection limit of 0.2 µg/L), which indicates that the K_d value used in the calculations is reasonable to conservative.

Table E-2 also shows predicted maximum leachate concentration for the next 1,000 years to range from 0.180 µg/L to 0.249 µg/L as a result of contaminated soils left in place. In other words, there is a small impact to groundwater quality of 0.001 µg/L (predicted maximum less the initial concentration) for the next 1,000 years. Since the maximum measured and predicted mercury concentrations are protective of groundwater

to the MCL value of 2 μg/L for mercury, it is not necessary to develop a remediation goal for mercury.

Conclusion

The maximum measured lead and mercury concentrations in soil are shown to be protective of groundwater for at least the next 1000 years.

References

Battelle, 1989. Chemical Data Bases for the Multimedia Environmental Pollutant Assessment Systems (MEPAS): Version 1. Prepared for the U.S. Department of Energy under Contract DE-AC06-76RKI 1830 by Pacific Northwest Laboratory operated by Battelle Memorial Institute.

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USEPA, 1999. *Understanding Variation in Partition Coefficient, Kd, Values. Volume II: Review of Geochemistry and Available Kd values for Cadmium, Cesium, Chromium, Lead, Plutonium, Radon, Strontium, Thorium, Tritium (^{3}H), and Uranium, EPA 402-R-99-004B*, August.

Table E-1
Summary of VLEACH Simulations for Lead
LHAAP-49 Site

Lead Concentration (mg/kg)				Predicted Leachate Concentration (µg/L)			
0-2 feet[1]	>2 feet	Soil pH	Kd[2] (ml/g)	Initial Values[3] at 15.7 feet bgs	Maximum[4] at 15.7 feet bgs	Major Assumptions	Remarks
1740	7.81	5.72	1398	5.60	5.60	(1) Average soil pH measured at LHAAP-49 Site is applicable to the entire soil column. (2) Soil column after the first 2 feet is at the mean concentration in the background soils.	Model predictions are consistent with the measured groundwater concentrations at LHAAP-49 Site.
1740	8.29	5.72	1398	5.94	5.94	(1) Average soil pH measured at LHAAP-49 Site is applicable to the entire soil column. (2) Soil column after the first 2 feet is at the 95% UCL concentration in the background soils.	Model predictions are consistent with the measured groundwater concentrations at LHAAP-49 Site.
1740	7.81	5.2	1013	7.73	7.73	(1) Average soil pH measured in the background soil samples is applicable to the entire soil column. (2) Soil column after the first 2 feet is at the mean concentration in the background soils.	Model predictions are consistent with the measured groundwater concentrations at LHAAP-49 Site.
1740	8.29	5.2	1013	8.20	8.20	(1) Average soil pH measured in the background soil samples is applicable to the entire soil column. (2) Soil column after the first 2 feet is at the 95% UCL concentration in the background soils.	Model predictions are consistent with the measured groundwater concentrations at LHAAP-49 Site.

Notes:

1 - Conservatively assumed that the measured maximum soil concentration applies to the top 2 feet of the soil column.

2 - Adsorption coefficient (Kd) calculated from soil pH values as per the equation presented in "Understanding Variation in Partition Coefficient, Kd, Values. Volume II: Review of Geochemistry and available Kd values for Cadmium, Cesium, Chromium, Lead, Plutonium, Radon, Strontium, Thorium, Tritium (^{3}H), and Uranium", EPA Report no. EPA 402-R-99-004B, August 1999.

3 - Pore water concentration at time = 0.

4 - Maximum pore water concentration at any time during the simulation period.

Table E-2
Summary of VLEACH Simulations for Mercury
LHAAP-49 Site

Mercury Concentration (mg/kg)		K_d (ml/g)	Predicted Leachate Concentration (µg/L)		Major Assumptions	Remarks
0-2 feet[1]	>2 feet		Initial Values[4] at 15.7 feet bgs	Maximum[5] at 15.7 feet bgs		
778	0.0576	322[2]	0.179	0.180	(1) Use the lowest reported K_d value in literature (Battelle, 1989) (2) Soil column after the first 2 feet is at the mean concentration in the background soils.	Model predictions are consistent with the measured groundwater concentrations at LHAAP-49 Site.
778	0.0576	288[3]	0.200	0.201	(1) Calculate K_d from mean concentration in background soil and the reporting limit for groundwater samples (mercury was not detected in filtered groundwater samples). (2) Soil column after the first 2 feet is at the mean concentration in the background soils.	Model predictions are consistent with the measured groundwater concentrations at LHAAP-49 Site.
778	0.0714	322[2]	0.222	0.223	(1) Use the lowest reported K_d value in literature (Battelle, 1989) (2) Soil column after the first 2 feet is at the 95% UCL concentration in the background soils.	Model predictions are consistent with the measured groundwater concentrations at LHAAP-49 Site.
778	0.0714	288[3]	0.248	0.249	(1) Calculate K_d from mean concentration in backgrthe ound soil and reporting limit for groundwater samples (mercury was not detected in groundwater samples). (2) Soil column after the first 2 feet is at the 95% UCL concentration in the background soils.	Model predictions are consistent with the measured groundwater concentrations at LHAAP-49 Site.

Notes:

1 - Conservatively assumed that the high soil concentration applies to the top 2 feet of the soil column.

2 - The lowest reported K_d value in the literature as compiled by Battelle (1989) report titled "Chemical Data Bases for the Multimedia Environmental Pollutant Assessment Systems (MEPAS): Version 1. Prepared for the U.S. Department of Energy under Contract DE-AC06-76RKI 1830 by Pacific Northwest Laboratory operated by Battelle Memorial Institute.

3 - Miinium value calculated from the relationship $K_d = C_s/C_w$ using site specific data.

4 - Pore water concentration at time = 0.

5 - Maximum pore water concentration at any time during the simulation period.

VLEACH Electronic Files

VLEACH input and output files are provided on the attached CD located at the back of the binder.

VLEACH Model Run	Soil pH (su)	Background Concentration (mg/kg)	Kd (ml/g)
Lead pH 572 b781 s1740 Kd1398	5.72	7.81	1398
Lead pH 572 b829 s1740 Kd1398	5.72	8.29	1398
Lead pH 52 b781 s1740 Kd1013	5.2	7.81	1013
Lead pH 52 b829 s1740 Kd1013	5.2	8.29	1013
Mercury b576 s778 Kd322	-	0.0576	322
Mercury b576 s778 Kd288	-	0.0576	288
Mercury b714 s778 Kd322	-	0.0714	322
Mercury b714 s778 Kd288	-	0.0714	288

Each model run has four files on the CD.

_____.OUT
_____.DAT
____-input.TXT
_____.PRF

The results are summarized on **Tables E-1** and **E-2**.

Appendix F

Additional Groundwater Sample Results

Table F-1
Groundwater Results from 2005 to 2009
LHAAP-49

		LOCATION CODE	49WW01					49WW02					49WW03					49WW03					49WW01					49WW03				
		SAMPLE NO	49WW01-050517					49WW02-050517					49WW03-050517					49WW03-050517FD					492201-071023					49WW03-071023				
		SAMPLE DATE	17-May-05					17-May-05					17-May-05					17-May-05					23-Oct-07					23-Oct-07				
Test Group	Parameter	Units	Result	Qual	ValQual	RC	DF	Result	Qual	ValQual	RC	DF	Result	Qual	ValQual	RC	DF	Result	Qual	ValQual	RC	DF	Result	Qual	ValQual	RC	DF	Result	Qual	ValQual	RC	DF
FIELD TESTS	Dissolved Oxygen	ug/L																													
FIELD TESTS	Oxygen Reduction Potential	mV																													
FIELD TESTS	pH	PH UNITS																													
FIELD TESTS	Specific Conductivity	uS/cm																													
FIELD TESTS	Temperature	Deg C																													
FIELD TESTS	Turbidity	NTU																													
GEN CHEMISTRY	Nitrate	mg/L																					0.025	U	U		1	0.033	J	J	15	1
GEN CHEMISTRY	Nitrate / Nitrite	mg/L	0.05	U	UJ	17	1	15.4		J	17	1	0.13		J	17	1	0.501		J	17	1									
GEN CHEMISTRY	Nitrite	mg/L																					0.005	U	U		1	0.005	U	U		1
METALS	Aluminum	mg/L	0.614				1	0.244		B	06A	1	0.414				1						0.05	U	U		1	0.05	U	U		1
METALS	Antimony	mg/L	0.000594	J	J	15	1	0.0005	U	U		1	0.0005	U	U		1						0.0025	U	U		10	0.0025	U	U		10
METALS	Arsenic	mg/L	0.002	U	U		1	0.002	U	U		1	0.01	U	U		5						0.00745	J	J	15	10	0.0131				10
METALS	Barium	mg/L	0.0216				1	0.0262				1	0.0684				1						0.026	J	J	15	10	0.0878				10
METALS	Beryllium	mg/L	0.00025	U	U		1	0.00025	U	U		1	0.00025	U	U		1						0.0005	U	U		1	0.0005	U	U		1
METALS	Cadmium	mg/L	0.00315	J	J	15	1	0.0025	U	U		1	0.0025	U	U		1						0.00125	U	U		10	0.00125	U	U		10
METALS	Calcium	mg/L	394				1	401				1	349				1						229				1	381				1
METALS	Chromium	mg/L	0.0248		J	08B,17	1	0.0455		J	08B,17	1	0.296		J	08B,17	1						0.0394				10	0.0676				10
METALS	Cobalt	mg/L	0.00669	J	J	15	1	0.00655	J	J	15	1	0.0101	J	J	15	1						0.0025	U	U		1	0.0025	U	U		1
METALS	Copper	mg/L	0.0103	J	J	15	1	0.00696	J	J	15	1	0.00998	J	J	15	1						0.005	U	U		10	0.005	U	U		10
METALS	Iron	mg/L	0.555				1	0.37				1	2.55				1						0.109				1	0.134				1
METALS	Lead	mg/L	0.01				1	0.00881				1	0.00868				1						0.0025	U	U		10	0.00913				10
METALS	Magnesium	mg/L	303				1	286				1	299				1						180				1	316				1
METALS	Manganese	mg/L	1.22				1	0.244				1	1.69				1						0.166				10	1.54				10
METALS	Mercury	mg/L	0.0001	U	U		1	0.0001	U	U		1	0.0001	U	U		1						0.0001	U	U		1	0.0001	U	U		1
METALS	Nickel	mg/L	0.0616				1	0.477				1	0.608				1						0.0349	J	J	15	10	0.896				10
METALS	Potassium	mg/L	9.7		J	13	1	12.8		J	13	1	10.1		J	13	1						5	U	U		20	10.6				1
METALS	Selenium	mg/L	0.0171				1	0.0157				1	0.0297				1						0.0363				10	0.0581				10
METALS	Silver	mg/L	0.005	U	U		1	0.005	U	U		1	0.005	U	U		1						0.0025	U	U		10	0.0025	U	U		10
METALS	Sodium	mg/L	448		J	13	100	391		J	13	100	451		J	13	100						381		J	13	20	538		J	13	20
METALS	Thallium	mg/L	0.0001	U	U		1	0.000486				1	0.000111	J	J	15	1						0.000274				10	0.000326				10
METALS	Vanadium	mg/L	0.005	U	U		1	0.005	U	U		1	0.0052	J	J	15	1						0.1	U	U		20	0.005	U	U		1
METALS	Zinc	mg/L	0.005	U	U		1	0.005	U	U		1	0.005	U	U		1						0.00935	J	J	15	1	0.01	J	J	15	1
METALS-DISSOLVED	Aluminum	mg/L	0.284		B	06A	1	0.233		B	06A	1	0.244		B	06A	1						0.05	U	U		1	0.5	U	U		10
METALS-DISSOLVED	Antimony	mg/L	0.0005	U	U		1	0.0005	U	U		1	0.0005	U	U		1						0.0025	U	U		10	0.0025	U	U		10
METALS-DISSOLVED	Arsenic	mg/L	0.002	U	U		1	0.002	U	U		1	0.002	U	U		1						0.00365	J	J	15	10	0.00714	J	J	15	10
METALS-DISSOLVED	Barium	mg/L	0.0768				1	0.092				1	0.125				1						0.0288	J	J	15	10	0.0859				10
METALS-DISSOLVED	Beryllium	mg/L	0.00025	U	U		1	0.00025	U	U		1	0.00025	U	U		1						0.0005	U	U		1	0.0005	U	U		1
METALS-DISSOLVED	Cadmium	mg/L	0.00328	J	J	15	1	0.0025	U	U		1	0.0025	U	U		1						0.00125	U	U		10	0.00125	U	U		10
METALS-DISSOLVED	Calcium	mg/L	411				1	400				1	356				1						214				1	346				10
METALS-DISSOLVED	Chromium	mg/L	0.0025	U	U		1	0.0242				1	0.0025	U	U		1						0.00885	J	J	15	10	0.0074	J	J	15	10
METALS-DISSOLVED	Cobalt	mg/L	0.00599	J	J	15	1	0.00624	J	J	15	1	0.00718	J	J	15	1						0.0025	U	U		1	0.0025	U	U		1
METALS-DISSOLVED	Copper	mg/L	0.00898	J	J	15	1	0.00556	J	J	15	1	0.00554	J	J	15	1						0.005	U	U		10	0.005	U	U		10
METALS-DISSOLVED	Iron	mg/L	0.0358	J	J	15	1	0.0812				1	0.02	U	U		1						0.025	U	U		1	0.025	U	U		1
METALS-DISSOLVED	Lead	mg/L	0.0101				1	0.00885				1	0.00901				1						0.0025	U	U		10	0.00921				10
METALS-DISSOLVED	Magnesium	mg/L	316				1	287				1	306				1						164				1	282				1
METALS-DISSOLVED	Manganese	mg/L	1.2				1	0.233				1	1.48				1						0.119				10	1.42				10
METALS-DISSOLVED	Mercury	mg/L	0.0001	U	U		1	0.0001	U	U		1	0.0001	U	U		1						0.000114	J	J	15	1	0.0001	U	U		1
METALS-DISSOLVED	Nickel	mg/L	0.0608				1	0.482				1	0.562				1						0.0512				10	0.915				10
METALS-DISSOLVED	Potassium	mg/L	9.71				1	12.5				1	10.1				1						5.12				1	9.57				1
METALS-DISSOLVED	Selenium	mg/L	0.0142				1	0.0142				1	0.0282				1						0.0174				10	0.0291				10
METALS-DISSOLVED	Silver	mg/L	0.005	U	U		1	0.005	U	U		1	0.005	U	U		1						0.0025	U	U		10	0.0025	U	U		10
METALS-DISSOLVED	Sodium	mg/L	462				100	401				100	435				100						415		J	13	10	545		J	13	10
METALS-DISSOLVED	Thallium	mg/L	0.0001	U	U		1	0.0001	U	U		1	0.0001	U	U		1						0.000206				10	0.000368				10
METALS-DISSOLVED	Vanadium	mg/L	0.005	U	U		1	0.005	U	U		1	0.005	U	U		1						0.05	U	U		10	0.05	U	U		10
METALS-DISSOLVED	Zinc	mg/L	0.00574	J	J	15	1	0.005	U	U		1	0.005	U	U		1						0.0073	J	J	15	1	0.00573	J	J	15	1

Notes, abbreviations, and reason codes are on last page.

Table F-1
Groundwater Results from 2005 to 2009
LHAAP-49

		LOCATION CODE	49WW03					49WW04					49WW05					49WW06					49WW07					49WW07					49WW08				
		SAMPLE NO	49WW03-100808					49WW04-120308					49WW05-120208					49WW06-120308					49WW07-120208					49WW07-120208-FD					49WW08-120308				
		SAMPLE DATE	8-Oct-08					3-Dec-08					2-Dec-08					3-Dec-08					2-Dec-08					2-Dec-08					3-Dec-08				
Test Group	Parameter	Units	Result	Qual	ValQual	RC	DF	Result	Qual	ValQual	RC	DF	Result	Qual	ValQual	RC	DF	Result	Qual	ValQual	RC	DF	Result	Qual	ValQual	RC	DF	Result	Qual	ValQual	RC	DF	Result	Qual	ValQual	RC	DF
FIELD TESTS	Dissolved Oxygen	ug/L	11900					4060					5310					2000					930										4470				
FIELD TESTS	Oxygen Reduction Potential	mV	47.8					-32.6					-36.4					-41.9					-77.3										-25.9				
FIELD TESTS	pH	PH UNITS	6.2					6.93					7.07					6.8					7.01										6.9				
FIELD TESTS	Specific Conductivity	uS/cm	6.723					3.334					2.391					5.982					4.673										2.104				
FIELD TESTS	Temperature	Deg C	18.85					18.55					18.95					18.55					19.64										18.3				
FIELD TESTS	Turbidity	NTU	5.8					0					7.9					5.3					5.1										3.9				
GEN CHEMISTRY	Nitrate	mg/L																																		
GEN CHEMISTRY	Nitrate / Nitrite	mg/L						1.72				1	2.07				4	1.36				1	0.661				1	0.637				1	0.213				1
GEN CHEMISTRY	Nitrite	mg/L																																		
METALS	Aluminum	mg/L	0.0774	J	J	15	1											2.34				1															
METALS	Antimony	mg/L	0.00025	U	U		1											0.00181				1															
METALS	Arsenic	mg/L	0.00823				1											0.0483				1															
METALS	Barium	mg/L	0.0709				1											0.246				1															
METALS	Beryllium	mg/L	0.0005	U	U		1											0.000592	J	J	15	1															
METALS	Cadmium	mg/L	0.001				1											0.000669				1															
METALS	Calcium	mg/L	422				1											329				1															
METALS	Chromium	mg/L	0.207				1											0.00673				1															
METALS	Cobalt	mg/L	0.0155				1											0.00658				1															
METALS	Copper	mg/L	0.00814				1											0.0053				1															
METALS	Iron	mg/L	1.24				1											2.21				1															
METALS	Lead	mg/L	0.000295	J	J	15	1											0.007				1															
METALS	Magnesium	mg/L	314				1											237				1															
METALS	Manganese	mg/L	2.62				20											2.11				100															
METALS	Mercury	mg/L	0.0001	U	U		1											0.0001	U	U		1															
METALS	Nickel	mg/L	0.964	B			20											0.0363				1															
METALS	Potassium	mg/L	7.32				1											14.2				1															
METALS	Selenium	mg/L	0.0348				1											0.0603				1															
METALS	Silver	mg/L	0.00025	U	U		1											0.00025	U	U		1															
METALS	Sodium	mg/L	554				5											463				5															
METALS	Thallium	mg/L	0.000223				1											0.000321				1															
METALS	Vanadium	mg/L	0.1	U	U		20											0.005	U	U		1															
METALS	Zinc	mg/L	0.0205				1											0.0264				1															
METALS-DISSOLVED	Aluminum	mg/L																																		
METALS-DISSOLVED	Antimony	mg/L																																		
METALS-DISSOLVED	Arsenic	mg/L																																		
METALS-DISSOLVED	Barium	mg/L																																		
METALS-DISSOLVED	Beryllium	mg/L																																		
METALS-DISSOLVED	Cadmium	mg/L																																		
METALS-DISSOLVED	Calcium	mg/L																																		
METALS-DISSOLVED	Chromium	mg/L																																		
METALS-DISSOLVED	Cobalt	mg/L																																		
METALS-DISSOLVED	Copper	mg/L																																		
METALS-DISSOLVED	Iron	mg/L																																		
METALS-DISSOLVED	Lead	mg/L																																		
METALS-DISSOLVED	Magnesium	mg/L																																		
METALS-DISSOLVED	Manganese	mg/L																																		
METALS-DISSOLVED	Mercury	mg/L																																		
METALS-DISSOLVED	Nickel	mg/L																																		
METALS-DISSOLVED	Potassium	mg/L																																		
METALS-DISSOLVED	Selenium	mg/L																																		
METALS-DISSOLVED	Silver	mg/L																																		
METALS-DISSOLVED	Sodium	mg/L																																		
METALS-DISSOLVED	Thallium	mg/L																																		
METALS-DISSOLVED	Vanadium	mg/L																																		
METALS-DISSOLVED	Zinc	mg/L																																		

Notes, abbreviations, and reason codes are on last page.

Table F-1
Groundwater Results from 2005 to 2009
LHAAP-49

		LOCATION CODE	49WW04					49WW06					49WW04					49WW04					49WW06					49WW06				
		SAMPLE NO	49WW04-022409					49WW06-022409					49WW04-040409					49WW04-090507					49WW06-040409					49WW06-090513				
		SAMPLE DATE	24-Feb-09					24-Feb-09					4-Apr-09					7-May-09					4-Apr-09					13-May-09				
Test Group	Parameter	Units	Result	Qual	ValQual	RC	DF	Result	Qual	ValQual	RC	DF	Result	Qual	ValQual	RC	DF	Result	Qual	ValQual	RC	DF	Result	Qual	ValQual	RC	DF	Result	Qual	ValQual	RC	DF
FIELD TESTS	Dissolved Oxygen	ug/L																													
FIELD TESTS	Oxygen Reduction Potential	mV																													
FIELD TESTS	pH	PH UNITS																													
FIELD TESTS	Specific Conductivity	uS/cm																													
FIELD TESTS	Temperature	Deg C																													
FIELD TESTS	Turbidity	NTU																													
GEN CHEMISTRY	Nitrate	mg/L																													
GEN CHEMISTRY	Nitrate / Nitrite	mg/L	1				1						0.141				1	0.097				1										
GEN CHEMISTRY	Nitrite	mg/L																								1					1
METALS	Aluminum	mg/L																					0.05	U	U		1	0.05	U	U		1
METALS	Antimony	mg/L																													
METALS	Arsenic	mg/L						0.00862				5											0.0139				5	0.0128				1
METALS	Barium	mg/L																													
METALS	Beryllium	mg/L																													
METALS	Cadmium	mg/L																													
METALS	Calcium	mg/L																													
METALS	Chromium	mg/L						0.00428	J	J	15	5																			
METALS	Cobalt	mg/L																													
METALS	Copper	mg/L																													
METALS	Iron	mg/L																					0.0551	J	J	15	1	0.025	U	U		1
METALS	Lead	mg/L																													
METALS	Magnesium	mg/L																													
METALS	Manganese	mg/L																													
METALS	Mercury	mg/L																													
METALS	Nickel	mg/L																													
METALS	Potassium	mg/L																													
METALS	Selenium	mg/L																													
METALS	Silver	mg/L																													
METALS	Sodium	mg/L																													
METALS	Thallium	mg/L																													
METALS	Vanadium	mg/L																													
METALS	Zinc	mg/L																													
METALS-DISSOLVED	Aluminum	mg/L																													
METALS-DISSOLVED	Antimony	mg/L																													
METALS-DISSOLVED	Arsenic	mg/L																													
METALS-DISSOLVED	Barium	mg/L																													
METALS-DISSOLVED	Beryllium	mg/L																													
METALS-DISSOLVED	Cadmium	mg/L																													
METALS-DISSOLVED	Calcium	mg/L																													
METALS-DISSOLVED	Chromium	mg/L																													
METALS-DISSOLVED	Cobalt	mg/L																													
METALS-DISSOLVED	Copper	mg/L																													
METALS-DISSOLVED	Iron	mg/L																													
METALS-DISSOLVED	Lead	mg/L																													
METALS-DISSOLVED	Magnesium	mg/L																													
METALS-DISSOLVED	Manganese	mg/L																													
METALS-DISSOLVED	Mercury	mg/L																													
METALS-DISSOLVED	Nickel	mg/L																													
METALS-DISSOLVED	Potassium	mg/L																													
METALS-DISSOLVED	Selenium	mg/L																													
METALS-DISSOLVED	Silver	mg/L																													
METALS-DISSOLVED	Sodium	mg/L																													
METALS-DISSOLVED	Thallium	mg/L																													
METALS-DISSOLVED	Vanadium	mg/L																													
METALS-DISSOLVED	Zinc	mg/L																													

Notes and Abbreviations:

B - The concentration reported was detected in the associated method blank, trip blank, or equipment blank within 5X/10X the blank concentration.

Deg C - degrees Celsius

DF - dilution factor

FD - field duplicate

J - The analyte was positively identified; the reported value is the estimated concentration of the constituent detected in the sample analyzed.

µg/L - micrograms per liter

µS/cm - microseconds per centimeter

mg/L - milligrams per liter

mV - millivolts

NTU - nephelometric turbidity unit

RC - reason code

U - Not detected. The analyte was analyzed for, but not detected above the associated reporting limit.

Reason Codes:

06A - method or preparation blank

08B - % RPD outside acceptance criteria (precision)

13 - serial dilution

15 - quantitation

17 - field duplicate RPD criteria is exceeded

00074186

GROUNDWATER SAMPLING FORM

Sheet 1 of 2

Operable Unit/Site ID: LNAAP-49
Project Name/#: 117591.0006.00
Weather: Cloudy 40s

Sampling location ID: 49WW01
Sample ID: 49WW01-102307
Collection Time/Date: 12:55 10/23/07

Pump Installation

Pump installation crew: A. Willmore
PID/FID reading (well head/background): 0.0
Casing diameter (inches): 4"
Total well Depth (ft. BTOC): 36.57'
Initial (pre-installation) DTW/time: 27.16
Final (after pump priming) DTW/time: 27.16
Free product (circle): LNAPL / DNAPL
Volume of water removed during priming (mL): NA
Discharge tube length (ft.): 34'

Installation date/beginning time: 10/23/07 11:50
Installation date/completion time: 10/23/07 11:55
Screen Interval (ft. BTOC): 26.5 to 36.5
Pump intake depth (ft BTOC): 31'
Post-installation DTW/time: 27.10
Max. sustainable pump rate (mL/min): 100
Appearance of product: None
Discharge tube diameter (3/8" or 1/4"): 1/4
Inlet reducer used (Y/N): N

Pneumatic Controller Tuning:
Initial air pressure = H (ft.) X 0.43 = NR psi

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting									
Discharge Setting									
Flow rate (mL/min)									

Purging

Purging/sampling crew: A. Willmore
Purge date/beginning time: 10/23/07 12:00
Initial (pre-purging) DTW (ft. BTOC): 27.10
Calculated tubing + pump volume: NA

PID/FID reading (well head/background): 6.0
Purge date/completion time: 10/23/07 13:00
Final (post-purging) DTW (ft. BTOC): 27.73
No. of tubing + pump volumes purged: NA

Pneumatic Controller Tuning:
Initial air pressure = H (ft.) X 0.43 = NA psi

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting	NA								
Discharge Setting									
Flow rate (mL/min)									

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
12:00	27.83	100	0.1	16.24	4.199	6.79	601.1	10.61	10.7
12:05	27.23	100	0.6	16.21	4.194	6.79	600.9	9.81	8.4
12:10	27.25	100	1.1	16.19	4.181	6.79	545.1	9.51	6.2
12:15	27.27	100	1.6	16.17	4.179	6.76	539.1	9.51	4.1
12:25	27.23	100	2.1	16.18	4.179	6.75	538.1	9.45	3.1
12:30	27.25	100	2.6	16.09	4.179	6.75	537.8	9.41	3.4

00074187

GROUNDWATER SAMPLING FORM

Sheet 2 of 2

49WW01

Water Quality Parameter Measurements (continued)

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C) ±10%	Electrical Conductivity (uMhos/cm) ±3%	pH ±0.1	Eh (mv) ±10	DO (mg/L) ±10%	Turbidity (NTU) ±10%

10-c 20

10/23/07

Sampling

Sampling beginning time: 12:55

Sampling completion time: 13:05

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
13:16	27.23	100	~7	6.04	4.172	4.75	547.1	9.33	5.4

Sample Information

Sample ID: 49WW01-102307

Sample collection date/time: 10/23/07 12:55

Duplicate sample collected (Y/N): N

Duplicate sample ID: NA

Split sample collected (Y/N): N

Split sample ID: NA

COC No(s):

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers
TAL Mcy (Fish/Sed/Alg)	6020B	2x 500mL HDPE			
Nitrates/Nitrites		1 500mL HDPE			

Comments: Purged & sampled w/ peristaltic pump

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter

00074188

GROUNDWATER SAMPLING FORM

Sheet 1 of 2

Operable Unit/Site ID: LHAAP-49
Project Name/#: LHAAP / 117591. [illegible]
Weather: Cloudy, 40s

Sampling location ID: 49WW02
Sample ID: 49WW02-102307-DRY-No Sample
Collection Time/Date:

Pump Installation

Pump installation crew: A. Willmore
PID/FID reading (well head/background): 0.0
Casing diameter (inches): 4"
Total well Depth (ft. BTOC): 24.81
Initial (pre-installation) DTW/time: DRY
Final (after pump priming) DTW/time: DRY
Free product (circle): LNAPL / DNAPL
Volume of water removed during priming (mL): NA
Discharge tube length (ft.):

Installation date/beginning time:
Installation date/completion time: NA
Screen Interval (ft. BTOC): 15 to 25
Pump intake depth (ft BTOC):
Post-installation DTW/time:
Max. sustainable pump rate (mL/min): NA
Appearance of product:
Discharge tube diameter (3/8" or 1/4"):
Inlet reducer used (Y/N):

Pneumatic Controller Tuning:
Initial air pressure = H (ft.) X 0.43 = NA psi

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting									
Discharge Setting				DRY					
Flow rate (mL/min)									

Purging

Purging/sampling crew: A. Willmore
Purge date/beginning time:
Initial (pre-purging) DTW (ft. BTOC): NA
Calculated tubing + pump volume: NA

PID/FID reading (well head/background): NA
Purge date/completion time:
Final (post-purging) DTW (ft. BTOC):
No. of tubing + pump volumes purged:

Pneumatic Controller Tuning:
Initial air pressure = H (ft.) X 0.43 = NA psi

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting									
Discharge Setting			DRY						
Flow rate (mL/min)									

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
				DRY					

00074189

GROUNDWATER SAMPLING FORM

Sheet 2 of 2

49WW02

Water Quality Parameter Measurements (continued)

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C) ±10%	Electrical Conductivity (uMhos/cm) ±3%	pH ±0.1	Eh (mv) ±10	DO (mg/L) ±10%	Turbidity (NTU) ±10%

10/23/07

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Sampling

Sampling beginning time:_____ Sampling completion time:_____

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
				DRY					

Sample Information

Sample ID:_____ Sample collection date/time:_____

Duplicate sample collected (Y/N):_____ NA Duplicate sample ID:_____ NA

Split sample collected (Y/N):_____ Split sample ID:_____

COC No(s):_____

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers
		DRY			

Comments: No Sample collected, well is DRY

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter

00074190

GROUNDWATER SAMPLING FORM

Sheet 1 of 2

Operable Unit/Site ID: LHAAP-49
Project Name/#: LHAAP / 117591. ~~8888A 1000~~ 000 GC 100
Weather: cloudy, ~~80s~~ 40's (High)

Sampling location ID: 49WW03
Sample ID: 49WW03-102307
Collection Time/Date: 11:10 10/23/07

Pump Installation

Pump installation crew: A. Willmore
PID/FID reading (well head/background): 6.0
Casing diameter (inches): 4"
Total well Depth (ft. BTOC): 37.08
Initial (pre-installation) DTW/time: 26.75
Final (after pump priming) DTW/time:
Free product (circle): LNAPL / DNAPL
Volume of water removed during priming (mL): NA
Discharge tube length (ft.): 34'

Installation date/beginning time: 10/23/07 10:01
Installation date/completion time: 10/23/07 10:02
Screen Interval (ft. BTOC): 27 to 37
Pump intake depth (ft BTOC): 31'
Post-installation DTW/time: 26.75
Max. sustainable pump rate (mL/min): 100
Appearance of product: None
Discharge tube diameter (3/8" or 1/4"): 1/4"
Inlet reducer used (Y/N): N

Pneumatic Controller Tuning:
Initial air pressure = H (ft.) X 0.43 = NA psi

Peristaltic pump

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting									
Discharge Setting									
Flow rate (mL/min)									

Purging

Purging/sampling crew: A. Willmore
Purge date/beginning time: 10/23/07 10:20
Initial (pre-purging) DTW (ft. BTOC): 26.75
Calculated tubing + pump volume: NA
Pneumatic Controller Tuning:
Initial air pressure = H (ft.) X 0.43 = NA psi

PID/FID reading (well head/background): 6.0
Purge date/completion time: 10/23/07 11:00
Final (post-purging) DTW (ft. BTOC): 26.89
No. of tubing + pump volumes purged: NA

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)	NA								
Refill Setting									
Discharge Setting									
Flow rate (mL/min)									

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
10:20	26.89	100	0.1	16.84	7.017	7.12	611.1	9.11	8.0
10:25	26.89	100	0.6	16.22	7.010	7.04	601.4	7.89	6.3
10:30	26.89	100	1.1	16.12	7.004	7.00	597.1	7.01	6.1
10:35	26.89	100	1.6	15.91	6.981	7.00	500.3	6.94	4.2
10:40	26.89	100	2.1	15.90	6.976	7.00	485.1	6.64	3.1
10:45	26.89	100	2.6	15.88	6.975	7.00	481.0	6.65	3.2
10:50	26.89	100	3.1		6.973	7.00	480.6	6.60	3.2
10:55	26.89	100	3.6	15.73	6.972	6.99	480.4	6.59	3.1

00074191

GROUNDWATER SAMPLING FORM

Sheet 2 of 2

49WW03

Water Quality Parameter Measurements (continued)

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C) ±10%	Electrical Conductivity (uMhos/cm) ±3%	pH ±0.1	Eh (mv) ±10	DO (mg/L) ±10%	Turbidity (NTU) ±10%

10/23/07

10 - est 20

Sampling

Sampling beginning time: 11:16 Sampling completion time: 11:25

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
11:30	26.89	100	7.1	15.69	6.958	6.98	491.2	6.63	2.1

Sample Information

Sample ID: 49WW03-102307

Duplicate sample collected (Y/N): N

Split sample collected (Y/N): N

COC No(s):

Sample collection date/time: 10/23/07 11:10

Duplicate sample ID: NA

Split sample ID: N

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers
TAL Metals (F/U)	6020B	2x 500mL HDPE			
Nitrates / Nitrites		1x 50mL HDPE			

Comments: Purged and sampled w/ peristaltic pump.

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter

00074192

49 DPT01 HOLE NO. 01

DRILLING LOG	DIVISION: SHAW E+I	INSTALLATION: Longhorn AAP	SHEET 1 OF 3 SHEETS
1. PROJECT: MARC LHAAP		10. SIZE AND TYPE OF BIT: Geoprobe Macro-Core	
2. LOCATION (Coordinates or Station): Site 49		11. DATUM FOR ELEVATION SHOWN (TBM or MSL): —	
3. DRILLING AGENCY: Strata-Core		12. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 6610	
4. HOLE NO. (As shown on drawing title and file number): 49-DPT01		13. OVERBURDEN SAMPLES: DISTURBED —	UNDISTURBED —
5. NAME OF DRILLER: Shane		14. TOTAL NUMBER CORE BOXES: —	
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER: 24.5	
		16. DATE HOLE: STARTED 9/29/08	COMPLETED 9/29/08
7. THICKNESS OF OVERBURDEN: —		17. ELEVATION TOP OF HOLE: —	
8. DEPTH DRILLED INTO ROCK: —		18. TOTAL CORE RECOVERY FOR BORING: 100 %	
9. TOTAL DEPTH OF HOLE: 28ft		Andy Grivest INSPECTOR	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	1		Silty Clay - 10YR 7/4 (very pale brown) red iron mottling, dry, loose			
	2					
	3		SAA - 10YR 6/2 (light brownish gray)			
	4					
	5					
	6		SAA			
	7					
	8		SAA - small gravel, iron mottling			
	9					
	10		SAA - low plasticity, dry 10YR 6/3 (pale brown)			
	11		Sandy Clay - 10YR 6/3 (pale brown) fine grain, low plasticity			
	12					

00074193

49DPT01 HOLE NO. 01

DRILLING LOG	DIVISION: SHAW E+I	INSTALLATION: Longhorn AAP	SHEET 2 OF 3 SHEETS
1. PROJECT: MARC LONGHORN AAP		10. SIZE AND TYPE OF BIT: Geoprobe, Macro-Core	
2. LOCATION (Coordinates or Station): Site 49		11. DATUM FOR ELEVATION SHOWN (TBM or MSL): —	
3. DRILLING AGENCY: Strata-Core		12. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 6610	
4. HOLE NO. (As shown on drawing title and file number): 49DPT01		13. OVERBURDEN SAMPLES: DISTURBED —	UNDISTURBED —
5. NAME OF DRILLER: Shane		14. TOTAL NUMBER CORE BOXES: —	
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER: 24.5	
7. THICKNESS OF OVERBURDEN: —		16. DATE HOLE: STARTED 9/29/08	COMPLETED 9/29/08
8. DEPTH DRILLED INTO ROCK: —		17. ELEVATION TOP OF HOLE: —	
9. TOTAL DEPTH OF HOLE: 28 ft		18. TOTAL CORE RECOVERY FOR BORING: 100 %	
		ANDY GILCRIEST INSPECTOR	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	13		SAA			
	14					
	15					
	16					
	17		Sand - 10YR 7/4 (very pale brown) fine grain, dry, loose			
	18					
	19		SAA			
	20					
	21		Silty Sand - 10YR 6/4 (light yellowish brown) moist, soft, low plasticity			
	22					
	23		SAA - increasing moisture			
	24					

00074194

49DPT01 HOLE NO. 01

DRILLING LOG	DIVISION SHAW E-I	INSTALLATION LONGHORN AAP	SHEET 3 OF 3 SHEETS
1. PROJECT MARC LHAAP		10. SIZE AND TYPE OF BIT Geoprobe Macro-Core	
2. LOCATION (Coordinates or Station) Site 49		11. DATUM FOR ELEVATION SHOWN (TBM or MSL) –	
3. DRILLING AGENCY Strata-Core		12. MANUFACTURER'S DESIGNATION OF DRILL Geoprobe 6610	
4. HOLE NO. (As shown on drawing title and file number) 49DPT01		13. OVERBURDEN SAMPLES DISTURBED –	UNDISTURBED –
5. NAME OF DRILLER Shane		14. TOTAL NUMBER CORE BOXES –	
6. DIRECTION OF HOLE ☑ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER 24.5	
		16. DATE HOLE STARTED 9/29/08	COMPLETED 9/29/08
7. THICKNESS OF OVERBURDEN –		17. ELEVATION TOP OF HOLE	
8. DEPTH DRILLED INTO ROCK –		18. TOTAL CORE RECOVERY FOR BORING 100 %	
9. TOTAL DEPTH OF HOLE 28ft		ANDY GILCRIEST INSPECTOR	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
		▽				
	25	– water –	Sand - 10YR 5/1 (gray) wet, fine grain, loose			
	26					
	27		Silty Clay - 2.5Y 5/2 (grayish brown) moist stiff, low plasticity			
	28		End of Boring			

00074195

49DPT02 HOLE NO. 02

DRILLING LOG	DIVISION SHAW E&I	INSTALLATION Longhorn AAP	SHEET 1 OF 3 SHEETS
1. PROJECT MARC LHAAP		10. SIZE AND TYPE OF BIT Geoprobe Macro-Core	
2. LOCATION (Coordinates or Station) Site 49		11. DATUM FOR ELEVATION SHOWN (TBM or MSL) —	
3. DRILLING AGENCY Strata-Core		12. MANUFACTURER'S DESIGNATION OF DRILL Geoprobe 6610	
4. HOLE NO. (As shown on drawing title and file number) 49DPT-02		13. OVERBURDEN SAMPLES —	DISTURBED — UNDISTURBED —
5. NAME OF DRILLER Shane		14. TOTAL NUMBER CORE BOXES —	
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER 25'	
		16. DATE HOLE STARTED 10/6/08	COMPLETED 10/6/08
7. THICKNESS OF OVERBURDEN —		17. ELEVATION TOP OF HOLE —	
8. DEPTH DRILLED INTO ROCK —		18. TOTAL CORE RECOVERY FOR BORING 100 %	
9. TOTAL DEPTH OF HOLE 28'		ANDY GILCRIEST INSPECTOR	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	1		silty clay 5YR 4/6 yellowish red moist soft med. plasticity organics			
	2					
	3					
	4		SAA			
	5					
	6		SAA 10YR 5/4 yellowish brown			
	7					
	8		clayey sand fine grain moist soft loose 2.5Y 5/2 grayish brown			
	9		very moist			
	10					
	11		SAA 10YR 5/3 brown			
	12					

00074196

49DPT02 HOLE NO. 02

DRILLING LOG	DIVISION: SHAW E&I	INSTALLATION: LONGHORN AAP	SHEET 2 OF 3 SHEETS
1. PROJECT: MARC LHAAP		10. SIZE AND TYPE OF BIT: Geoprobe Macro-Core	
2. LOCATION (Coordinates or Station): Site 49		11. DATUM FOR ELEVATION SHOWN (TBM or MSL): -	
3. DRILLING AGENCY: Strata-Core		12. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 6610	
4. HOLE NO. (As shown on drawing title and file number): 49DPT-02		13. OVERBURDEN SAMPLES: DISTURBED -	UNDISTURBED -
5. NAME OF DRILLER: Shane		14. TOTAL NUMBER CORE BOXES: -	
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER: 25'	
		16. DATE HOLE: STARTED 10/6/08	COMPLETED 10/6/08
7. THICKNESS OF OVERBURDEN: -		17. ELEVATION TOP OF HOLE: -	
8. DEPTH DRILLED INTO ROCK: -		18. TOTAL CORE RECOVERY FOR BORING: 100 %	
9. TOTAL DEPTH OF HOLE: 28'		ANDY GILCRIEST INSPECTOR	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	13		SAA			
	14		SAA 10YR 7/2 light gray w/ iron staining			
	15					
	16					
	17					
	18					
	19		clay moist low plasticity 10YR 5/4 yellowish brown			
	20					
	21					
	22		sand moist loose some organics 2.5Y 6/4 light yellowish brown			
	23					
	26					

00074197

49DPT02 HOLE NO. 02

DRILLING LOG

DIVISION: SHAW E&I

INSTALLATION: LONGHORN AAP

SHEET 3 OF 3 SHEETS

1. PROJECT: MARC LHAAP
2. LOCATION (Coordinates or Station): Site 49
3. DRILLING AGENCY: Strata-Core
4. HOLE NO. (As shown on drawing title and file number): 49DPT-02
5. NAME OF DRILLER: Shane
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: -
8. DEPTH DRILLED INTO ROCK: -
9. TOTAL DEPTH OF HOLE: 28'
10. SIZE AND TYPE OF BIT: Geoprobe Macro-Core
11. DATUM FOR ELEVATION SHOWN (TBM or MSL):
12. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 6610
13. OVERBURDEN SAMPLES: DISTURBED -; UNDISTURBED -
14. TOTAL NUMBER CORE BOXES: -
15. ELEVATION GROUND WATER: 25'
16. DATE HOLE: STARTED 10/6/08; COMPLETED 10/6/08
17. ELEVATION TOP OF HOLE: -
18. TOTAL CORE RECOVERY FOR BORING: 100 %

Andy Gilchrist — INSPECTOR

1630 end hole

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	25	▽ water	SAA			
	26		silty 10YR 5/3 brown low plast. silt/clay ~~slight~~ slightly moist			
	27					
	28		EOB			

00074198

49DPT03 HOLE NO. 03

DRILLING LOG	DIVISION: SHAW E+I	INSTALLATION: LONGHORN AAP	SHEET 1 OF 2 SHEETS
1. PROJECT: MARC LHAAP		10. SIZE AND TYPE OF BIT: Geoprobe Macro-Core	
2. LOCATION (Coordinates or Station): Site 49		11. DATUM FOR ELEVATION SHOWN (TBM or MSL): -	
3. DRILLING AGENCY: Strata-Core		12. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 6610	
4. HOLE NO. (As shown on drawing title and file number): 49DPT-03		13. OVERBURDEN SAMPLES: DISTURBED -	UNDISTURBED -
5. NAME OF DRILLER: Shane		14. TOTAL NUMBER CORE BOXES: -	
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER: -	
7. THICKNESS OF OVERBURDEN: -		16. DATE HOLE: STARTED 10/7/08	COMPLETED 10/7/08
8. DEPTH DRILLED INTO ROCK: -		17. ELEVATION TOP OF HOLE: -	
9. TOTAL DEPTH OF HOLE: 16'		18. TOTAL CORE RECOVERY FOR BORING: %	
		ANDY GILCRIEST INSPECTOR	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0–1		grass & roots gravel			
	1–8		clay 10YR 6/4 lt yellowish brown dry low plasticity SAA 10YR 4/1 dark gray			
	8–9		peat 10YR 2/2 very dk brown			
	9–16		sandy clay 2.5Y 3/0 very dark gray dry loose low plasticity fine grain			

00074199

49DPT03 HOLE NO. 03

DRILLING LOG	DIVISION: Shaw E+I	INSTALLATION: LONGHORN AAP	SHEET 2 OF 2 SHEETS
1. PROJECT: MARC LHAAP		10. SIZE AND TYPE OF BIT: Geoprobe Macro-Core	
2. LOCATION (Coordinates or Station): Site 49		11. DATUM FOR ELEVATION SHOWN (TBM or MSL): –	
3. DRILLING AGENCY: Strata - Core		12. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 6610	
4. HOLE NO. (As shown on drawing title and file number): 49 DPT-03		13. OVERBURDEN SAMPLES: DISTURBED –	UNDISTURBED –
5. NAME OF DRILLER: Shane		14. TOTAL NUMBER CORE BOXES: –	
6. DIRECTION OF HOLE: ☑ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER: –	
7. THICKNESS OF OVERBURDEN: –		16. DATE HOLE: STARTED 10/7/08	COMPLETED 10/7/08
8. DEPTH DRILLED INTO ROCK: –		17. ELEVATION TOP OF HOLE: –	
9. TOTAL DEPTH OF HOLE: 16		18. TOTAL CORE RECOVERY FOR BORING: *	
		Andy Gilcrest INSPECTOR	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	13					
	14					
	15					
	16		too hard to probe/sample use point to advance hole to well depth could not get deeper than 16' bgs			

00074200

49DPT04 HOLE NO. 04

DRILLING LOG	DIVISION: Shaw E+I	INSTALLATION: Longhorn AAP	SHEET 1 OF 2 SHEETS
1. PROJECT: MARC LHAAP		10. SIZE AND TYPE OF BIT: Geoprobe Macro-Core	
2. LOCATION (Coordinates or Station): Site 49		11. DATUM FOR ELEVATION SHOWN (TBM or MSL): —	
3. DRILLING AGENCY: Strata-Core		12. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 6610	
4. HOLE NO. (As shown on drawing title and file number): 49DPT-04		13. OVERBURDEN SAMPLES: DISTURBED — UNDISTURBED —	
5. NAME OF DRILLER: Shane		14. TOTAL NUMBER CORE BOXES: —	
6. DIRECTION OF HOLE: ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.		15. ELEVATION GROUND WATER: —	
7. THICKNESS OF OVERBURDEN: —		16. DATE HOLE: STARTED 10/6/08 COMPLETED 10/6/08	
8. DEPTH DRILLED INTO ROCK: —		17. ELEVATION TOP OF HOLE: —	
9. TOTAL DEPTH OF HOLE: 22'		18. TOTAL CORE RECOVERY FOR BORING: 100 %	
		Andy Gilcriest INSPECTOR	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	1	..	silty clay 2.5Y 7/4 pale yellow dry loose trace organics			
	2					
	3					
	4		small peat layer			
	5					
	6		SAA			
	7					
	8		SAA			
	9					
	10		clay 10YR 3/1 very dark gray hard low plasticity			
	11					
	12					

00074201

49DPT04 HOLE NO. 04

DRILLING LOG	DIVISION: SHAW E+I	INSTALLATION: LONGHORN AAP	SHEET 2 OF 2 SHEETS
1. PROJECT: MARC LHAAP		10. SIZE AND TYPE OF BIT: Geoprobe Macro-Core	
2. LOCATION (Coordinates or Station): Site 49		11. DATUM FOR ELEVATION SHOWN (TBM or MSL): –	
3. DRILLING AGENCY: Strata-Core		12. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 6610	
4. HOLE NO. (As shown on drawing title and file number): 49DPT-04		13. OVERBURDEN SAMPLES: DISTURBED –	UNDISTURBED –
5. NAME OF DRILLER: Shane		14. TOTAL NUMBER CORE BOXES: –	
6. DIRECTION OF HOLE: ☑ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER: –	
7. THICKNESS OF OVERBURDEN: –		16. DATE HOLE: STARTED 10/6/08	COMPLETED 10/6/08
8. DEPTH DRILLED INTO ROCK: –		17. ELEVATION TOP OF HOLE: –	
9. TOTAL DEPTH OF HOLE: 22'		18. TOTAL CORE RECOVERY FOR BORING: 100 %	
		ANDY GILCRIEST INSPECTOR	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	13		SAA			
	14					
	15		SAA			
	16		Clayey sand 10YR 6/3 brown low plasticity loose moist			
	17					
	18					
	19					
	20		Clay 10YR 4/1 hard low plasticity dark gray slightly moist			
	21					
	22		Refusal - too hard to penetrate			

00074202

OFFICE	DRAWN BY		CHECKED BY	
Houston, TX	B. Lu	09/22/08	K. Everett	09/22/08

APPROVED BY	

FILE PATH: T:\DGIS\Longhorn\My WKSP\MXD\Kay Maps\LHAAP49_GWElev.mxd

Plot Date: 09/08

Shaw®

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

FIGURE X

GROUNDWATER ELEVATION CONTOUR MAP
LHAAP-49

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

00074203

Hole No. 49LWW01(S)

DRILLING LOG | DIVISION: USACE - Tulsa | INSTALLATION: LHAAP - Karnack, TX | SHEET 1 OF 2 SHEETS

1. PROJECT: LHAAP - Site 49
2. LOCATION (Coordinates or Station):
3. DRILLING AGENCY: GPI, Inc. - Austin, TX
4. HOLE NO. (As shown on drawing title and file number): 49WW01(S)
5. NAME OF DRILLER: José Contreras
6. DIRECTION OF HOLE: ☑ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: Penetrated 34.0 ft
8. DEPTH DRILLED INTO ROCK: N/A
9. TOTAL DEPTH OF HOLE: 24.0 Below Grade
10. SIZE AND TYPE OF BIT: 8" Auger Tooth Bit
11. DATUM FOR ELEVATION SHOWN (MSL or MSL):
12. MANUFACTURER'S DESIGNATION OF DRILL: CME-75 / 7¼" O.D. HSA / CME split spoon / 11" O.D. HSA
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 7 | UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES: N/A
15. ELEVATION GROUND WATER: –
16. DATE HOLE: STARTED 11-7-98 | COMPLETED 11-8-98
17. ELEVATION TOP OF HOLE: –
18. TOTAL CORE RECOVERY FOR BORING: N/A %
19. SIGNATURE OF INSPECTOR: [signature] C. Ike P.G.

ELEVATION a	DEPTH (Ft.) b	USC LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) Time g
	0	OL	6" DK gray-brown topsoil, abundant sand and roots - Wet		SS #1	1345 Commenced HSA pilot hole for 49WW01
	1	CL	- Silty clay/clayey silt - Lt. to med. gray, tan, yellowish-orange, and reddish-brown mottled, streaked and stained, some fine sand, plastic - Dry to Damp (Hard)	4.0'	0.0' to 4.0'	HNu reading in sampler = 0ppm (10.2 ev HNu PID)
	4	SM	- Sandy silt - DK gray, med. brown-gray and DK. greenish-gray - mottled and layered, fine grained sand, some sl. clayey - Moist (Soft)		SS #2	
	5			5.0'	4.0' to 9.0'	HNu Reading in sampler = 0ppm
	6		(fine sand content increasing with Depth)			
	9		- Sandy silt (some sl. clayey) Med. brown-gray, tan and yellowish-orange (mottled) some apparent layering (thin), fine grained sand - Moist to wet @ 13.5 (Soft)		SS #3	1355
	10			5.0'	9.0' to 14.0'	HNu Reading in sampler = 0ppm
	13	CL	- Silty clay/clayey silt Lt. to med. gray, med. blue-gray, and some greenish-gray (mottled) with some brown and yellowish orange layering. Some fine sand throughout some rust-colored staining, Sl. plastic - Damp (Med. Stiff)		SS #4	
	15			5.0'	14.0' to 19.0'	HNu Reading in sampler = 0ppm
	16		- Silty clay - Med. gray, med. brown-gray, and tan (mottled - and layered) abundant v. thin horiz. fine sand/silt lenses tr. to some fine sand, plastic, Damp (Hard)			
	19				SS #5	
	20					

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PROJECT: LHAAP | HOLE NO. 49WW01(S)

00074204

DRILLING LOG (Cont Sheet) ELEVATION TOP OF HOLE — Hole No. 49WW01(S)

PROJECT LHAAP — INSTALLATION LHAAP – Karnack, TX — SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) Time g
	21	SM	Sandy silt/same as silty sand - Med. to DK. gray and brown, with some DK. gray layering and mottling, fine grained sand (inc. with depth) sl. clayey, abundant V. thin horiz. fine sand lenses - Moist to sl. wet along V. thin fine sand lenses (med. dense) (No vis. H_2O in sample)	5.0'	A.0 to 24.0'	HNu Reading in soil gas = 8ppm
	25	CL-SM	Silty clay (thinly layered) with sandy silt (V. thin horiz. layers). fine grained sand, uniform thickness of horiz. layering - DK. gray to blue-gray, lighter gray along V. thin sand lenses - Damp in silty clay layers to sl. moist in fine sand lenses - (No vis. H_2O in sample)	5.0'	SS #6 24.0' to 29.0'	HNu Reading in sample = 0ppm
	30		Same as above with Darker gray/blue gray silty clay layering and thin sand lenses and layering @ 33.5' - Damp to sl. moist @ 33.5' No vis. water in samples	5.0'	SS #7 29.0' to 34.0'	HNu Reading in sample = 0ppm
	34		(stopped @ 1438 on 11-7-98) T.D.@ 34.0' Below grade in Hard DK. gray/blue gray silty clay with some sand) lenses. (Base of hole Dry @ T.D.)			1438 T.D. pilot hole @ 34' below grade, pulled up augers 5' to wait on water (Hole Dry @ T.D.)
	35					11-8-98 water @ 21.57' Below grade inside augers. - Drilled hole to 34.0' with 11" O.D. HSA. Pumped 49WW01(S) Monitoring Well Completion

- Bent. cement grout 14' to grade
- Sugar sand (20-40) 15' to 14'
- Bent. seal (Hole) 8' - to 15'
- Sugar sand (20-40) 19' to 18'
- Primary Sand Filterpack (16-30) 34' to 19'
- 10', #10 slot, 4" Screen 24'-34'
- T.D. hole (overdrill) 34.0'

ENG FORM 1836-A JUN 67 (ER 1110-1-1801) GPO 1980 OF-628-603 PROJECT LHAAP HOLE NO. 49WW01(S)

Hole No. 49WW02(S)

DRILLING LOG	DIVISION USACE - Tulsa	INSTALLATION LHAAP - Karnack, TX	SHEET 1 OF 2 SHEETS
1. PROJECT LHAAP Site 49		10. SIZE AND TYPE OF BIT 8" Auger tooth bit	
2. LOCATION (Coordinates or Station)		11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	
3. DRILLING AGENCY GPI, Inc. - Austin, TX		12. MANUFACTURER'S DESIGNATION OF DRILL CME-75 / 7 7/8" OD HSA / 5' CME cont. sampler	11" O.D. HSA
4. HOLE NO. (As shown on drawing title and file number) 49WW01(S)		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 5	UNDISTURBED 0
5. NAME OF DRILLER José Landeros		14. TOTAL NUMBER CORE BOXES N/A	
6. DIRECTION OF HOLE ☑ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER –	
7. THICKNESS OF OVERBURDEN Penetrated 24.0'		16. DATE HOLE: STARTED 11-6-98	COMPLETED 11-7-98
8. DEPTH DRILLED INTO ROCK N/A		17. ELEVATION TOP OF HOLE –	
9. TOTAL DEPTH OF HOLE 24.0' Below Grade		18. TOTAL CORE RECOVERY FOR BORING N/A %	
		19. SIGNATURE OF INSPECTOR Cika PG	

ELEVATION (44') a	DEPTH b	USC LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) Time g
	0	OL	DK. brown sandy topsoil, abundant roots - moist tough (possible fill)		SS #1	1550 commenced HSA 7 7/8" O.D. pilot hole for 49WW02(S)
	1	CL	- Silty clay - Lt. gray, tan, yellowish-orange, reddish-brown and some blue-gray mottled, streaked, and stained, some fine sand - Damp (V. stiff)	3.8'	0.0' to 4.0'	HNu Reading @ Auger = 0ppm (10.2 eV PID calibrated to isobutylene)
	2					
	3					
	4		- Silty clay/Clayey silt - V. Light gray to med. gray and tan (mottled), trace to some fine sand - Dry to Damp (Hard)		SS #2	
	5			4.9'	4.0' to 9.0'	HNu reading in sample: 0ppm
	6					
	7					
	8					
	9		- Silty clay/clayey silt - Lt. to med gray, Lt. to DK brown, yellowish-orange and tan (mottled) (layered), some within horiz. fine sand/silt lenses (horiz.), some fine sand - Damp (V. stiff to hard) (some Sl. moist thin zones in more plastic clays)		SS #3	
	10			4.8'	9.0' to 14.0'	HNu reading in sample: 0ppm
	11					
	12					
	13					
	14					
	15				SS #4	
	16	SM	- Silty sand - med. brown-gray fine grained sand, some Sl. clayey - Moist to wet (soft)	5.0'	14.0' to 19.0'	HNu Reading in sample: 0ppm
	17					
	18	SP	- Sand - Lt. to med. brown-gray fine grained, trace to some silt, some layering - moist to wet (soft)			
	19					
	20	SM CL	- Sandy silt - Med. brown-gray and yellowish-orange - mottled and layered - Moist tough (soft)		SS #5	

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PROJECT LHAAP

HOLE NO. 49WW02(S)

00074206

DRILLING LOG (Cont Sheet) ELEVATION TOP OF HOLE — **Hole No.** 49WW02 (S)

PROJECT LHAAP — INSTALLATION LHAAP - Karnack, TX — SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) Time g
	21	SM	- Silty clay / Clayey silt - med brown - gray (mottled), some fine sand, sl. plastic & moist to wet (soft) and saturated		19.0' to 24.0	
	22		- Sandy silt - Lt gray, tan and yellowish orange (mottled and layered), some sl. clayey fine grained sand - moist (soft). (clay content increasing)	5.0'		HNu Reading: in sample: ppm
	23	CL	- Silty clay - Lt. brown, Lt. gray, and tan (mottled), trace to some fine sand, plastic - Damp (Stiff)			
	24		T.D. @ 24.0' in Silty clay (Damp)			T.D. @ 1523 & 7 1/8" HSA
	25					Pulled up augers 2 ft covered auger head. Will let sit overnite (bottom of hole dry @ T.D.)
						11-7-98
						0730 - W.L. @ 17.5' below grade inside augers.
						- Pulled Augers
						- Overdrilled hole to 24.0' below grade with 11" O.D. plugged HSAs. 49WW02 monitoring well completion
						- Bent./cement grout 7' to grade
						- Sugar sand (30-70) 8' to 7'
						- Bent. seal (Hyd) 11' to 8'
						- Sugar sand (30-70) 12' to 11'
						- Primary sand filterpack (16-30) 24' to 12'
						- 10', #10 slot, 4", SS screen 24' to 14'
						- T.D. (overdrill hole) 24.0'

ENG FORM 1836-A JUN 67 (ER 1110-1-1801) GPO 1980 OF - 626-603

PROJECT LHAAP — HOLE NO. 49WW02 (S)

00074207

Hole No. 49WW03(S)

DRILLING LOG	DIVISION USACE - Tulsa	INSTALLATION LHAAP - Karnack, TX	SHEET 1 OF 2 SHEETS
1. PROJECT LHAAP		10. SIZE AND TYPE OF BIT 8" Auger Bit	
2. LOCATION (Coordinates or Station)		11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	
3. DRILLING AGENCY GPI, Inc. - Austin, TX		12. MANUFACTURER'S DESIGNATION OF DRILL CME-75 / 7 7/8" O.D. HSA / 3 CME cont. sampler	/ 11" O.D. 1 1/8 I.D.
4. HOLE NO. (As shown on drawing title and file number)	49WW03	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 7	UNDISTURBED 0
5. NAME OF DRILLER Jose Landeros		14. TOTAL NUMBER CORE BOXES N/A	
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER —	
7. THICKNESS OF OVERBURDEN Penetrated 34.0'		16. DATE HOLE STARTED 11-6-98	COMPLETED 11-6-98
8. DEPTH DRILLED INTO ROCK N/A		17. ELEVATION TOP OF HOLE —	
9. TOTAL DEPTH OF HOLE 34.0' Below grade		18. TOTAL CORE RECOVERY FOR BORING N/A %	
		19. SIGNATURE OF INSPECTOR Dave Ahn PG Dave Cika	

ELEVATION a	DEPTH (Ft) b	USC LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	1	FILL	Dark brown topsoil, some roots, with med. to coarse gravel - Moist (Apparent end of fill 1.2')		SS #1	Commenced HSA @ 7 7/8" O.D. Augers @ 0810 (pilot hole)
	2	CL	- Silty clay - Lt. to med. gray, yellowish-orange, tan, brown, and reddish-orange mottled streaked, and stained, some fine sand - Damp to moisy	4.0'	0.0' to 4.0'	HNu Reading in Sample = 0 ppm
	3	SM	- Silty sand - med to dk brown/gray, fine grained sand - moist			
	4	CL	- clayey silt - Med. brown and reddish-brown, fine grained sand, cl plastic - Damp		SS #2	
	5	SM	- Sandy silt - Lt. to med gray, yellowish-orange, and tan mottled, streaked and stained, fine grained sand throughout non-plastic, some sl. clayey - Dry to Damp	5.0'	4.0' to 9.0'	HNU Reading in Sample = ppm
	6					
	7					
	8					
	9		- Sandy silt - Lt. gray mottled, some sl. clayey, fine grained sand - Damp to sl. moist (Non-plastic)		SS #3	
	10		(clay content increasing)		9.0' to 14.0'	
	11			5.0'		HNu Reading in Sample = ppm
	12	CL	- Silty clay - Med. gray to greenish-gray, yellowish-orange and tan (mottled), some dark reddish-brown gravel fragments, some fine sand, some os clayey silt, some fine sand - Moist			
	13					
	14		- Silty clay/clayey silt - Lt. to med. gray, some greenish-gray, tan, and yellowish-orange; mottled and layered, abundant v. thin horiz. fine sand/silt lenses, plastic, some fine sand throughout - breaks along sample v. thin lenses, some black "root like" structures - Dry to moist		SS #4	
	15				14.0' to 19.0'	
	16			5.0'		HNu Reading in Sample = ppm
	17					
	18					
	19		- clayey silt - Lt. to Dk gray, greenish-gray, and tan (mottled) abundant v. thin horiz. fine sand/silt lenses, sl. plastic - Dry to Damp		SS #5	
	20					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

(TRANSLUCENT)

PROJECT LHAAP | HOLE NO. 49WW03(S)

00074208

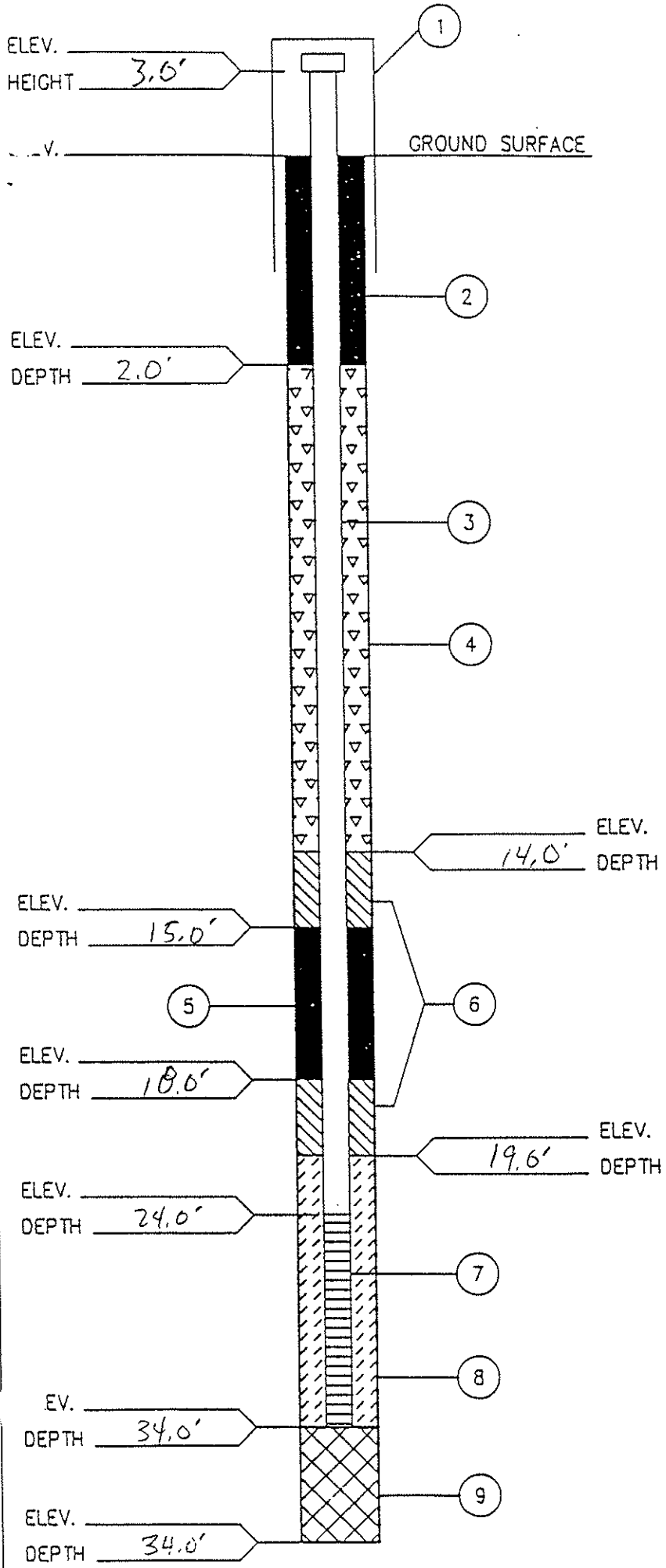
DRILLING LOG (Cont Sheet) | ELEVATION TOP OF HOLE | Hole No. 49WWW03(S)

PROJECT LHAAP | INSTALLATION Karnack TX | SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH (ft) b	USC LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOV-ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	21	CL	- Clayey silt (Same as Sl. sandy silt) DK gray, tan, med gray/greenish gray, thin layering color, abundant V. thin fine sand/silt lenses, sl. plastic - Dry to Damp (stiff)	5.0'	(9.0' to 24.0'	HNu Reading in sampler 0ppm
	22					
	23					
	24		- Clayey silt - DK gray, some V. thin fine sand/silt lenses - fine grained sand throughout - Dry to Damp (stiff)			0857
	25				SS #6	
	26	SM	- Sandy silt - med to DK brown/gray, some DK brown black streaking and staining, fine grained sand - Moist @ 26.5' below grade (soft)	5.0'	24.0' to 29.0'	HNu Reading in sampler 0ppm
	27					
	28		(fine sand content increasing)			
	29				SS #7	
	30					
	31	SP SM	- Sand/silty sand - med. gray/greenish-gray, fine grained sand, some DK gray thin layering - Moist to wet (soft)	5.0'	29.0' to 34.0'	HNU Reading in sampler = 0ppm
	32	CL	- Clayey silt, DK gray, some as sandy silt, fine grained sand throughout - Moist (soft)			Stopped @ 34' Bdowgrade @ 0912, pulled augers up 5.0' - Wait on water from SP Zone.
	33	COAL CL	- Clayey Lignite coal seam (thin) - Clayey silt - (Med gray and blue-grey, abundant V. thin horiz. fine sand/silt lenses, fine sand throughout, sl. plastic - Dry to Damp (V. stiff)			- 0956 - Some mud on tape @ base of hole! Still waiting - Water @ 33.8' @ 1034
	34					
	35		T.D. of hole = 34.0' Below grade in V. stiff Dry to Damp clayey silt (Hole essentially Dry @ T.D.)			49WWW03(S) well completion - Bent. grout 16' to Grade - Sugar Sand (30-70) 17'-16' - Bent. Seal (Hyd.) 20'-17' - Sugar Sand (30-70) 21'-20' - Primary Silica Sand (16-30) 34'-21' - 10' SS, #10 slot screen, 34'-24' - T.D hole 34.0' (over drill)

ENG FORM 1836-A JUN 67 (ER 1110-1-1801) GPO 1980 OF-626-603 | PROJECT LHAAP | HOLE NO. 49WWW03(S)

00074209



MONITORING WELL CONSTRUCTION INFORMATION

JOB. NO. 000187

BORING/WELL NO. 490W01(S)

DATE 11-7-98 to 11-8-98

CHIEF/UNIT DC/CME-75

1. PROTECTIVE CASING YES NO

   LOCKING YES NO

2. TYPE OF SURFACE SEAL (IF INSTALLED)
   Cement

3. SOLID PIPE TYPE Stainless Steel

   SOLID PIPE LENGTH 27.0 ft.

   JOINT TYPE SLIP/GLUED/THREADED

4. TYPE OF BACKFILL Bent./Cement Grout

   HOW INSTALLED – TREMIE Pipe

   FROM SURFACE

5. TYPE OF LOWER SEAL (IF INSTALLED)
   Bentonite (Hydrated)

6. TYPE OF SECONDARY FILTER PACK
   Sand (30-Fc)

7. SCREEN TYPE Stainless steel

   SCREEN LENGTH 10.0 ft.

   SLOT SIZE #10 Machine in.

   SCREEN DIAMETER 4 in. (ID)

8. TYPE OF PRIMARY FILTER PACK
   Primary Sand (16-30)

9. TYPE OF BACKFILL Primary Sand

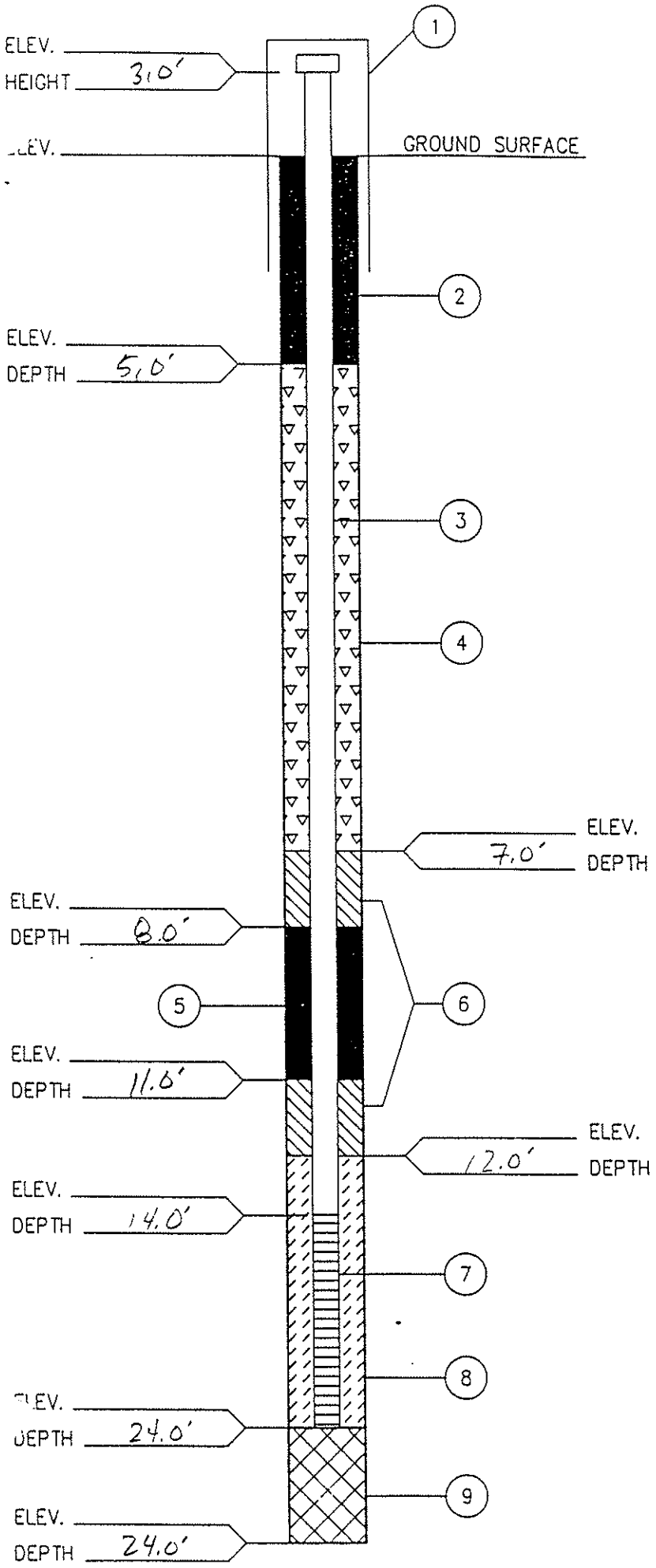
10. DRILLING METHOD HSA

WATER LEVEL _____ DATE _____

*ALL DEPTHS MEASURED FROM GROUND SURFACE

Sverdrup
ENVIRONMENTAL

00074210



MONITORING WELL CONSTRUCTION INFORMATION

JOB. NO. 000187

BORING/WELL NO. 49WW02(S)

DATE 11-7-98

CHIEF/UNIT DC/CME-75

1. PROTECTIVE CASING YES NO

   LOCKING YES NO

2. TYPE OF SURFACE SEAL (IF INSTALLED) Cement

3. SOLID PIPE TYPE Stainless Steel

   SOLID PIPE LENGTH 15.0' ft.

   JOINT TYPE SLIP/GLUED/THREADED

4. TYPE OF BACKFILL Bent./Cement Grout

   HOW INSTALLED - TREMIE pipe

   FROM SURFACE

5. TYPE OF LOWER SEAL (IF INSTALLED) Bentonite (Hydrated)

6. TYPE OF SECONDARY FILTER PACK Sand (30-70)

7. SCREEN TYPE Stainless Steel

   SCREEN LENGTH 10.0 ft.

   SLOT SIZE #10 Machine in.

   SCREEN DIAMETER 4.0 in. (I.D.)

8. TYPE OF PRIMARY FILTER PACK Primary Sand (16-30)

9. TYPE OF BACKFILL Primary Sand

10. DRILLING METHOD HSA

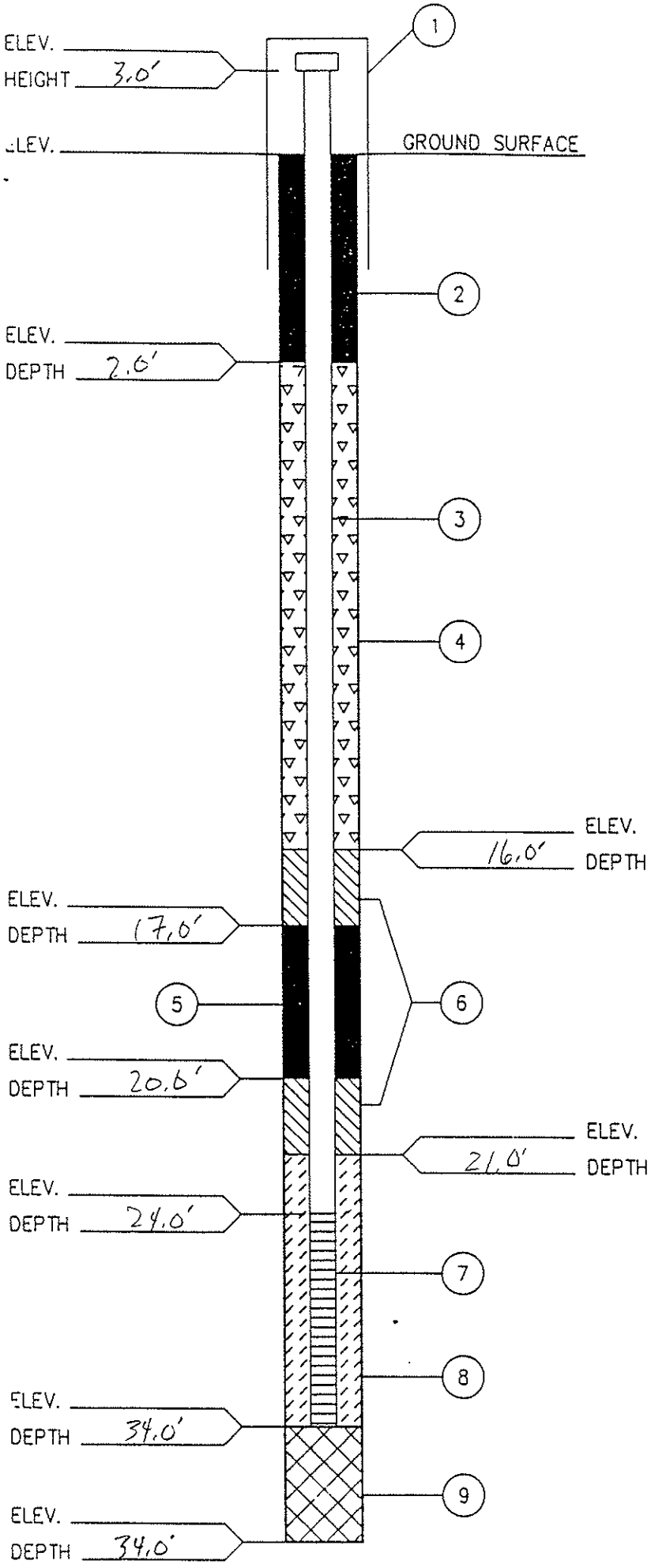
WATER LEVEL _____ DATE _____

*ALL DEPTHS MEASURED FROM GROUND SURFACE

Sverdrup

ENVIRONMENTAL

00074211



MONITORING WELL CONSTRUCTION INFORMATION

JOB. NO. 000187

BORING/WELL NO. 49WW03(S)

DATE 11-6-98

CHIEF/UNIT DC / CME-75

1. PROTECTIVE CASING YES NO

   LOCKING YES NO

2. TYPE OF SURFACE SEAL (IF INSTALLED)
   Cement

3. SOLID PIPE TYPE Stainless Steel

   SOLID PIPE LENGTH 27.0' ft.

   JOINT TYPE SLIP/GLUED/THREADED

4. TYPE OF BACKFILL Bent/Cement Grout

   HOW INSTALLED - TREMIE pipe
   FROM SURFACE

5. TYPE OF LOWER SEAL (IF INSTALLED)
   Bentonite (Hydrated)

6. TYPE OF SECONDARY FILTER PACK
   Sand (30-7c)

7. SCREEN TYPE stainless Steel

   SCREEN LENGTH 10.0 ft.

   SLOT SIZE #10 Machine in.

   SCREEN DIAMETER 4 in. (ID)

8. TYPE OF PRIMARY FILTER PACK
   Primary Sand (16-30)

9. TYPE OF BACKFILL Primary Sand

10. DRILLING METHOD HSA

WATER LEVEL _____ DATE _____

*ALL DEPTHS MEASURED FROM GROUND SURFACE

Sverdrup
ENVIRONMENTAL

00074212

HOLE NO. 49MW04

BORING LOG	DIVISION Federal	INSTALLATION Longhorn AAP	SHEET 1 OF 1 SHEETS
1. PROJECT 117591		9. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL	
2. LOCATION LHAAP-49		10. MANUFACTURER'S DESIGNATION OF DRILL FOREMOST 500 HSA	
3. DRILLING AGENCY ETTL		11. OVERBURDEN SAMPLES	DISTURBED — UNDISTURBED —
4. HOLE NO. (As shown on drawing title and file number) 49WW04		12. TOTAL NUMBER CORE BOXES —	
		13. ELEVATION GROUND WATER 11/08	
5. NAME OF DRILLER Tommy Cook		14. DATE HOLE STARTED ~~10/~~ 11/07/08	COMPLETED
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED 0 DEG. FROM VERT.		15. ELEVATION TOP OF HOLE NA	
7. TOTAL DEPTH OF HOLE 35'		16. TOTAL CORE RECOVERY FOR BORING 100 %	
8. SIZE AND TYPE OF BIT 10" hollow-stem		17. LOGGED BY [illegible]	QC [illegible]

PID (ppm) a	DEPTH b	USCS c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	SAMPLE f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			See Previous Logs (49MW03)			
	24		Clay, sand, organics, dense, no plasticity, dry, gray			
	25					
0.0	26			100%		
	27					
	28					
	29					
	30					
	31					
0.0	32			100%		
	33					
	34					
	35		END OF Boring @ 35' bgs			

00074213

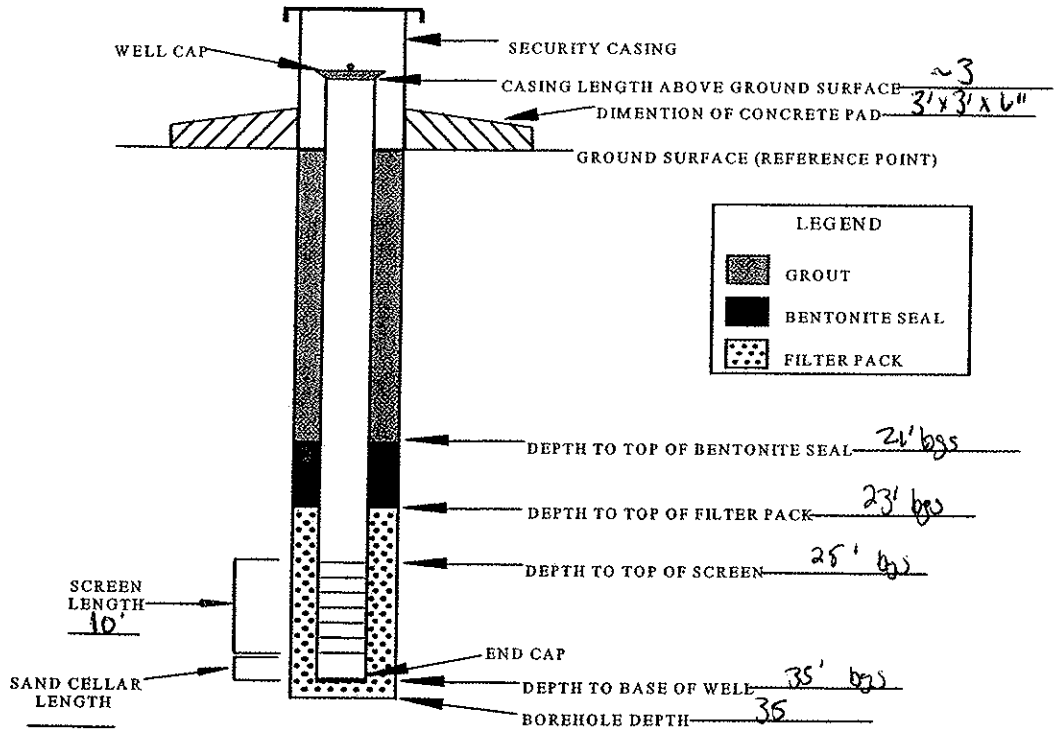
49WW04

WELL COMPLETION FORM (Stickup or Above Grade Completion Well)

FIELD REPRESENTATIVE: Allen Willmore
DRILLING CONTRACTOR: ETIC
DRILLING TECHNIQUE: H.S.A.
AUGER SIZE AND TYPE: 8" I.D.
BOREHOLE IDENTIFICATION: 49WW04
BOREHOLE DIAMETER: 8"
WELL IDENTIFICATION: 49WW04
WELL CONSTRUCTION START DATE: 11/18/08
WELL CONSTRUCTION COMPLETE DATE: 11/18/08
SCREEN MATERIAL: sch. 40 PVC
SCREEN DIAMETER: 4"
STRATUM-SCREENED INTERVAL (FT): 10'
CASING MATERIAL: sch. 40 PVC
CASING DIAMETER: 4"

TYPE OF FILTER PACK: Silica Sand
GRADIATION: 20/40
AMOUNT OF FILTER PACK USED: 9-bags 50lbs
TYPE OF BENTONITE: pellets
AMOUNT BENTONITE USED: 1-50lb bucket
TYPE OF CEMENT: portald cement
AMOUNT CEMENT USED: NR
GROUT MATERIALS USED: Bent.
DIMENSIONS OF SECURITY CASING: 8"x8"x~3'
TYPE OF WELL CAP: plugging cap
TYPE OF END CAP: sch. 40 PVC
COMMENTS:

SPECIAL CONDITIONS
(describe and draw)



NOT TO SCALE

INSTALLED BY: Doug Hinds/Billy Rogers INSTALLATION OBSERVED BY: Allen Willmore
DISCREPANCIES: none

00074214

HOLE NO. 49WW05 5 (A)

DRILLING LOG

DIVISION: FEDERAL

INSTALLATION: Longhorn

SHEET 1 OF SHEETS

1. PROJECT: LHAAP
2. LOCATION (Coordinates or Station): Karnack, Texas
3. DRILLING AGENCY: ETTL
4. HOLE NO. (As shown on drawing title and file number): 49WW05
5. NAME OF DRILLER: Doug Hinds
6. DIRECTION OF HOLE: ☑ VERTICAL ☐ INCLINED 0° DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 32'
8. DEPTH DRILLED INTO ROCK: 0'
9. TOTAL DEPTH OF HOLE: 32'
10. SIZE AND TYPE OF BIT: 8" I.D. HSA
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL: 5500 CME
13. OVERBURDEN SAMPLES: DISTURBED ☐ UNDISTURBED ☑
14. TOTAL NUMBER CORE BOXES: NR
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED 11/7/08 COMPLETED 11/7/08
17. ELEVATION TOP OF HOLE: NR
18. TOTAL CORE RECOVERY FOR BORING: NR %

ALLEN WILLMORE — INSPECTOR

ELEVATION PID (a)	DEPTH (b)	LEGEND (c)	CLASSIFICATION OF MATERIALS (Description) (d)	% CORE RECOVERY (e)	BOX OR SAMPLE NO. (f)	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) (g)
0.0	0					
0.0						
0.0		CL	CLAY, SILT, moist, soft, medium plasticity, yellowish-red			
0.0	5					
0.0						
0.0						
0.0			SAND, CLAYEY, fine-grained, moist, grayish-brown, soft, loose			
0.0	10	SC				
0.0			- becomes brown			
0.0						

DRILLING LOG (Cont Sheet) | ELEVATION TOP OF HOLE NR | Hole No. 49WW05

PROJECT: LHAAP - MARC | INSTALLATION: Longhorn | SHEET 2 OF 3 SHEETS

ELEVATION PID (a)	DEPTH (b)	LEGEND (c)	CLASSIFICATION OF MATERIALS (Description) (d)	% CORE RECOVERY (e)	BOX OR SAMPLE NO. (f)	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) (g)
0.0			same as above			
	15	SC				
0.0			Sand, silty, pale brown, fine grained, dry, loose			
0.0		SM				
	20		▽			
0.0						
0.0			- becomes more moist			
	29					
0.0			- becomes wet			
0.0			CLAY, silty, grayish brown, moist, stiff, low plasticity			
		CL				
0.0						

DRILLING LOG (Cont Sheet)

ELEVATION TOP OF HOLE: NR

Hole No. 49MW05

PROJECT: LHAAP - MARC

INSTALLATION: Longhorn

SHEET 3 OF 3 SHEETS

ELEVATION (MSL) a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
0.0	30	CL	Same as above			
0.0	32		End of boring @ 32' bgs			

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MAR 71

00074217

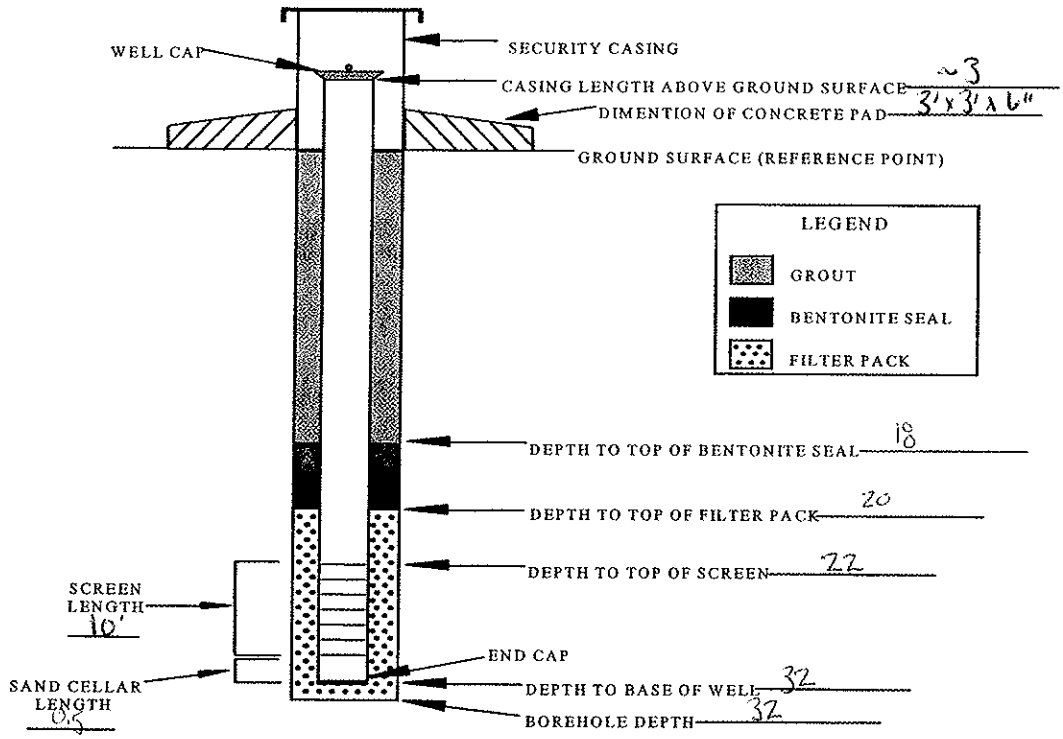
49WWW05

WELL COMPLETION FORM (Stickup or Above Grade Completion Well)

FIELD REPRESENTATIVE: Allen Willmore
DRILLING CONTRACTOR: ETTL
DRILLING TECHNIQUE: H.SA.
AUGER SIZE AND TYPE: 8" I.D.
BOREHOLE IDENTIFICATION: 49WWW05
BOREHOLE DIAMETER: 8"
WELL IDENTIFICATION: 49WWW05
WELL CONSTRUCTION START DATE: 11/7/08
WELL CONSTRUCTION COMPLETE DATE: 11/10/08
SCREEN MATERIAL: sch. 40 PVC
SCREEN DIAMETER: 4"
STRATUM-SCREENED INTERVAL (FT):
CASING MATERIAL: sch. 40 PVC
CASING DIAMETER: 4"

TYPE OF FILTER PACK: Silica Sand
GRADIATION: 20/40
AMOUNT OF FILTER PACK USED: 9-bags 50lbs
TYPE OF BENTONITE: pellets
AMOUNT BENTONITE USED: 1- 50lb bucket
TYPE OF CEMENT: portland cement
AMOUNT CEMENT USED: NR
GROUT MATERIALS USED: Dent.
DIMENSIONS OF SECURITY CASING: 8"x8"x~3'
TYPE OF WELL CAP: plug in csg
TYPE OF END CAP: sch. 40 PVC
COMMENTS:

SPECIAL CONDITIONS
(describe and draw)



NOT TO SCALE

INSTALLED BY: Doug Hinds/Billy Rogers INSTALLATION OBSERVED BY: Allen Willmore
DISCREPANCIES: none

00074218

HOLE NO. 49WW06

DRILLING LOG

DIVISION: FEDERAL

INSTALLATION: Longhorn

SHEET 1 OF 1 SHEETS

1. PROJECT: LHAAP
2. LOCATION (Coordinates or Station): Karnack, Texas
3. DRILLING AGENCY: ETTL
4. HOLE NO. (As shown on drawing title and file number): 49WW06
5. NAME OF DRILLER: Doug Hinds
6. DIRECTION OF HOLE: ☑ VERTICAL ☐ INCLINED 0° DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 34'
8. DEPTH DRILLED INTO ROCK: 0'
9. TOTAL DEPTH OF HOLE: 34'
10. SIZE AND TYPE OF BIT: 8" I.D. HSA
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL: 5500 CME
13. OVERBURDEN SAMPLES: DISTURBED ☐ UNDISTURBED ✓
14. TOTAL NUMBER CORE BOXES: NR
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED 11/7/08 COMPLETED 11/7/08
17. ELEVATION TOP OF HOLE: NR
18. TOTAL CORE RECOVERY FOR BORING: NR %

INSPECTOR: Allen Willmore

~~ELEVATION~~ PID (a)	DEPTH (b)	LEGEND (c)	CLASSIFICATION OF MATERIALS (Description) (d)	% CORE RECOVERY (e)	BOX OR SAMPLE NO. (f)	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) (g)
			THIS WELL WAS COMPLETED @ 34' bgs and was installed as a replacement well for 49WW03. Please see boring log 49WW03 for lithological information.			
			END OF BORING @ 34' bgs.			

00074219

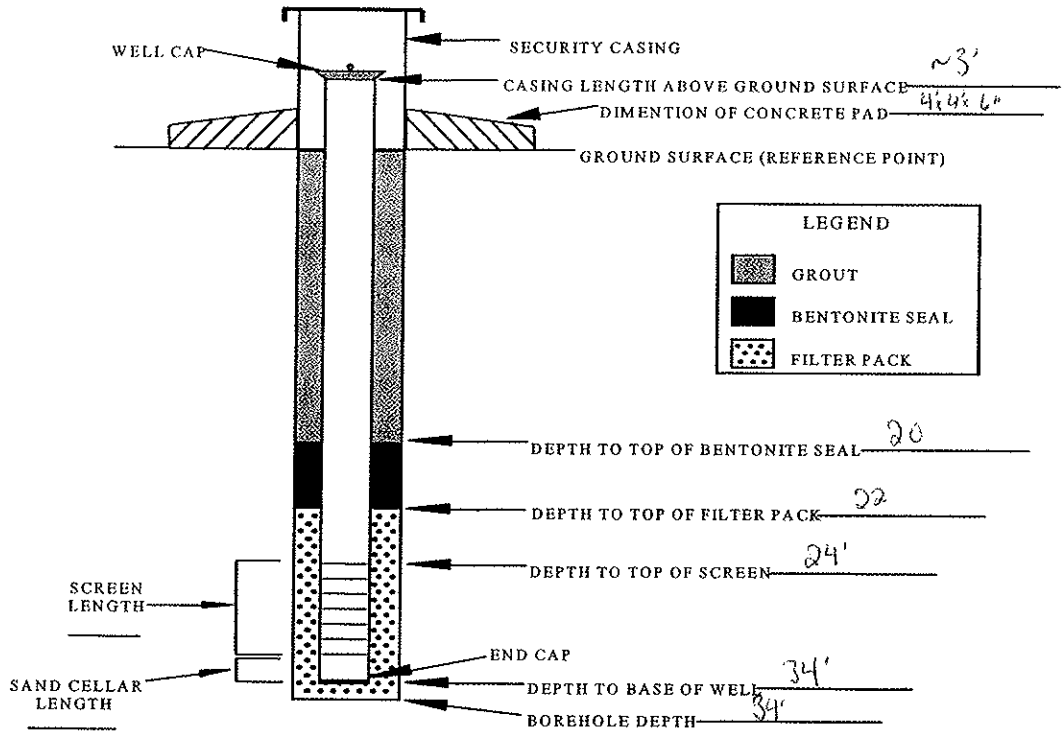
49WW06

WELL COMPLETION FORM (Stickup or Above Grade Completion Well)

FIELD REPRESENTATIVE: Allen Willmer
DRILLING CONTRACTOR: ETTC
DRILLING TECHNIQUE: HSA
AUGER SIZE AND TYPE: 10"
BOREHOLE IDENTIFICATION: 49WW06
BOREHOLE DIAMETER: 4"
WELL IDENTIFICATION: 49WW06
WELL CONSTRUCTION START DATE: 11/7/08
WELL CONSTRUCTION COMPLETE DATE: 11/10/08
SCREEN MATERIAL: Sch. 40 PVC
SCREEN DIAMETER: 4"
STRATUM-SCREENED INTERVAL (FT): 10'
CASING MATERIAL: Sch. 40 PVC
CASING DIAMETER: 4"

TYPE OF FILTER PACK: Silica Sand
GRADIATION: 20/40
AMOUNT OF FILTER PACK USED:
TYPE OF BENTONITE: bentonite pellets
AMOUNT BENTONITE USED:
TYPE OF CEMENT: portland cement
AMOUNT CEMENT USED:
GROUT MATERIALS USED: bentonite
DIMENSIONS OF SECURITY CASING: 8" x 8" x 5'
TYPE OF WELL CAP: plugging cap
TYPE OF END CAP: SR 40 PVC
COMMENTS:

SPECIAL CONDITIONS
(describe and draw)



NOT TO SCALE

INSTALLED BY: ~~A. Willmer~~ Billy Regan INSTALLATION OBSERVED BY: Allen Willmer

DISCREPANCIES: See Boring log 49WW03 for lithology

00074220

HOLE NO. 49WW07

BORING LOG	DIVISION Federal	INSTALLATION Longhorn AAP	SHEET 1 OF 2 SHEETS
1. PROJECT 117591		9. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL	
2. LOCATION LHAAP - 49		10. MANUFACTURER'S DESIGNATION OF DRILL 8" ID. HSA	
3. DRILLING AGENCY ETTL		11. OVERBURDEN SAMPLES	DISTURBED — / UNDISTURBED —
4. HOLE NO. (As shown on drawing title and file number) 49WW07		12. TOTAL NUMBER CORE BOXES —	
		13. ELEVATION GROUND WATER	
5. NAME OF DRILLER Tommy Cook		14. DATE HOLE STARTED 11/07/08	COMPLETED 11/07/08
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED 0 DEG. FROM VERT.		15. ELEVATION TOP OF HOLE NA	
7. TOTAL DEPTH OF HOLE 32'		16. TOTAL CORE RECOVERY FOR BORING 100 %	
8. SIZE AND TYPE OF BIT 10" hollow stem		17. LOGGED BY Adler	QC KR

PID (ppm) a	DEPTH b	USCS c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	SAMPLE f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	14		See Previous Log			
			Sand, clay, organics, friable, dry, brown			
	15		Clay, sand, organics, soft, no plasticity, dry, brown mottled			
0.0	16		lignite - organic, dark	100%		
	17		Sand, clay, fine to very fine grained, dry, brown			
	18		Clay, sand, organic, dense, no plasticity, dry, gray			
	19					
	20		- becomes very dense			
	21					
0.0	22			100%		
	23					
	24					
	25					

DRILLING LOG (Cont Sheet)

ELEVATION TOP OF HOLE: NA

Hole No. 49WW07

PROJECT: 117591

INSTALLATION: Longhorn AAP

SHEET 2 OF 2 SHEETS

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
PLD	b	c	d	e	f	g
	26		Same as above			
	27					
0.0				100%		
	28					
	29					
	30					
0.0				100%		
	31					
	32		end of boring @ 32' bgs			

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MAR 71

PROJECT

HOLE NO.

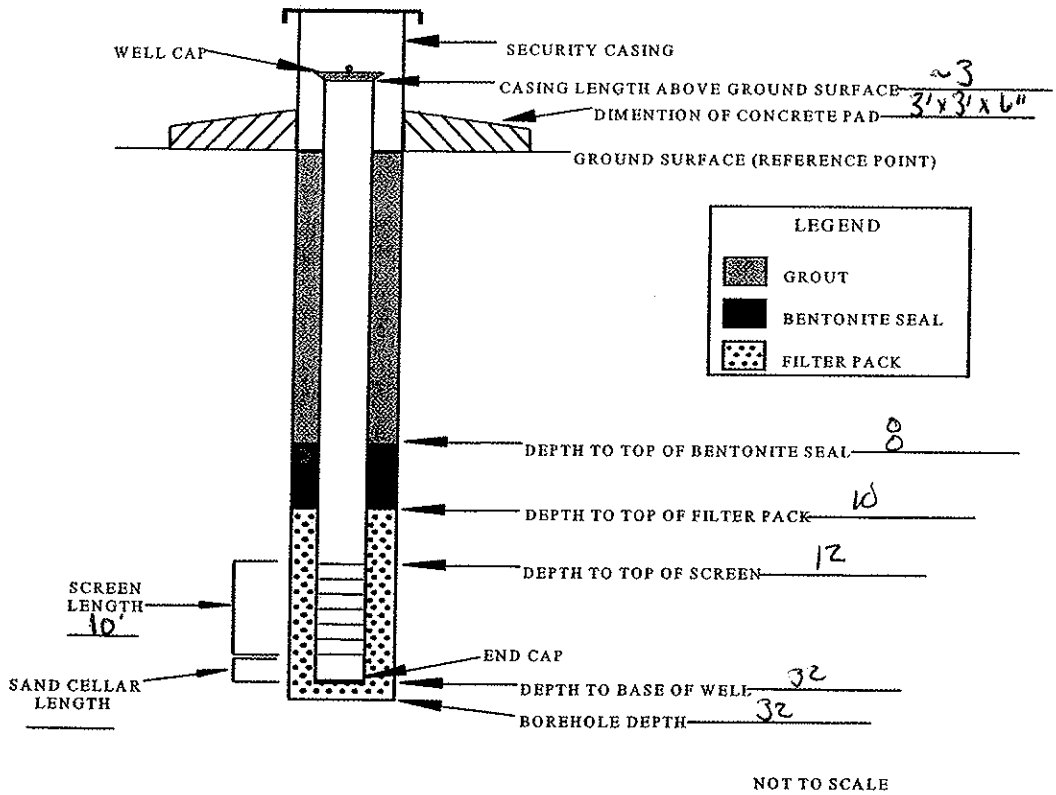
00074222
49WW07

WELL COMPLETION FORM (Stickup or Above Grade Completion Well)

FIELD REPRESENTATIVE: Allen Willmore
DRILLING CONTRACTOR: ETTL
DRILLING TECHNIQUE: H.S.A.
AUGER SIZE AND TYPE: 8" I.D.
BOREHOLE IDENTIFICATION: 49WW07
BOREHOLE DIAMETER: 8"
WELL IDENTIFICATION: 49WW07
WELL CONSTRUCTION START DATE: 11/7/08
WELL CONSTRUCTION COMPLETE DATE: 11/7/08
SCREEN MATERIAL: sch. 40 PVC
SCREEN DIAMETER: 4"
STRATUM-SCREENED INTERVAL (FT): 20'
CASING MATERIAL: sch. 40 PVC
CASING DIAMETER: 4"

TYPE OF FILTER PACK: Silica Sand
GRADIATION: 20/40
AMOUNT OF FILTER PACK USED: 9-bags 50lbs
TYPE OF BENTONITE: pellets
AMOUNT BENTONITE USED: 1- 50lb bucket
TYPE OF CEMENT: portald cement
AMOUNT CEMENT USED: NR
GROUT MATERIALS USED: Bent.
DIMENSIONS OF SECURITY CASING: 8"x8"x~3'
TYPE OF WELL CAP: plugging cap
TYPE OF END CAP: sch. 40 pvc
COMMENTS:

SPECIAL CONDITIONS
(describe and draw)



NOT TO SCALE

INSTALLED BY: Doug Hinds/Billy Rogers INSTALLATION OBSERVED BY: Allen Willmore
DISCREPANCIES: none

00074223

HOLE NO. 49 WW/08

DRILLING LOG

DIVISION: FEDERAL

INSTALLATION: Longhorn

SHEET 1 OF 3 SHEETS

1. PROJECT: LHAAP
2. LOCATION (Coordinates or Station): Karnack, Texas
3. DRILLING AGENCY: ETTL
4. HOLE NO. (As shown on drawing title and file number): WW
5. NAME OF DRILLER: Doug Hinds
6. DIRECTION OF HOLE: ☑ VERTICAL ☐ INCLINED 0° DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: —
8. DEPTH DRILLED INTO ROCK: 0'
9. TOTAL DEPTH OF HOLE: 32'
10. SIZE AND TYPE OF BIT: 8" I.D. HSA
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL: 5500 CME
13. OVERBURDEN SAMPLES: DISTURBED ☐ UNDISTURBED ☑
14. TOTAL NUMBER CORE BOXES: NR
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED 11/12/08 COMPLETED 11/12/08
17. ELEVATION TOP OF HOLE: NR
18. TOTAL CORE RECOVERY FOR BORING: NR %

INSPECTOR: Allen Willmore

ELEVATION PID (a)	DEPTH (b)	LEGEND (c)	CLASSIFICATION OF MATERIALS (Description) (d)	% CORE RECOVERY (e)	BOX OR SAMPLE NO. (f)	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) (g)
0.0			CLAY, Silty, dry, loose, organics (roots), Pale yellow.			
0.0		CL				
0.0			-2" peat seam			
0.0	5					
0.0						
0.0						
0.0	10		CLAY, Sandy, hard, very dark, low Plasticity			
0.0		CL				

DRILLING LOG (Cont Sheet)	ELEVATION TOP OF HOLE NR	Hole No. 49WW108
PROJECT LHAAP-MARC	INSTALLATION Longhorn	SHEET 2 OF 3 SHEETS

ELEVATION P1D (a)	DEPTH (b)	LEGEND (c)	CLASSIFICATION OF MATERIALS (Description) (d)	% CORE RECOVERY (e)	BOX OR SAMPLE NO. (f)	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) (g)
		CL	same as above			
	15	SC	Sand, clayey, brown, dry to moist, low plasticity			
	20		CLAY, SANDY, hard, low plasticity, dark gray, slightly moist - dry			
	25					

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MAR 71

DRILLING LOG (Cont Sheet)	ELEVATION TOP OF HOLE NR	Hole No. 49WW108
PROJECT LHAAP - MARC	INSTALLATION Longhorn	SHEET 3 OF 3 SHEETS

ELEVATION FMD (a)	DEPTH (b)	LEGEND (c)	CLASSIFICATION OF MATERIALS (Description) (d)	% CORE RECOVERY (e)	BOX OR SAMPLE NO. (f)	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) (g)
0.0	30	CL	Same as above			
	32		END OF BORING @ 32' bgs			

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MAR 71

00074226

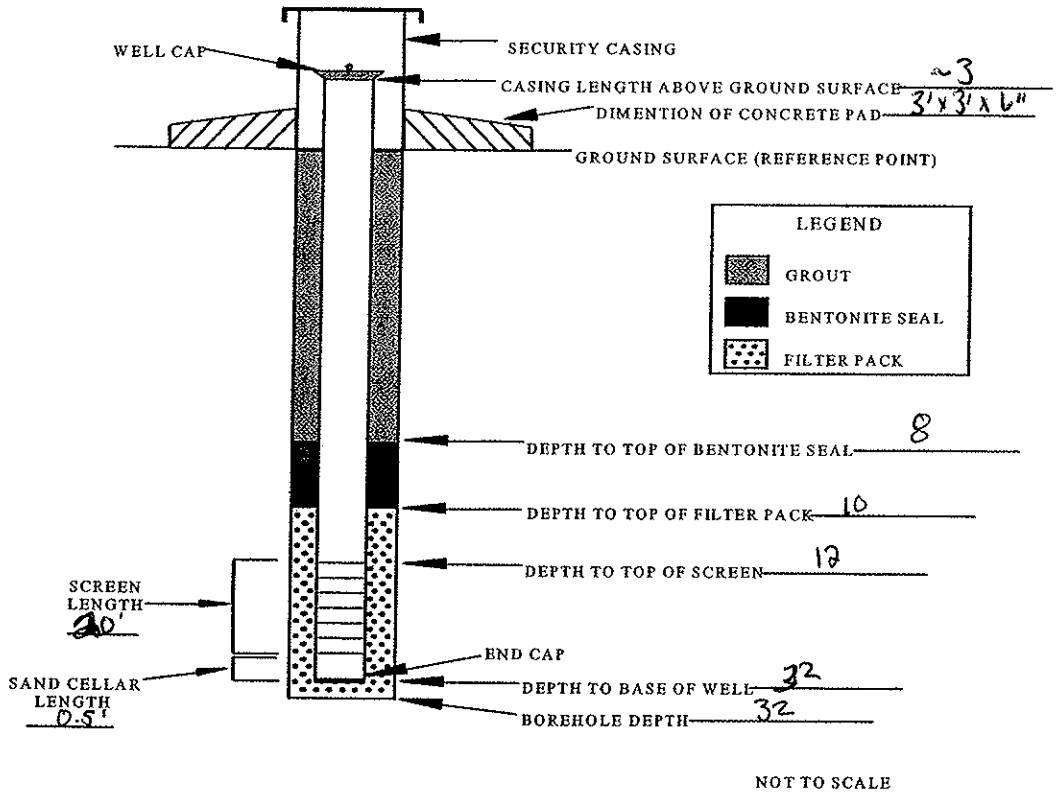
49WW08

WELL COMPLETION FORM (Stickup or Above Grade Completion Well)

FIELD REPRESENTATIVE: Allen Willmore
DRILLING CONTRACTOR: ETL
DRILLING TECHNIQUE: H.S.A.
AUGER SIZE AND TYPE: 8" I.D.
BOREHOLE IDENTIFICATION: WW
BOREHOLE DIAMETER: 8"
WELL IDENTIFICATION: WW
WELL CONSTRUCTION START DATE: 11/12/08
WELL CONSTRUCTION COMPLETE DATE: 11/12/08
SCREEN MATERIAL: sch. 40 PVC
SCREEN DIAMETER: 4"
STRATUM-SCREENED INTERVAL (FT): 20
CASING MATERIAL: sch. 40 PVC
CASING DIAMETER: 4"

TYPE OF FILTER PACK: Silica Sand
GRADIATION: 20/40
AMOUNT OF FILTER PACK USED: 9 bags 50lbs
TYPE OF BENTONITE: pellets
AMOUNT BENTONITE USED: 1 - 50lb bucket
TYPE OF CEMENT: portald cement
AMOUNT CEMENT USED: NR
GROUT MATERIALS USED: Bent.
DIMENSIONS OF SECURITY CASING: 8" x 8" x ~3'
TYPE OF WELL CAP: plugging cap
TYPE OF END CAP: sch. 40 pvc
COMMENTS:

SPECIAL CONDITIONS
(describe and draw)



NOT TO SCALE

INSTALLED BY: Doug Hinds/Billy Rogers INSTALLATION OBSERVED BY: Allen Willmore
DISCREPANCIES: none

GROUNDWATER SAMPLING FORM

Sheet 1 of 2

Operable Unit/Site ID: LHAAP-49
Project Name/#: Longhorn / 11759
Weather: cloudy, 50s

Sampling location ID: 49WW04
Sample ID: 49WW04-120308
Collection Time/Date: 10:15 12-03-08

Pump Installation

Pump installation crew: A. Willmore / A. Gilchrist
PID/FID reading (well head/background): 0.0
Casing diameter (inches): 4"
Total well Depth (ft. BTOC): ~35
Initial (pre-installation) DTW/time: 26.50
Final (after pump priming) DTW/time: NA
Free product (circle): LNAPL / DNAPL
Volume of water removed during priming (mL): NA
Discharge tube length (ft.): 38
Pneumatic Controller Tuning:
Initial air pressure = H (ft.) X 0.43 = NR psi

Installation date/beginning time: 12-03-08 0952
Installation date/completion time: 12-03-08 09:44
Screen Interval (ft. BTOC): 25 to 35
Pump intake depth (ft BTOC): 30'
Post-installation DTW/time: 26.50
Max. sustainable pump rate (mL/min): 100
Appearance of product: None
Discharge tube diameter (3/8" or 1/4"): 1/4"
Inlet reducer used (Y/N): N

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting									
Discharge Setting					NA				
Flow rate (mL/min)									

Purging

Purging/sampling crew: A. Willmore, A. Gilchrist
Purge date/beginning time: 12-03-08 09:48
Initial (pre-purging) DTW (ft. BTOC): 26.52
Calculated tubing + pump volume: NA
Pneumatic Controller Tuning:
Initial air pressure = H (ft.) X 0.43 = NR psi

PID/FID reading (well head/background): 0.0
Purge date/completion time: 12-03-08 10:25
Final (post-purging) DTW (ft. BTOC): 26.72
No. of tubing + pump volumes purged: NR

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting									
Discharge Setting					NA				
Flow rate (mL/min)									

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
09:53	26.72	100	0.5	18.51	3.365	7.05	-46.0	4.39	5.4
09:58	26.72	100	1.0	18.51	3.366	6.94	-35.2	3.91	0.0
10:03	26.72	100	1.5	18.51	3.361	6.93	-34.2	3.88	0.0
10:08	26.72	100	2.0	18.54	3.357	6.93	-32.8	3.91	0.0

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GROUNDWATER SAMPLING FORM

Page 2 of 2

49WW04

Water Quality Parameter Measurements (continued)

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)

12/3/08

Sampling

Sampling beginning time: 10:15 Sampling completion time: 10:20

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
10:25	26.72	100	3.5	18.55	3.334	6.93	-32.6	4.06	0.0

Sample Information

Sample ID: 49WW04-120308

Sample collection date/time: 12.03.08 10:15

Duplicate sample collected (Y/N): N

Duplicate sample ID: NA

Split sample collected (Y/N): N

Split sample ID: NA

COC No(s): NA

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers
Nitrates/Nitrites	353.2	1 x 500 mL HDPE			

Comments: Purged & Sampled w/ peristaltic pump

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; ft - feet; mL - milliliter; mv - millivolts

GROUNDWATER SAMPLING FORM

Sheet 1 of 2

Operable Unit/Site ID: LHAAP-49 | Sampling location ID: 49WW05
Project Name/#: 117591 / Longhorn | Sample ID: 49WW05-120208
Weather: clear, 60s | Collection Time/Date: 14:00 12-02-08

Pump Installation

Pump installation crew: A. Willmore / A. Gilchrist | Installation date/beginning time: 12/2/08 13:35
PID/FID reading (well head/background): 0.0 | Installation date/completion time: 12/2/08 13:38
Casing diameter (inches): 4" | Screen Interval (ft. BTOC): 25 to 35
Total well Depth (ft. BTOC): ~35' | Pump intake depth (ft BTOC): 30
Initial (pre-installation) DTW/time: 24.90 | Post-installation DTW/time: 24.90
Final (after pump priming) DTW/time: NA | Max. sustainable pump rate (mL/min): 100
Free product (circle): LNAPL / DNAPL | Appearance of product: None
Volume of water removed during priming (mL): NA | Discharge tube diameter (3/8" or 1/4"): 1/4"
Discharge tube length (ft.): 33' | Inlet reducer used (Y/N): N

Pneumatic Controller Tuning:
Initial air pressure = H (ft.) X 0.43 = NA psi

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting				NA					
Discharge Setting									
Flow rate (mL/min)									

Purging

Purging/sampling crew: A. Willmore / A. Gilchrist | PID/FID reading (well head/background): 0.0
Purge date/beginning time: 12-02-08 / 13:45 | Purge date/completion time: 12-02-08 14:25
Initial (pre-purging) DTW (ft. BTOC): 24.90 | Final (post-purging) DTW (ft. BTOC): 25.21
Calculated tubing + pump volume: NA | No. of tubing + pump volumes purged: NA

Pneumatic Controller Tuning:
Initial air pressure = H (ft.) X 0.43 = _____ psi

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting				NA					
Discharge Setting									
Flow rate (mL/min)									

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
13:50	25.21	100	0.50	18.90	2.515	7.17	-47.9	5.31	19.3
13:55	25.21	100	1.0	18.92	2.484	7.13	-45.2	5.31	19.8
14:00	25.21	100	1.5	18.94	2.445	7.09	-40.8	5.32	15.4
14:05	25.21	100	2.0	18.95	2.394	7.00	-37.7	5.32	10.0

00074230

GROUNDWATER SAMPLING FORM

Sheet 2 of 2

49WW05

Water Quality Parameter Measurements (continued)

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)

12/02/08

Sampling

Sampling beginning time: 14:16 Sampling completion time: 14:15

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
14:20	25.21	100	3.5	18.95	2.391	7.07	-36.4	5.31	7.9

Sample Information

Sample ID: 49WW05 - 120208 Sample collection date/time: 12/02/08 14:16

Duplicate sample collected (Y/N): N Duplicate sample ID: NA

Split sample collected (Y/N): N Split sample ID: NA

COC No(s): NA

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers
Nitrates/Nitrite	353.2	~~Nitrate/ Nitrite~~ 1-500ml	HDPE / H_2SO_4		

Comments: Peristaltic used to sample & purge

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter

GROUNDWATER SAMPLING FORM

Sheet 1 of 2

Operable Unit/Site ID: LHAAP-49 | Sampling location ID: 49WW06
Project Name/#: Longhorn / 117591 | Sample ID: 49WW06-120308
Weather: cloudy, 60s | Collection Time/Date: 12:40 12.03.08

Pump Installation

Pump installation crew: A. Willmer / A. Gilchrist | Installation date/beginning time: 12.03.08 12:05
PID/FID reading (well head/background): 0.0 | Installation date/completion time: 12.03.08 12:08
Casing diameter (inches): 4" | Screen interval (ft. BTOC): 27 to 37
Total well Depth (ft. BTOC): ~37' | Pump intake depth (ft BTOC): 32
Initial (pre-installation) DTW/time: 27.83 | Post-installation DTW/time: 27.83
Final (after pump priming) DTW/time: | Max. sustainable pump rate (mL/min): 100
Free product (circle): LNAPL / DNAPL | Appearance of product: None
Volume of water removed during priming (mL): | Discharge tube diameter (3/8" or 1/4"): 1/4
Discharge tube length (ft.): ~34 | Inlet reducer used (Y/N): N

Pneumatic Controller Tuning:

Initial air pressure = H (ft.) X 0.43 = _____ psi

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting									
Discharge Setting			NA						
Flow rate (mL/min)									

Purging

Purging/sampling crew: A. Willmer / A. Gilchrist | PID/FID reading (well head/background): 0.0
Purge date/beginning time: 12.03.08 12:13 | Purge date/completion time: 12.03.08 12:50
Initial (pre-purging) DTW (ft. BTOC): 27.83 | Final (post purging) DTW (ft. BTOC): 28.03
Calculated tubing + pump volume: NA | No. of tubing + pump volumes purged: NA

Pneumatic Controller Tuning:

Initial air pressure = H (ft.) X 0.43 = _____ psi

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting									
Discharge Setting					NA				
Flow rate (mL/min)									

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos cm)	pH	Eh (mV)	DO (mg/L)	Turbidity (NTU)
12:18	28.03	100	0.5	18.62	5.603	6.87	-46.6	2.31	18.9
12:23	28.03	100	1.0	18.56	5.595	6.79	-44.5	1.83	10.8
12:28	28.03	100	1.5	18.58	5.591	6.79	-44.1	1.90	8.0
12:33	28.03	100	2.0	18.54	5.590	6.80	-41.7	1.92	6.2

00074232

GROUNDWATER SAMPLING FORM

Page 2 of 2

49W020b

Water Quality Parameter Measurements (continued)

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)

12/03/08

Sampling

Sampling beginning time: 12:46 Sampling completion time: 12:45

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
12:50	28.03	100	3.5	18.55	5.982	6.80	-41.9	2.00	5.3

Sample Information

Sample ID: 49W006-120308 Sample collection date/time: 12-03-08 12:40

Duplicate sample collected (Y/N): N Duplicate sample ID: NA

Split sample collected (Y/N): N Split sample ID: NA

COC No(s): NA

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers
TAL Metals	6020	1 - 500 HDPE HNO_3			
Nitrates / Nitrites	353.2	1 - 500 HDPE H_2SO_4			

Comments: Purged & Sampled w/ peristaltic pump. No filter used.

Abbreviations: BTOC - Below top of casing, DTW - Depth to water, H - head above pump intake, mL - milliliter, L - Liter

00074233

GROUNDWATER SAMPLING FORM

Sheet 1 of 2

Operable Unit/Site ID: UHAAP-46
Project Name/#: Longhorn AAP / 117591
Weather: clear, Hi 60's
Sampling location ID: 46WW07-R
Sample ID: 46WW07-120208
Collection Time/Date: 12:45 12-02-08

Pump Installation

Pump installation crew: A. Willmore / A. Gilchrist
PID/FID reading (well head/background): 0.0
Casing diameter (inches): 4"
Total well Depth (ft. BTOC): 34.59
Initial (pre-installation) DTW/time: 20.11
Final (after pump priming) DTW/time:
Free product (circle): LNAPL / DNAPL
Volume of water removed during priming (mL):
Discharge tube length (ft.): 37
Installation date/beginning time: 12-02-08 12:12
Installation date/completion time: 12-02-08 12:14
Screen Interval (ft. BTOC): 24 to 34
Pump intake depth (ft BTOC): 24'
Post-installation DTW/time: NR
Max. sustainable pump rate (mL/min): 100
Appearance of product: None
Discharge tube diameter (3/8" or 1/4"): 1/4"
Inlet reducer used (Y/N): N

Pneumatic Controller Tuning:
Initial air pressure = H (ft.) X 0.43 = NR psi

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting									
Discharge Setting				NA					
Flow rate (mL/min)									

Purging

Purging/sampling crew: A. Willmore / A. Gilchrist
Purge date/beginning time: 12-02-08 12:20
Initial (pre-purging) DTW (ft. BTOC): 20.11
Calculated tubing + pump volume: NA
PID/FID reading (well head/background): 0.0
Purge date/completion time:
Final (post-purging) DTW (ft. BTOC): 20.43
No. of tubing + pump volumes purged:

Pneumatic Controller Tuning:
Initial air pressure = H (ft.) X 0.43 = NR psi

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting									
Discharge Setting				NA					
Flow rate (mL/min)									

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
12:25	20.43	100	0.5	19.63	4.682	7.0	-77.5	0.99	7.1
12:30	20.43	100	1.0	19.64	4.687	7.02	-76.3	1.02	7.0
12:35	20.43	100	1.5	19.62	4.685	7.02	-76.7	1.01	6.4
12:40	20.43	100	2.0	19.64	4.678	7.01	-78.0	0.98	6.0

00074234

GROUNDWATER SAMPLING FORM

Sheet 2 of 2

49WW07

Water Quality Parameter Measurements (continued)

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)

12/02/08

Sampling

Sampling beginning time: 12:45 Sampling completion time: 12:50

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
12:55	20.43	100	3.5	19.64	4.677	7.01	-77.3	0.93	5.1

Sample Information

Sample ID: 49WW07-120208

Sample collection date/time: 12-02-08 12:45

Duplicate sample collected (Y/N): Y

Duplicate sample ID: 49WW07-120208

Split sample collected (Y/N): N

Split sample ID:

COC No(s): NA

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers
Nitrates/Nitrites		2-HDPE H_2SO_4			

Comments: Purged & Sampled w/ peristaltic

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter

GROUNDWATER SAMPLING FORM

Sheet 1 of 2

Operable Unit/Site ID: Site 49
Project Name/#: Longhorn / 117591
Weather: cloudy, 50s

Sampling location ID: 49WW08
Sample ID: 49WW08-120308
Collection Time/Date: 11:00 12-03-08

Pump Installation

Pump installation crew: A. Willmore / A. Gilchrist
PID/FID reading (well head/background): 0.0
Casing diameter (inches): 4"
Total well Depth (ft. BTOC): 35
Initial (pre-installation) DTW/time: NR
Final (after pump priming) DTW/time: NR
Free product (circle): LNAPL / DNAPL
Volume of water removed during priming (mL): NA
Discharge tube length (ft.): 28

Installation date/beginning time: 12-03-08 10:30
Installation date/completion time: 12-03-08 10:32
Screen Interval (ft. BTOC): 15 to 35
Pump intake depth (ft BTOC): 25
Post-installation DTW/time: 22.77
Max. sustainable pump rate (mL/min): 150
Appearance of product: None
Discharge tube diameter (3/8" or 1/4"): 1/4"
Inlet reducer used (Y/N): N

Pneumatic Controller Tuning:
Initial air pressure = H (ft.) X 0.43 = NR psi

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting				NA					
Discharge Setting									
Flow rate (mL/min)									

Purging

Purging/sampling crew: A. Willmore / A. Gilchrist
Purge date/beginning time: 10:34
Initial (pre-purging) DTW (ft. BTOC): 22.77
Calculated tubing + pump volume: NA

PID/FID reading (well head/background): 0.0
Purge date/completion time: 12-03-08 10:18
Final (post-purging) DTW (ft. BTOC): 23.07
No. of tubing + pump volumes purged: NA

Pneumatic Controller Tuning:
Initial air pressure = H (ft.) X 0.43 = NR psi

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting				NA					
Discharge Setting									
Flow rate (mL/min)									

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
10:39	23.04	100	0.5	18.23	2.467	6.99	-38.0	4.81	39.5
10:44	23.04	100	1.0	18.28	2.145	6.92	-21.4	4.48	19.5
10:49	23.04	100	1.5	18.31	2.139	6.91	-24.6	4.53	10.2
10:54	23.04	100	2.0	18.30	2.137	6.90	-25.3	4.46	4.8

00074236

GROUNDWATER SAMPLING FORM

Page 2 of 2

49WW08

Water Quality Parameter Measurements (continued)

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mV)	DO (mg/L)	Turbidity (NTU)

12/03/08

Sampling

Sampling beginning time: 11:00 Sampling completion time: 11:65

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mV)	DO (mg/L)	Turbidity (NTU)
11:10	23.07	160	3.5	18.30	2.104	6.40	-25.9	4.47	3.9

Sample Information

Sample ID: 49WW08-120308

Sample collection date/time: 12.03.08 11:00

Duplicate sample collected (Y/N): N

Duplicate sample ID: NA

Split sample collected (Y/N): N

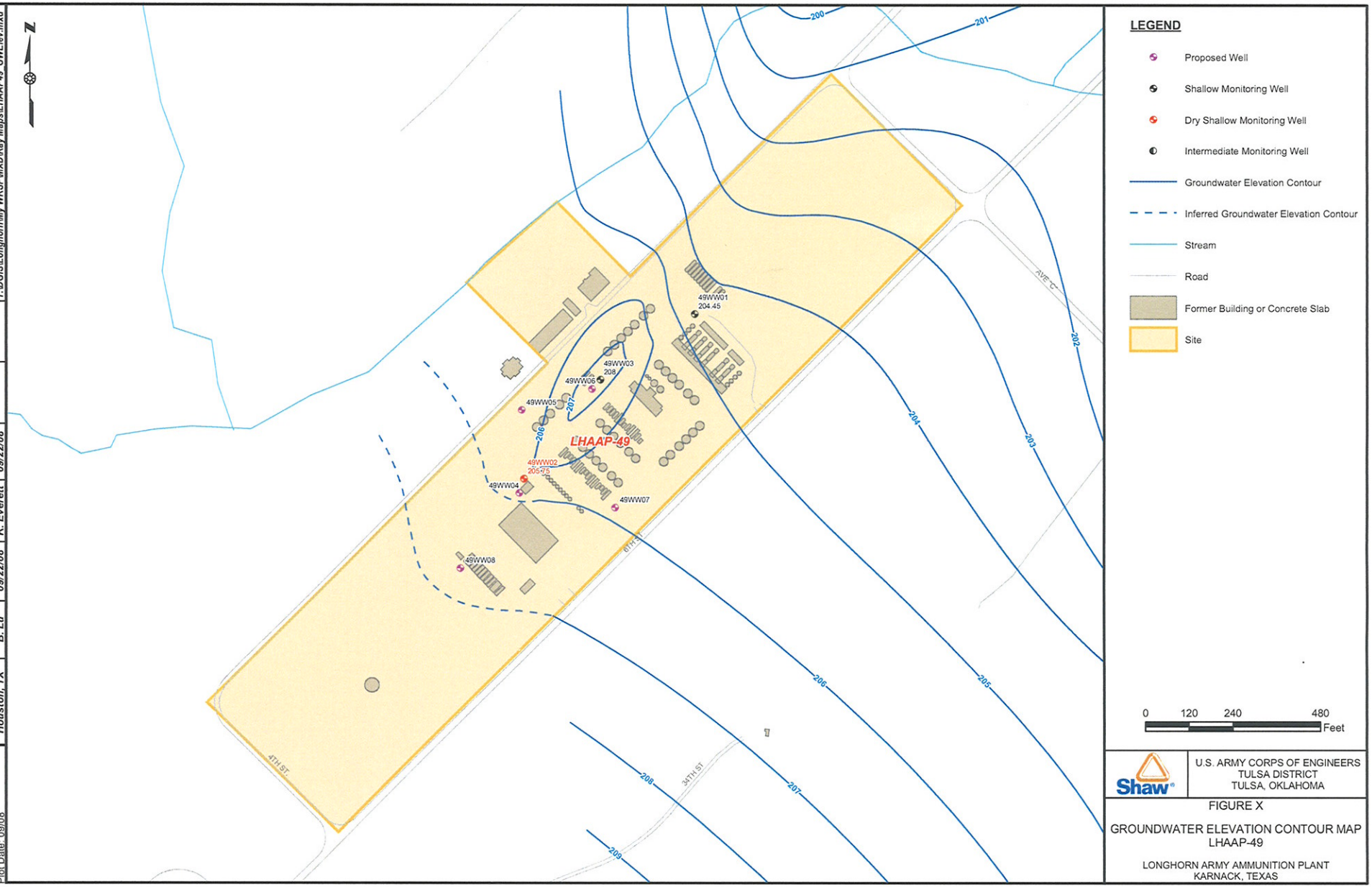
Split sample ID: NA

COC No(s): NA

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers
Nitrate/Nitrite	353.2	1-500 mL HDPE			

Comments: Purged & Sampled w/ Peristaltic pump

Abbreviations: BTOC = Below top of casing, DTW = Depth to water, H = head above pump intake, ml = milliliter, L = liter



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Houston, TX	B. Lu 09/22/08	K. Everett 09/22/08		T:\DGIS\Longhorn\My WKSP\MXD\Kay Maps\LHAAP49_GWElev.mxd

Plot Date: 09/08

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

FIGURE X

GROUNDWATER ELEVATION CONTOUR MAP
LHAAP-49

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

00074238

GROUNDWATER SAMPLING FORM

Sheet 1 of 2

Operable Unit/Site ID: UHMP-99 | Sampling location ID: 49WW04
Project Name/#: Longhorn / 117591 | Sample ID: 49WW04-022409
Weather: cloudy | Collection Time/Date: 12:55 2-24-09

Pump Installation

Pump installation crew: A. Willmore / Mike Martinez | Installation date/beginning time: 2/24/09 12:17
PID/FID reading (well head/background): 0.0 | Installation date/completion time: 2/24/09 12:20
Casing diameter (inches): 4" | Screen Interval (ft. BTOC): 27.5 to 37.5
Total well Depth (ft. BTOC): 37.45 | Pump intake depth (ft BTOC): 32.5
Initial (pre-installation) DTW/time: 26.01 | Post-installation DTW/time: 26.01
Final (after pump priming) DTW/time: NA | Max. sustainable pump rate (mL/min): 100
Free product (circle): LNAPL / DNAPL | Appearance of product: None
Volume of water removed during priming (mL): NA | Discharge tube diameter (3/8" or 1/4"): 1/4"
Discharge tube length (ft.): ~40 | Inlet reducer used (Y/N): N

Pneumatic Controller Tuning:
Initial air pressure = H (ft.) X 0.43 = NA psi

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting				NA					
Discharge Setting									
Flow rate (mL/min)									

Purging

Purging/sampling crew: A. Willmore / M. Martinez | PID/FID reading (well head/background): 0.0
Purge date/beginning time: 2/24/09 / 12:25 | Purge date/completion time: 2/24/09
Initial (pre-purging) DTW (ft. BTOC): 26.01 | Final (post-purging) DTW (ft. BTOC): 26.72
Calculated tubing + pump volume: NA | No. of tubing + pump volumes purged:

Pneumatic Controller Tuning:
Initial air pressure = H (ft.) X 0.43 = NA psi

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting				NA					
Discharge Setting									
Flow rate (mL/min)									

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
12:30	26.58	140	0.5	18.99	3.075	6.80	220.8	38.5	0.2
12:35	26.72	100	1.0	18.98	3.090	6.80	225.3	3.28	0.0
12:40	26.72	100	1.5	18.84	3.120	6.80	232.4	2.45	0.0
12:45	26.72	106	2.0	18.81	3.130	6.79	233.6	2.41	0.0
12:50	26.72	100	2.5	18.73	3.132	6.79	236.9	2.39	0.0

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GROUNDWATER SAMPLING FORM

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49MW04

Water Quality Parameter Measurements (continued)

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)

2/24/09

Sampling

Sampling beginning time: 12:55 Sampling completion time: 13:00

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
13:05	26.72	100	3.0	18.72	3.151	6.79	239.7	2.07	0.0

Sample Information

Sample ID: 49MW04-022409 Sample collection date/time: 2/24/09 12:55

Duplicate sample collected (Y/N): N Duplicate sample ID: NA

Split sample collected (Y/N): N Split sample ID: NA

COC No(s):

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers
Nitrate/ Nitrites		1 x 250 mL			

Comments: Purged & Sampled w/ peristaltic pump

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter

00074240

GROUNDWATER SAMPLING FORM

Sheet 1 of 2

Operable Unit/Site ID: LHAAP-49
Project Name/#: Longhorn / 117591
Weather: cloudy; 50's

Sampling location ID: 49MW06
Sample ID: 49MW06-022409
Collection Time/Date: 15:00 02/24/09

Pump Installation

Pump installation crew: A. Williams / M. Martinez
PID/FID reading (well head/background): 0.0
Casing diameter (inches): 4"
Total well Depth (ft. BTOC): 36.98
Initial (pre-installation) DTW/time: 27.98
Final (after pump priming) DTW/time: NA
Free product (circle): LNAPL / DNAPL
Volume of water removed during priming (mL): NA
Discharge tube length (ft.): 40

Installation date/beginning time: 02/24/09 14:02
Installation date/completion time: 02/24/09 14:09
Screen Interval (ft. BTOC): 27 to 37
Pump intake depth (ft BTOC): 32
Post-installation DTW/time: 36.98
Max. sustainable pump rate (mL/min): 100
Appearance of product: N/A
Discharge tube diameter (3/8" or 1/4"): 1/4"
Inlet reducer used (Y/N): N

Pneumatic Controller Tuning:
Initial air pressure = H (ft.) X 0.43 = NR psi

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting				NA					
Discharge Setting									
Flow rate (mL/min)									

Purging

Purging/sampling crew: A. Williams / M. Martinez
Purge date/beginning time: 02/24/09 14:09
Initial (pre-purging) DTW (ft. BTOC): 36.98 27.98
Calculated tubing + pump volume: NA

PID/FID reading (well head/background): 0.0
Purge date/completion time: 2/24/09 15:05
Final (post-purging) DTW (ft. BTOC): 28.12
No. of tubing + pump volumes purged: NA

Pneumatic Controller Tuning:
Initial air pressure = H (ft.) X 0.43 = NR psi

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting									
Discharge Setting				NA					
Flow rate (mL/min)									

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
1424	28.03	100	2.0	18.89	5.764	6.70	138.8	2.09	8.6
1434	28.12	100	3.0	18.93	5.758	6.70	157.0	2.18	7.1
1439	28.12	100	3.5	18.84	5.746	6.70	163.0	2.38	7.0
1444	28.12	100	4.0	18.69	5.724	6.70	173.2	2.22	4.8
1449	28.12	100	4.5	18.76	5.712	6.70	185.1	2.37	6.1
1454	28.12	100	5.0	18.79	5.708	6.72	191.1	2.46	5.7
1459	28.12	100	5.5	18.76	5.700	6.72	190.1	2.36	6.6
1500	Sample								

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GROUNDWATER SAMPLING FORM

Sheet 2 of 2

49HW06

Water Quality Parameter Measurements (continued)

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)

2/24/09

Sampling

Sampling beginning time: 15:00 Sampling completion time: 15:05

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
15:05	28.12	100	6.1	10.72	5.694	6.73	191.1	2.32	4.6

Sample Information

Sample ID: 49HW06-022409 Sample collection date/time: 02/24/09

Duplicate sample collected (Y/N): N Duplicate sample ID: NA

Split sample collected (Y/N): N Split sample ID: NA

COC No(s):

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers
As/Ca	6020B	1-250 mL HDPE			

Comments: Purged & Sampled w/ peristal tic pum

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter

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GROUNDWATER SAMPLING FORM

Sheet 1 of 2

Operable Unit/Site ID: LHAAP-49
Project Name/#: Longhorn MARC / 117591
Weather: clear, 70s

Sampling location ID: 49WW04
Sample ID: 49WW04-040409
Collection Time/Date: 14:05 4/4/09

Pump Installation

Pump installation crew: A. Willmore
PID/FID reading (well head/background): 0.0
Casing diameter (inches): 4"
Total well Depth (ft. BTOC): 37.45
Initial (pre-installation) DTW/time: 26.20
Final (after pump priming) DTW/time: NA
Free product (circle): LNAPL / DNAPL
Volume of water removed during priming (mL): NA
Discharge tube length (ft.): 35

Installation date/beginning time: 4/4/09 13:18
Installation date/completion time: 4/4/09 13:31
Screen Interval (ft. BTOC): 27.5 to 37.5
Pump intake depth (ft BTOC): 32
Post-installation DTW/time: 26.17
Max. sustainable pump rate (mL/min): 100
Appearance of product: None
Discharge tube diameter (3/8" or 1/4"): 1/4"
Inlet reducer used (Y/N): N

Pneumatic Controller Tuning:
Initial air pressure = H (ft.) X 0.43 = NA psi

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting									
Discharge Setting				NA					
Flow rate (mL/min)									

Purging

Purging/sampling crew: A. Willmore
Purge date/beginning time: 4/4/09 13:25
Initial (pre-purging) DTW (ft. BTOC): 26.17
Calculated tubing + pump volume: NA

PID/FID reading (well head/background): 0.0
Purge date/completion time: 4/4/09 14:13
Final (post-purging) DTW (ft. BTOC): 26.94
No. of tubing + pump volumes purged: NA

Pneumatic Controller Tuning:
Initial air pressure = H (ft.) X 0.43 = NA psi

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting									
Discharge Setting				NA					
Flow rate (mL/min)									

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
13:30	26.31	100	0.5	18.17	3.124	6.80	257.4	2.07	0.0
13:45	26.78	100	2.0	18.63	2.973	6.80	250.6	1.94	0.0
13:50	26.94	100	2.5	18.48	2.909	6.80	248.1	1.93	0.0
13:55	26.94	100	3.0	18.49	2.911	6.80	243.9	1.92	0.0
14:00	26.94	100	3.5	18.51	2.910	6.81	244.1	1.98	0.0

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GROUNDWATER SAMPLING FORM

Sheet 2 of 2

49MW04

Water Quality Parameter Measurements (continued)

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C) ± 10%	±3% Electrical Conductivity (uMhos/cm)	pH ± 0.1	Eh (mv) ± 10	DO (mg/L) ± 10%	Turbidity (NTU) ± 10%

4/7/09

10/20

Sampling

Sampling beginning time: 14:05 Sampling completion time: 14:10

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
14:15	26.94	100	5.0	18.78	2.904	6.81	243.1	1.97	0.0

Sample Information

Sample ID: 49MW04-040409
Duplicate sample collected (Y/N): N
Split sample collected (Y/N): N
COC No(s):

Sample collection date/time: 14:05
Duplicate sample ID: NA
Split sample ID: NA

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers
Nitrate/Nitrite		1-250 mL HDPE			

Comments: Purged & Sampled w/Peristaltic Pump.

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter

00074244

GROUNDWATER SAMPLING FORM

Sheet 1 of 2

Operable Unit/Site ID: LHAAP-49
Project Name/#: Longhorn MARC / 117591
Weather: clear 70s

Sampling location ID: 49WW06
Sample ID: 49WW06-040409
Collection Time/Date: 17:15 4.4.09

Pump Installation

Pump installation crew: A. Willmore
PID/FID reading (well head/background): 0.0
Casing diameter (inches): 4"
Total well Depth (ft. BTOC): 36.98
Initial (pre-installation) DTW/time: 27.65
Final (after pump priming) DTW/time: NA
Free product (circle): LNAPL / DNAPL
Volume of water removed during priming (mL): NA
Discharge tube length (ft.): 35

Installation date/beginning time: 4.4.09 16:15
Installation date/completion time: 4.4.09 16:21
Screen Interval (ft. BTOC): 27 to 37
Pump intake depth (ft BTOC): 32
Post-installation DTW/time: 37.64
Max. sustainable pump rate (mL/min): 100
Appearance of product: None
Discharge tube diameter (3/8" or 1/4"): 1/4"
Inlet reducer used (Y/N): N

Pneumatic Controller Tuning:
Initial air pressure = H (ft.) X 0.43 = NA psi

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting				NA					
Discharge Setting									
Flow rate (mL/min)									

Purging

Purging/sampling crew: A. Willmore
Purge date/beginning time: 4.4.09 16:36
Initial (pre-purging) DTW (ft. BTOC): 27.64
Calculated tubing + pump volume: NA

PID/FID reading (well head/background): 0.6
Purge date/completion time: 04.04.09 17:26
Final (post-purging) DTW (ft. BTOC): 28.14
No. of tubing + pump volumes purged: NA

Pneumatic Controller Tuning:
Initial air pressure = H (ft.) X 0.43 = NA psi

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting									
Discharge Setting				NA					
Flow rate (mL/min)									

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
16:41	27.74	100	0.5	18.35	6.001	6.72	184.1	3.31	7.8
16:56	27.91	100	2.0	18.31	5.682	6.73	192.1	3.14	6.9
17:01	28.14	100	2.5	18.26	5.698	6.73	194.3	3.30	6.4
17:06	28.14	100	3.0	18.24	5.691	6.74	196.9	2.89	6.3
17:11	28.14	100	3.5	18.23	5.691	6.74	197.1	2.29	5.1

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GROUNDWATER SAMPLING FORM

Sheet 2 of 2

49WW06

Water Quality Parameter Measurements (continued)

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C) ± 10%	±3% Electrical Conductivity (uMhos/cm)	pH ± 0.1	Eh (mv) ± 10	DO (mg/L) ± 10%	Turbidity (NTU) ± 10% 10/20

4/4/09

Sampling

Sampling beginning time: 17:15 Sampling completion time: 17:20

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
17:26	28.14	100	5	18.01	5.683	6.74	196.1	2.29	4.3

Sample Information

Sample ID: 49WW06-040409 Sample collection date/time: 4.4.09 17:15

Duplicate sample collected (Y/N): N Duplicate sample ID: NA

Split sample collected (Y/N): N Split sample ID: NA

COC No(s): NR

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers

Comments: Purged & Sampled w/Peristaltic Pump.
As, Al, Fe Sample NOT filtered

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter

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GROUNDWATER SAMPLING FORM

Sheet 1 of 2

Operable Unit/Site ID: LHAAP-49
Project Name/#: Longhorn / 117591
Weather: cloudy, 80's

Sampling location ID: 49GW04
Sample ID: 49WW04-090507
Collection Time/Date: 15:30 05/07/09

Pump Installation

Pump installation crew: A. Willmore / P. Srivastav
PID/FID reading (well head/background): NR
Casing diameter (inches): 4"
Total well Depth (ft. BTOC): 37.27
Initial (pre-installation) DTW/time: 26.11
Final (after pump priming) DTW/time: NA
Free product (circle): LNAPL / DNAPL
Volume of water removed during priming (mL): NA
Discharge tube length (ft.): ~~29~~ 35

Installation date/beginning time: 5/7/09 14:22
Installation date/completion time: 5/7/09 14:24
Screen Interval (ft. BTOC): 27 to 37
Pump intake depth (ft BTOC): ~~25.97~~ 32
Post-installation DTW/time: 25.97
Max. sustainable pump rate (mL/min): 100
Appearance of product: None
Discharge tube diameter (3/8" or 1/4"): 1/4"
Inlet reducer used (Y/N): N

Pneumatic Controller Tuning:
Initial air pressure = H (ft.) X 0.43 = NA psi

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting									
Discharge Setting					NA				
Flow rate (mL/min)									

Purging

Purging/sampling crew: A. Willmore / P. Srivastav
Purge date/beginning time: 5/7/09 14:38
Initial (pre-purging) DTW (ft. BTOC): 25.97
Calculated tubing + pump volume: NA
Pneumatic Controller Tuning:
Initial air pressure = H (ft.) X 0.43 = NA psi

PID/FID reading (well head/background): NR
Purge date/completion time: 5/7/09
Final (post-purging) DTW (ft. BTOC): 27.64
No. of tubing + pump volumes purged: NA

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)	22								22
Refill Setting	10								10
Discharge Setting	5								5
Flow rate (mL/min)	160								160

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
15:08		160							
~~14:58~~	27.64	~~160~~	0.8	20.20	~~3.047~~ 3,317	6.90	147.9	2.31	0.0
15:13	27.64	160	1.6	19.64	3.303	6.90	127.8	2.54	0.0
15:18	27.64	160	2.4	19.61	3.303	6.90	137.5	2.27	0.0
15:23	27.64	160	3.2	19.64	3.309	6.89	142.6	2.20	0.0

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GROUNDWATER SAMPLING FORM

Sheet 2 of 2

49WW04

Water Quality Parameter Measurements (continued)

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C) ± 10%	±3% Electrical Conductivity (uMhos/cm)	pH ± 0.1	Eh (mv) ± 10	DO (mg/L) ± 10%	Turbidity (NTU) ± 10% 10/20

5/7/09

Sampling

Sampling beginning time: 15:30 Sampling completion time: 15:35

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
15:40	27.64	160	~5.7	19.71	3.316	6.89	141.9	2.28	0.0

Sample Information

Sample ID: 49WW04-090507

Sample collection date/time: 15:30 5/7/09

Duplicate sample collected (Y/N): N

Duplicate sample ID: NA

Split sample collected (Y/N): N

Split sample ID: NA

COC No(s):

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers
Nitrates/Nitrite	300.1	1-500 mL HDPE			

Comments:

Purged & Sampled w/ ~~peristaltic~~ Bladder pump.

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter

00074248

GROUNDWATER SAMPLING FORM

Sheet 1 of 2

Operable Unit/Site ID: LWMP-49
Project Name/#: 117591
Weather: partly cloudy 86°

Sampling location ID: 49WW06
Sample ID: 49WW06-090513
Collection Time/Date: 14:30 5/13/09

Pump Installation

Pump installation crew: A. Willmore
PID/FID reading (well head/background): 0.0
Casing diameter (inches): 4"
Total well Depth (ft. BTOC): ~~27.44~~ 36.97
Initial (pre-installation) DTW/time: 27.44
Final (after pump priming) DTW/time:
Free product (circle): LNAPL / DNAPL
Volume of water removed during priming (mL): NA
Discharge tube length (ft.): 34

Installation date/beginning time: 5/13/09 13:50
Installation date/completion time: 5/13/09 13:50
Screen Interval (ft. BTOC): 24.5 to 36.5
Pump intake depth (ft BTOC): 31
Post-installation DTW/time: 27.39
Max. sustainable pump rate (mL/min): 100
Appearance of product: None
Discharge tube diameter (3/8" or 1/4"): 1/4"
Inlet reducer used (Y/N): N

Pneumatic Controller Tuning:
Initial air pressure = H (ft.) X 0.43 = NA psi

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting									
Discharge Setting									
Flow rate (mL/min)									

Purging

Purging/sampling crew: A. Willmore
Purge date/beginning time: 5/13/09 14:00
Initial (pre-purging) DTW (ft. BTOC): 27.39
Calculated tubing + pump volume: NA
Pneumatic Controller Tuning:
Initial air pressure = H (ft.) X 0.43 = NA psi

PID/FID reading (well head/background): 0.0
Purge date/completion time: 5/13/09 14:46
Final (post-purging) DTW (ft. BTOC): 27.83
No. of tubing + pump volumes purged: NA

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting									
Discharge Setting									
Flow rate (mL/min)									

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
14:05	27.80	100	0.5	21.49	5.101	6.78	101.3	4.12	11.1
14:10	27.83	100	1.0	22.14	5.132	6.79	100.1	3.61	10.1
14:15	27.83	100	1.5	22.01	5.176	6.79	98.9	2.64	4.2
14:20	27.83	100	2.0	22.01	5.179	6.80	98.4	2.62	3.2
14:25	27.83	100	2.5	21.96	5.182	6.80	98.1	2.61	1.1

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GROUNDWATER SAMPLING FORM

Sheet 2 of 2

49MW06

Water Quality Parameter Measurements (continued)

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C) ± 10%	±3% Electrical Conductivity (uMhos/cm)	pH ± 0.1	Eh (mv) ± 10	DO (mg/L) ± 10%	Turbidity (NTU) ± 10% 10/20

6/13/09

Sampling

Sampling beginning time: 14:30 Sampling completion time: 14:35

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
14:40	27.83	100	4.0	21.42	5.191	6.80	97.5	2.63	2.1

Sample Information

Sample ID: 49MW06-090613
Sample collection date/time: 6/13/09 14:30
Duplicate sample collected (Y/N): N
Duplicate sample ID: NA
Split sample collected (Y/N): N
Split sample ID: NA
COC No(s):

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers
As, Pb,	6020 B	1-500mL HDPE			

Comments:

Purged & Sampled w/ peristaltic

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter

00074250

GROUNDWATER SAMPLING FORM

Sheet 1 of 2

Operable Unit/Site ID: LHAAP-49
Project Name/#: Longhorn / 117596
Weather: overcast; 80s

Sampling location ID: 49WW06
Sample ID: 49WW06 090507
Collection Time/Date: 13:40 5.07.09

Pump Installation

Pump installation crew: A. Willmore / P. Srivastav
PID/FID reading (well head/background): NR
Casing diameter (inches): 4"
Total well Depth (ft. BTOC): 36.97
Initial (pre-installation) DTW/time: 27.37
Final (after pump priming) DTW/time: NA
Free product (circle): LNAPL / DNAPL
Volume of water removed during priming (mL): NA
Discharge tube length (ft.): 34

Installation date/beginning time: 5/7/09 12:39
Installation date/completion time: 5/7/09 12:41
Screen Interval (ft. BTOC): 26.5 to 36.5
Pump intake depth (ft BTOC): 31
Post-installation DTW/time: 27.31
Max. sustainable pump rate (mL/min): 100
Appearance of product: None
Discharge tube diameter (3/8" or 1/4"): 1/4
Inlet reducer used (Y/N): N

Pneumatic Controller Tuning:
Initial air pressure = H (ft.) X 0.43 = NA psi

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting									
Discharge Setting									
Flow rate (mL/min)									

NA

Purging

Purging/sampling crew: A. Willmore / P. Srivastav
Purge date/beginning time: 5/7/09 12:44
Initial (pre-purging) DTW (ft. BTOC): 27.31
Calculated tubing + pump volume: NA

PID/FID reading (well head/background): NR
Purge date/completion time: 5/7/09
Final (post-purging) DTW (ft. BTOC):
No. of tubing + pump volumes purged: NA

Pneumatic Controller Tuning:
Initial air pressure = H (ft.) X 0.43 = NA psi

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)	19								19 / 10
Refill Setting	10								
Discharge Setting	5								5
Flow rate (mL/min)	100								100

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
12:49	27.81	300	~~0.5~~ 1.5	19.18	5.877	6.77	~~-2.8~~ 2.8	3.75	12.9
12:54	27.82	140	2.2	19.20	5.861	6.77	~~-10.4~~ 96.4	3.30	14.8
12:59	27.81	100	2.8	19.33	5.861	6.77	~~-10.6~~ 97.3	3.38	13.6
13:04	27.81	100	3.3	19.51	5.855	6.78	~~-9.1~~ 98.4	2.48	12.3
13:09	27.82	100	3.8	19.66	5.854	6.78	99.2	2.31	10.8
~~13:34~~	~~28.30~~	Purged for 25 mins							
13:34	28.30	100	8.2	19.73	5.831	6.78	98.3	2.55	1.6

00074251

GROUNDWATER SAMPLING FORM

Sheet 2 of 2

49WW06

Water Quality Parameter Measurements (continued)

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C) ± 10%	±3% Electrical Conductivity (uMhos/cm)	pH ± 0.1	Eh (mv) ± 10	DO (mg/L) ± 10%	Turbidity (NTU) ± 10% 10/20

5/7/09

Sampling

Sampling beginning time: 13:40 Sampling completion time: 13:45

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
13:45		100	8.7	20.29	5.848	6.78	97.4	2.61	2.0

Sample Information

Sample ID: 49WW06-090507
Duplicate sample collected (Y/N): N
Split sample collected (Y/N): N
COC No(s): NA

Sample collection date/time: 5/7/09
Duplicate sample ID: NA
Split sample ID: NA

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers
As,	6020B	1-500 mL HDPE			

Comments: Purged & sampled w/ bladder

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter

Appendix F - List of Laboratory Reports

Lab Report	Date	Tests	Wells	Apx
L0502501	3/10/05	Metals	TCLP Lead and Mercury in Soil	F
L0503144	3/16/05	Metals	Total Lead and Mercury in Soil	F
L0505399	5/25/05	Metals and Dissolved Metals	49WW01, 49WW02, 49WW03	F
L0710648	11/5/07	Metals and Dissolved Metals, Nitrate and Nitrite	49WW01, 49WW03	F
L08100062	10/6/08	Nitrate/Nitrite	49DPT01	F
L08100263	10/13/08	Nitrate/Nitrite	49DPT02	F
L08100257	10/13/08	RCRA Metals and TCLP Metals	Excavated Soil and Backfill Soil	D
L08100416	10/20/08	Metals	49WW03	F
L08120101	12/5/08	Metals, Nitrate/Nitrite	49WW04, 49WW05, 49WW06, 49WW07, 49WW08	F
L08120177	12/15/08	RCRA Metals, React/Ignit/Corros	Waste Characterization, no VOCs	D
L09020557	3/2/09	Nitrate/Nitrite	49WW04	F
L09040142	4/10/09	Metals, Nitrate/Nitrite	49WW04, 49WW06	F
L09030085	5/5/09	Metals	49WW06	F
L09050164	5/11/09	Metals, Nitrate/Nitrite	49WW04, 49WW06 (turbid, do not use metals result)	F
L09050313	5/14/09	Metals	49WW06	F

Refer to CD located in the back of the binder.

DATA EVALUATION REPORT
OF KEMRON REPORT NUMBER L0502501
DATA GAPS INVESTIGATION SITE 49
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

SHAW PROJECT NUMBER 845714

Prepared by

Shaw Environmental, Inc.
1430 Enclave Parkway
Houston, Texas 77077

March 10, 2005

DATA EVALUATION REPORT
KEMRON REPORT NUMBER L0502501
DATA GAPS INVESTIGATION SITE 49
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

March 10, 2005

Approved by: Diane Meyer Date: 3/10/05

Diane Meyer, Program Chemist

Table of Contents

List of Tables

Attachments

Acronyms and Abbreviations

%D	percent deviation
%RSD	percent relative standard deviation
COC	chain of custody
LCS	laboratory control sample
LHAPP	Longhorn Army Ammunition Plant
IDL	instrument detection limit
MDL	method detection limit
MS	matrix spike
MSD	matrix spike duplicate
NFG	National Functional Guidelines
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
RPD	relative percent difference
RL	reporting limit
TERC	Total Environmental Restoration Contract
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency

1.0 Introduction

Shaw Environmental, Inc. has performed a review of the laboratory data associated with sampling at Site 49 at Longhorn Army Ammunition Plant (LHAPP), Karnack, Texas. **Table 1-1** provides a list of the samples collected, a sample identification number and laboratory sample number cross-references, sample matrix, chain of custody (COC) number, date collected, sample location, and analytical method performed for each sample.

The work was performed under the Total Environmental Restoration Contract (TERC), Number DACA56-94-D-0020, and Task Order 109. This Data Evaluation Report is a summary of the analytical data generated by Kemron Environmental Services, Marietta, Ohio.

The purpose of the analytical data review is to assess the effect of the overall analytical process on the usability of the data. The review involved comparing the analytical data summary forms, as submitted by the laboratory, to method requirements set forth in methods found in SW-846, 3rd Edition, Update III, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (USEPA, 1997) and project-imposed requirements specified in the task order. Additionally, surrogate spike recoveries, if applicable, matrix spike recoveries, and duplicate sample results were reviewed to determine any matrix interference. The data packages were reviewed by the Project Chemist using the process outlined in Standard Operating Procedure 1141, Analytical Data Quality Evaluation and Reporting (Shaw, revised 2002).

This data evaluation report discusses accuracy, precision, and representativeness for each type of analysis. **Section 2.0** contains a discussion of precision, accuracy, and representativeness for each method. **Section 3.0** of this report is a technical summary of the data review for the data group as a whole, including completeness. **Section 4.0** lists references.

Data qualifiers and reason codes were added to the applicable results in the data package. A list of validation qualifiers and validation reason code definitions is included in **Attachment A**.

Table 1-1
Chain-of-Custody Summary

Sample I.D.	Lab Sample Number	Matrix	Chain of Custody No.	Date Collected	Methods SW-846
49TCLP-01	L0502501-01	Soil	02-KEMM-FEB05	2/24/05	TCLP lead - 1311/6010B
49TCLP-02	L0502501-02	Soil	02-KEMM-FEB05	2/24/05	TCLP mercury – 1311/74070A

)

2.0 Metals

The soil samples were collected and analyzed for toxicity characteristic leaching procedure (TCLP) lead by SW-846 methods 1311/6010B and TCLP mercury by methods 1311/7470A.

2.1 Initial and Continuing Calibration

The initial and continuing calibrations were within established limits.

2.2 Accuracy

The laboratory control sample (LCS), matrix spike (MS), and matrix spike duplicate (MSD) were within quality control limits. The serial dilutions and interference check standards were within quality control limits,

2.3 Precision

The MS/MSD relative percent difference (RPD) was within quality control limits.

2.4 Representativeness

The method blanks and continuing calibration blanks were free of contamination for lead and mercury. No QC replicate samples were submitted with this data package. The samples were analyzed within six months and mercury within 28 days.

3.0 Technical Summary

The following summarizes the data review for the sampling at LHAPP.

3.1 Documentation

The COC were complete and contained the required information. Any omissions were corrected and an amended COC was submitted to the laboratory. The actual methods used for sample analysis were based upon the COC.

Upon receipt at the laboratory, cooler receipt forms were completed and are included as part of the laboratory data package. All holding times for extraction and analyses were met.

3.2 Completeness

The 90% completeness goal was met as set forth in the USACE Engineering Manual 200-1-3 (February, 2001). None of the data were rejected, although some data was qualified estimated. Valid data are non-qualified data and estimated data.

- Data reported between the MDL and reporting limit (RL) were "J" flagged with reason code 15 (quantitation estimated).

3.3 Conclusion

An overall review of the samples collected indicates that the chain of custody procedures and laboratory analyses have been conducted in an acceptable manner according to the USEPA Contract Laboratory Program, National Functional Guidelines for Organic Data Review, Office of Emergency and Remedial Response, U.S. Environmental Protection Agency, Washington, D.C. (October 1999).

4.0 References

Shaw Environmental, Inc, (revised 2002), *Standard Operating Procedure Manual,* Houston, Texas.

United States Environmental Protection Agency (USEPA), 1997, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, Update III,* Washington, D.C.

Department of the Army, U.S. Army Corps of Engineers, Requirements for the Preparation of Sampling and Analysis Plans USACE Engineering Manual 200-1-3 (February 2001).

USEPA Contract Laboratory Program, National Functional Guidelines for Inorganic Data Review, Office of Emergency and Remedial Response, U.S. Environmental Protection Agency, Washington, D.C., October 1999.

ATTACHMENT A

VALIDATION QUALIFIERS AND VALIDATION REASON CODE DEFINITIONS

VALIDATION QUALIFIER DEFINITIONS

Qualifier	Definition
U	Not detected. The analyte was analyzed for, but not detected above the associated reporting limit,
J	The analyte was positively identified; the reported value is the estimated concentration of the constituent detected in the sample analyzed.
B	The concentration reported was detected in the associated method blank, trip blank, or equipment blank within 5X/10X the blank concentration.
R	The reported results are rejected due to 1. Severe deficiencies in the supporting quality control data; 2. Anomalies noted in the sampling or analysis process. 3. the presence or absence of the constituent cannot be verified based on the data provided. $. To indicate not to use a particular result in the event of a reanalysis.
UJ	The analyte was analyzed for, but not detected above the established reporting limit. However, review and evaluation of supporting QC data have indicated that the "non-detect" may be inaccurate or imprecise. The non-detect result should be estimated.
L	Result may be biased low. Details are provided in the validation report.
H	Result may be biased high. Details are provided in the validation report.

VALIDATION REASON CODE DEFINITIONS

Reason Code	Description
01	Sample received outside of 4 +/-2 degrees Celsius
01A	Improper sample preservation
02	Holding time exceeded
02A	Extraction
02B	Analysis
03	Instrument performance outside criteria
03A	BFB tune for GC/MS volatiles
03B	DFTPP tune for GC/MS semivolatiles
03C	DDT and/or endrin % breakdown exceeds criteria
03D	Retention time windows
03E	Resolution
04	Initial calibration results outside specified criteria
04A	Compound mean RRF QC criteria not met
04B	Individual % RSD criteria not met
04C	Correlation coefficient < 0.995
05	Continuing calibration results outsides specified criteria
05A	Compound mean RRF QC criteria not met
05B	Compound %deviation QC criteria not met
06	Result qualified as a results of the 5X/10X blank correction
06A	Method or preparation blank
06B	Initial calibration blank (ICB) or continuing calibration blank (CCB)
06C	Equipment rinsate
06D	Trip blank
06E	Field blank
07	Surrogate recoveries outside control limits
07A	Sample
07B	Associated method blank or LCS
08	MS/MSD/duplicate results outside criteria
08A	MS and/or MSD recovery not within control limits (accuracy)
08B	% RPD outside acceptance criteria (precision)

VALIDATION REASON CODE DEFINITIONS (continued)

Reason Code	Description
09	Post digestion spike outside criteria (GFAA)
10	Internal standards outside specified control limits
10A	Recovery
10B	Retention time
11	Laboratory control sample recoveries outside specified control limits
11A	Recovery
11B	% RPD (if run in duplicate)
12	Interference check standard
13	Serial dilution
14	Tentatively identified compounds
15	Quantitation
16	Multiple results available; alternate analysis preferred
17	Field duplicate RPD criteria is exceeded
18	Percent difference between original and second column exceeds QC criteria
19	Professional judgment was used to qualify the data
20	Pesticide clean-up checks
21	Target compound identification
22	Radiological calibration
23	Radiological quantitation
24	Reported result and/or lab qualifier revised to reflect validation findings

SHAW ENVIRONMENTAL, INC.
TECHNICAL SERVICE GROUP
ANALYTICAL DATA EVALUATION

The Project Chemist reviewed the attached Data Package. Detailed comments concerning specific analyses (i.e. GC/MS Semivolatiles) are provided in the attached review sheets. Any additional comments concerning the data package as a whole are listed below

Site/Location: Longhorn
Project No.: 843414
Laboratory: Kemron
Report No.: 405025O1

COMMENTS:

Diane Meyer

Data Reviewed by: March 9, 2005 Date: _____

Diane Meyer
Project Chemist

TIER 1 DATA REVIEW

DATA COMPLETENESS				
	REQUIREMENTS	**Y**	**N**	**NA**
Cooler Receipt Form	Cooler receipt form present?	✓		
	Documentation of broken bottles, bubbles in VOA vials, missing labels, seals, etc.?	✓		
	Was the cooler temperature upon receipt at the laboratory between 2° and 6° F?	✓		
	Was the pH of the sample acceptable?	✓		
Chain of Custody	Original chain of custody/analytical request form present and complete?	✓		
	Signature, dates, and times complete?	✓		
	Comparison of the reported parameters to the request on the chain of custody?	✓		
	Each sample number transcribed by the laboratory?	✓		
	Cross reference of field sample number, laboratory number and analytical batch?	✓		
	Correct sample collection date given for each sample?	✓		
Laboratory Reports	Date of preparation / extraction for each sample?	✓		
	Date analyzed for each sample?	✓		
	Dilution factors for samples?	✓		
	Detection / Quantitation limits reported as specified?	✓		
	Sample analytical results?	✓		
	Results reported for method blanks?	✓		
	Results reported for trip blanks (VOCs only)?			✓
	Results reported for laboratory duplicates (inorganic and radiological only)?			✓
QC Reports	Matrix Spike (MS) /Matrix Spike Duplicates (MSD) % recoveries and RPDs reported?	✓		
	Laboratory Control Samples (LCS) / LCS Duplicates (LCSD) % recoveries and RPDs reported?	✓		
	Surrogate values provided (organic samples only)?			✓
	Raw data provided for analysis, if applicable?			✓

If "NO," then List all samples on attached sheets

TIER 1 DATA REVIEW – INORGANIC ANALYSIS

ANALYSIS: Lead, Mercury MATRIX: LIQUID

EPA METHOD: 6010B; 7470A SOLID/SOIL TCLP X

BY: GF OR (ICP)

Hold Times were met

REQUIREMENTS		Y	N	NA
Method / Preparation Blank	Every Batch or 20 Sample All Compounds <IDL / (MDL) / RL	✓		
Equipment Rinsate Sample	All Compounds <IDL / MDL / RL			✓
Matrix Spike Recovery Values	75-125% Recovery or Lab Limits	✓		
Matrix Spike Duplicate Recovery Values	75-125% Recovery or Lab Limits	✓		
Matrix Spike / Matrix Spike Duplicate	<20%	✓		
Laboratory Control Sample (LCS) Analysis	80-120% Recovery	✓		
ICP Serial Dilutions	<10% difference when the amount is greater than 50 X IDL per case narrative	✓		
Field Duplicate Evaluation	Ratio <2.0 for Water			✓
	Ratio <5.0 for Soil			✓

If "NO," then list

Method Blank or Equipment Rinsate

Blank ID	Sample ID	Date Collected	Type of Analysis	Analyte	Concentration (units)

Matrix Spike / Matrix Spike Duplicate Results and Field Duplicate

Sample Type	Sample ID	Analyte	MS Recovery	MSD Recovery	Result -1	Result - 2	RPD%

Laboratory Control Sample Analysis and Duplicate Sample Analysis

Analysis Type / Element	Recovery %

ICP Serial Dilutions

Analysis Type / Element	Concentration True	Concentration Found	Percent Recovery

ANALYSIS: METALS MATRIX: LIQUID____

METHOD: 6010B, 7470A SOLID / SOIL____ TCLP X

BY: _____

REQUIREMENT		Y	N	NA
Initial Calibration Verification (ICV)	Beginning and every 10 samples	✓		
	ICV % Recovery (90-110%) except HG (80-120%) and	✓		
	Cn- (85-115%)			✓
RSD of Initial Calibration	Correlation coefficient must be > 0.995	✓		
Initial Calibration Blank (ICB)	Initial calibration present for every analysis date, element, and instrument	✓ ✓		
ICP Interference Check Sample (ICSA / ICSB)	Beginning and end of sample batch	✓		
	80-100% Recovery	✓		
Continuing Calibration Verification (CCV)	Every 10 samples	✓		
	CCV % Recovery (90-110%) except Hg (80-120%)	✓		
	and Cn- (85-115%)			✓
Continuing Calibration Blank (CCB)	Every 10 samples	✓		

If "NO," list all samples below

Standard / Blank Check and RSD of Initial Calibration

Calibration Date	Instrument ID	Run No.	Analyte	Standard Levels	Correlation Coefficient

ICV / CCV and ICP Interference Check Sample

Analysis Type / Element	Instrument ID	Run No.	ICV /CCV	Run Date	Concentration True	Concentration Found	Percent Recovery

ICP Interference Check Sample

File Name	Analysis Type / Element	Instrument ID	Concentration True	Concentration Found	Percent Recovery

DATA EVALUATION REPORT
OF KEMRON REPORT NUMBER L0503144
DATA GAPS INVESTIGATION SITE 49
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

SHAW PROJECT NUMBER 845714

Prepared by

Shaw Environmental, Inc.
1430 Enclave Parkway
Houston, Texas 77077

March 16, 2005

DATA EVALUATION REPORT
KEMRON REPORT NUMBER L0503144
DATA GAPS INVESTIGATION SITE 49
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

March 16, 2005

Approved by: Diane Meyer Date: 3/16/05

Diane Meyer, Program Chemist

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List of Tables

Attachments

Acronyms and Abbreviations

%D	percent deviation
%RSD	percent relative standard deviation
COC	chain of custody
LCS	laboratory control sample
LHAPP	Longhorn Army Ammunition Plant
IDL	instrument detection limit
MDL	method detection limit
MS	matrix spike
MSD	matrix spike duplicate
NFG	National Functional Guidelines
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
RPD	relative percent difference
RL	reporting limit
TERC	Total Environmental Restoration Contract
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency

1.0 Introduction

Shaw Environmental, Inc. has performed a review of the laboratory data associated with sampling at Site 49 at Longhorn Army Ammunition Plant (LHAPP), Karnack, Texas. **Table 1-1** provides a list of the samples collected, a sample identification number and laboratory sample number cross-references, sample matrix, chain of custody (COC) number, date collected, sample location, and analytical method performed for each sample.

The work was performed under the Total Environmental Restoration Contract (TERC), Number DACA56-94-D-0020, and Task Order 109. This Data Evaluation Report is a summary of the analytical data generated by Kemron Environmental Services, Marietta, Ohio.

The purpose of the analytical data review is to assess the effect of the overall analytical process on the usability of the data. The review involved comparing the analytical data summary forms, as submitted by the laboratory, to method requirements set forth in methods found in SW-846, 3rd Edition, Update III, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (USEPA, 1997) and project-imposed requirements specified in the task order. Additionally, surrogate spike recoveries, if applicable, matrix spike recoveries, and duplicate sample results were reviewed to determine any matrix interference. The data packages were reviewed by the Project Chemist using the process outlined in Standard Operating Procedure 1141, Analytical Data Quality Evaluation and Reporting (Shaw, revised 2002).

This data evaluation report discusses accuracy, precision, and representativeness for each type of analysis. **Section 2.0** contains a discussion of precision, accuracy, and representativeness for each method. **Section 3.0** of this report is a technical summary of the data review for the data group as a whole, including completeness. **Section 4.0** lists references.

Data qualifiers and reason codes were added to the applicable results in the data package. A list of validation qualifiers and validation reason code definitions is included in **Attachment A.**

Table 1-1
Chain-of-Custody Summary

Sample I.D.	Lab Sample Number	Matrix	Chain of Custody No.	Date Collected	Methods SW-846
49TCLP-01	L0503144-01	Soil	02-KEMM-FEB05	2/24/05	Total lead - 6010B
49TCLP-02	L0503144-02	Soil	02-KEMM-FEB05	2/24/05	mercury – 7471A

2.0 Metals

The soil samples were collected and analyzed for total lead by SW-846 method 6010B and total mercury by method 7471A.

2.1 Accuracy

The laboratory control sample (LCS), matrix spike (MS), and matrix spike duplicate (MSD) were within quality control limits. The serial dilution for lead exceeded the 10% RPD quality control limit. The total lead value was qualified "J" with a validation qualifier code 13 (serial dilution criterion exceeded).

2.2 Precision

The MS/MSD relative percent difference (RPD) was within quality control limits.

2.3 Representativeness

The method blanks were free of contamination for lead and mercury. No QC replicate samples were submitted with this data package. The samples were analyzed within six months and mercury within 28 days.

3.0 Technical Summary

The following summarizes the data review for the sampling at LHAPP.

3.1 Documentation

The COC were complete and contained the required information. Any omissions were corrected and an amended COC was submitted to the laboratory. The actual methods used for sample analysis were based upon the COC.

Upon receipt at the laboratory, cooler receipt forms were completed and are included as part of the laboratory data package. All holding times for extraction and analyses were met.

3.2 Completeness

The 90% completeness goal was met as set forth in the USACE Engineering Manual 200-1-3 (February, 2001). None of the data were rejected, although some data was qualified estimated. Valid data are non-qualified data and estimated data.

- Data reported between the MDL and reporting limit (RL) were "J" flagged with reason code 15 (quantitation estimated).
- The total lead value was qualified "J" with a validation qualifier code 13 (serial dilution criterion exceeded

3.3 Conclusion

An overall review of the samples collected indicates that the chain of custody procedures and laboratory analyses have been conducted in an acceptable manner according to the USEPA Contract Laboratory Program, National Functional Guidelines for Organic Data Review, Office of Emergency and Remedial Response, U.S. Environmental Protection Agency, Washington, D.C. (October 1999).

4.0 References

Shaw Environmental, Inc, (revised 2002), *Standard Operating Procedure Manual,* Houston, Texas.

United States Environmental Protection Agency (USEPA), 1997, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, Update III,* Washington, D.C.

Department of the Army, U.S. Army Corps of Engineers, Requirements for the Preparation of Sampling and Analysis Plans USACE Engineering Manual 200-1-3 (February 2001).

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ATTACHMENT A

VALIDATION QUALIFIERS AND VALIDATION REASON CODE DEFINITIONS

VALIDATION QUALIFIER DEFINITIONS

Qualifier	Definition
U	Not detected. The analyte was analyzed for, but not detected above the associated reporting limit,
J	The analyte was positively identified; the reported value is the estimated concentration of the constituent detected in the sample analyzed.
B	The concentration reported was detected in the associated method blank, trip blank, or equipment blank within 5X/10X the blank concentration.
R	The reported results are rejected due to 1. Severe deficiencies in the supporting quality control data; 2. Anomalies noted in the sampling or analysis process. 3. the presence or absence of the constituent cannot be verified based on the data provided. 4. To indicate not to use a particular result in the event of a reanalysis.
UJ	The analyte was analyzed for, but not detected above the established reporting limit. However, review and evaluation of supporting QC data have indicated that the "non-detect" may be inaccurate or imprecise. The non-detect result should be estimated.
L	Result may be biased low. Details are provided in the validation report.
H	Result may be biased high. Details are provided in the validation report.

VALIDATION REASON CODE DEFINITIONS

Reason Code	Description
01	Sample received outside of 4 +/-2 degrees Celsius
01A	Improper sample preservation
02	Holding time exceeded
02A	Extraction
02B	Analysis
03	Instrument performance outside criteria
03A	BFB tune for GC/MS volatiles
03B	DFTPP tune for GC/MS semivolatiles
03C	DDT and/or endrin % breakdown exceeds criteria
03D	Retention time windows
03E	Resolution
04	Initial calibration results outside specified criteria
04A	Compound mean RRF QC criteria not met
04B	Individual % RSD criteria not met
04C	Correlation coefficient < 0.995
05	Continuing calibration results outsides specified criteria
05A	Compound mean RRF QC criteria not met
05B	Compound %deviation QC criteria not met
06	Result qualified as a results of the 5X/10X blank correction
06A	Method or preparation blank
06B	Initial calibration blank (ICB) or continuing calibration blank (CCB)
06C	Equipment rinsate
06D	Trip blank
06E	Field blank
07	Surrogate recoveries outside control limits
07A	Sample
07B	Associated method blank or LCS
08	MS/MSD/duplicate results outside criteria
08A	MS and/or MSD recovery not within control limits (accuracy)
08B	% RPD outside acceptance criteria (precision)

VALIDATION REASON CODE DEFINITIONS (continued)

Reason Code	Description
09	Post digestion spike outside criteria (GFAA)
10	Internal standards outside specified control limits
10A	Recovery
10B	Retention time
11	Laboratory control sample recoveries outside specified control limits
11A	Recovery
11B	% RPD (if run in duplicate)
12	Interference check standard
13	Serial dilution
14	Tentatively identified compounds
15	Quantitation
16	Multiple results available; alternate analysis preferred
17	Field duplicate RPD criteria is exceeded
18	Percent difference between original and second column exceeds QC criteria
19	Professional judgment was used to qualify the data
20	Pesticide clean-up checks
21	Target compound identification
22	Radiological calibration
23	Radiological quantitation
24	Reported result and/or lab qualifier revised to reflect validation findings

SHAW ENVIRONMENTAL, INC.
TECHNICAL SERVICE GROUP
ANALYTICAL DATA EVALUATION

The Project Chemist reviewed the attached Data Package. Detailed comments concerning specific analyses (i.e. GC/MS Semivolatiles) are provided in the attached review sheets. Any additional comments concerning the data package as a whole are listed below

Site/Location: Longhorn
Project No.: 345774
Laboratory: Kemron
Report No.: ~~L050250~~ L0503144

COMMENTS:

Total lead & Mercury

Data Reviewed by: Diane Meyer Date: 3/16/05
Diane Meyer
Project Chemist

DATA COMPLETENESS				
	REQUIREMENTS	**Y**	**N**	**NA**
Cooler Receipt Form	Cooler receipt form present?	✓		
	Documentation of broken bottles, bubbles in VOA vials, missing labels, seals, etc.?	✓		
	Was the cooler temperature upon receipt at the laboratory between 2° and 6° F?	✓		
	Was the pH of the sample acceptable?			✓
Chain of Custody	Original chain of custody/analytical request form present and complete?	✓		
	Signature, dates, and times complete?	✓		
	Comparison of the reported parameters to the request on the chain of custody?	✓		
	Each sample number transcribed by the laboratory?	✓		
	Cross reference of field sample number, laboratory number and analytical batch?	✓		
	Correct sample collection date given for each sample?	✓		
Laboratory Reports	Date of preparation / extraction for each sample?	✓		
	Date analyzed for each sample?	✓		
	Dilution factors for samples?	✓		
	Detection / Quantitation limits reported as specified?	✓		
	Sample analytical results?	✓		
	Results reported for method blanks?	✓		
	Results reported for trip blanks (VOCs only)?			✓
	Results reported for laboratory duplicates (inorganic and radiological only)?			✓
QC Reports	Matrix Spike (MS) /Matrix Spike Duplicates (MSD) % recoveries and RPDs reported?			
	Laboratory Control Samples (LCS) / LCS Duplicates (LCSD) % recoveries and RPDs reported?			
	Surrogate values provided (organic samples only)?			✓
	Raw data provided for analysis, if applicable?			✓

If "NO," then List all samples on attached sheets

Relog of L05 02503 for total lead and mercury

TIER 1 DATA REVIEW – INORGANIC ANALYSIS

ANALYSIS: lead - 6010B MATRIX: LIQUID

EPA METHOD: Mercury - 7471A SOLID/SOIL X TCLP

BY: GF OR (ICP)

REQUIREMENTS		Y	N	NA
Method / Preparation Blank	Every Batch or 20 Sample All Compounds <IDL / (MDL) / RL	✓ ✓		
Equipment Rinsate Sample	All Compounds <IDL / MDL / RL			✓
Matrix Spike Recovery Values	75-125% Recovery or Lab Limits	✓		
Matrix Spike Duplicate Recovery Values	75-125% Recovery or Lab Limits	✓		
Matrix Spike / Matrix Spike Duplicate	<20%	✓		
Laboratory Control Sample (LCS) Analysis	80-120% Recovery	✓		
ICP Serial Dilutions	<10% difference when the amount is greater than 50 X IDL		✓	✓ am
Field Duplicate Evaluation	Ratio <2.0 for Water			✓
	Ratio <5.0 for Soil			✓

post digestion spike ok

If "NO," then list

Method Blank or Equipment Rinsate

Blank ID	Sample ID	Date Collected	Type of Analysis	Analyte	Concentration (units)

Matrix Spike / Matrix Spike Duplicate Results and Field Duplicate

Sample Type	Sample ID	Analyte	MS Recovery	MSD Recovery	Result -1	Result - 2	RPD%

Laboratory Control Sample Analysis and Duplicate Sample Analysis

Analysis Type / Element	Recovery %

ICP Serial Dilutions

Analysis Type / Element	Concentration True	Concentration Found	Percent Recovery
ICP/Pb : 11.7% - Qualify Pb result J-code 13			

No case narrative, or ~~Calibration~~ Calibration data provided

156 Starlite Drive, Marietta, OH 45750 ● TEL 740-373-4071 ● FAX 740-373-4835 ● http://www.kemron.com

Laboratory Report Number: L0505399

Please find enclosed the analytical results for the samples you submitted to KEMRON Environmental Services.

Review and compilation of your report was completed by KEMRON's Sales and Service Team. If you have questions, comments or require further assistance regarding this report, please contact our team member noted in the Reviewed box below at 800-373-4071. Team member e-mail addresses also appear here for your convenience.

Debra Elliott - Team Leader
delliott@kemron-lab.com

Amanda Fickiesen - Client Services Specialist
afickiesen@kemron-lab.com

Cheryl Koelsch - Team Chemist/Data Specialist
ckoelsch@kemron-lab.com

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Vicki Lauer - Client Services Specialist
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Kathy Albertson - Team Chemist/Data Specialist
kalbertson@kemron-lab.com

Micalyn Harris - Team Chemist/Data Specialist
mharris@kemron-lab.com

This report was reviewed on May 25, 2005:

Stephanie Mossburg

I certify that all test results meet all of the requirments of the NELAP standards and other applicable contract terms and conditions. All results for soil samples are reported on a 'dry-weight' basis unless specified otherwise. Analytical results for water and wastes are reported on an 'as received' basis unless specified otherwise. A statement of uncertainty for each analysis is available upon request. This laboratory report shall not be reproduced, except in full, without the written approval of KEMRON Environmental Services.

This report was certified on May 25, 2005:

David E. Vanderberg

FL DOH NELAP ID: E87551

This report contains a total of **169** pages.

Protecting Our Environmental Future

LABORATORY REPORT

00074285

L0505399

05/25/05 14:32

Submitted By

KEMRON Environmental Services
156 Starlite Drive
Marietta , OH 45750
(740) 373 - 4071

For

Account Name: Shaw E & I, Inc.
ABB Lummus Biulding
3010 Briarpark
Houston, TX 77042
Attention: Diane Mever

Account Number: 307-ALLIANCE-798
Work ID: LONGHORN AAP

P.O. Number: 98696

Sample Summary

Client ID	Lab ID	Date Collected	Date Received
49WW01-MAY05	L0505399-01	17-MAY-05	18-MAY-05
49WW01-MAY05	L0505399-02	17-MAY-05	18-MAY-05
49WW01-MAY05-MS	L0505399-03	17-MAY-05	18-MAY-05
49WW01-MAY05-MS	L0505399-04	17-MAY-05	18-MAY-05
49WW01-MAY05-MSD	L0505399-05	17-MAY-05	18-MAY-05
49WW01-MAY05-MSD	L0505399-06	17-MAY-05	18-MAY-05
49WW02-MAY05	L0505399-07	17-MAY-05	18-MAY-05
49WW02-MAY05	L0505399-08	17-MAY-05	18-MAY-05
49WW03-MAY05	L0505399-09	17-MAY-05	18-MAY-05
49WW03-MAY05-D	L0505399-10	17-MAY-05	18-MAY-05
49WW03-MAY05	L0505399-11	17-MAY-05	18-MAY-05
49WW03-MAY05-D	L0505399-12	17-MAY-05	18-MAY-05

KEMRON ENVIRONMENTAL SERVICES
REPORT NARRATIVE

KEMRON Login No.: L0505399

CHAIN OF CUSTODY: The chain of custody number was LHAAP-031

SHIPMENT CONDITIONS: The chain of custody forms were received sealed in a cooler. The cooler temperature was 1 degrees C.

SAMPLE MANAGEMENT: All samples received were intact.

I certify that this data package is in compliance with the terms and conditions agreed to by the client and KEMRON Environmental Services, both technically and for completeness, except for the conditions noted above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designated person, as verified by the following signature.

Approved: 19-MAY-05
Stephanie Mossburg

KEMRON ENVIRONMENTAL SERVICES
METALS

KEMRON Login No: L0505399

METHOD

Analysis: SW-846 6010

HOLDING TIMES

Sample Preparation: All holding times were met.

Sample Analysis: All holding times were met.

PREPARATION

Sample preparation proceeded normally.

CALIBRATION

Initial Calibrations: All acceptance criteria were met.

Alternate Source Standards: All acceptance criteria were met.

Continuing Calibration: WG189586(6010) - Due to continuing calibration verification failure for sodium on 23-MAY-2005 at 11:48 all QA/QC and client samples 01 thru 12 were analyzed on a different calibration for sodium.

BATCH QA/QC

Method Blank: All acceptance criteria were met.

Laboratory Control Sample: All acceptance criteria were met.

MS/MSD: WG189586(6010) - Samples 01,02 was chosen by the client for MS/MSD analysis. Samples 03,04(MS) and 05,06(MSD) yielded % recoveries out of limits for three elements.

Serial Dilution/Post Digestion Spike: WG189586(6010) - All acceptance criteria were met.

SAMPLES

WG189586(6010) - Client samples 09 and 11 yielded results for arsenic that were noncompliant on the negative side on initial analysis. The samples were reanalyzed at dilutions for arsenic. Sodium for client samples 01-12 yielded results which exceeded the linear range upon initial analysis. The samples were analyzed at dilutions for sodium.

I certify that this data package is in compliance with the terms and conditions agreed to by the client and KEMRON Environmental Services, both technically and for completeness, except for the conditions noted above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designated person, as verified by the following signature.

Analyst: KHR,MMB

Approved: 25-MAY-05
Maren Berry

KEMRON ENVIRONMENTAL SERVICES
METALS

KEMRON Login No: L0505399

METHOD

Analysis: SW-846 6020

HOLDING TIMES

Sample Preparation: All holding times were met.

Sample Analysis: All holding times were met.

PREPARATION

Sample preparation proceeded normally.

CALIBRATION

Initial Calibrations: All acceptance criteria were met.

Alternate Source Standards: All acceptance criteria were met.

Continuing Calibration: All acceptance criteria were met.

BATCH QA/QC

Method Blank: All acceptance criteria were met.

Laboratory Control Sample: All acceptance criteria were met.

MS/MSD: WG189691(6020) - Sample 01 and 02 were chosen by the client for MS/MSD analysis. All acceptance criteria were met.

Serial Dilution/Post Digestion Spike: WG189691(6020) - All acceptance criteria were met.

SAMPLES

All acceptance criteria were met.

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Analyst: JYH

Approved: 25-MAY-05
Maren Berry

KEMRON ENVIRONMENTAL SERVICES
METALS

KEMRON Login No: L0505399

METHOD

Analysis: 7470A

HOLDING TIMES

Sample Preparation: All holding times were met.

Sample Analysis: All holding times were met.

PREPARATION

Sample preparation proceeded normally.

CALIBRATION

Initial Calibrations: All acceptance criteria were met.

Alternate Source Standards: All acceptance criteria were met.

Continuing Calibration: WG189622(7470A) - Due to a non-compliant CCB (23-MAY-2005 at 17:44) client samples 06(MSD) ,07, 08, 09, 10, 11(DUP) and 12(DUP) were reanalyzed later in the run (23-May-2005 starting at 17:59) where the bracketing CCB's were compliant.

BATCH QA/QC

Method Blank: All acceptance criteria were met.

Laboratory Control Sample: All acceptance criteria were met.

MS/MSD: WG189622(7470A) - Sample 01 was chosen by the client for MS/MSD analysis. Samples 03(MS) and 05(MSD) met all acceptance criteria. Sample 02 was chosen by the client for MS/MSD analysis. Samples 04(MS) and 06(MSD) met all acceptance criteria.

Serial Dilution/Post Digestion Spike: WG189622(7470A) - All acceptance criteria were met.

SAMPLES

All acceptance criteria were met.

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Analyst: CRC

Approved: 25-MAY-05
Maren Berry

KEMRON ENVIRONMENTAL SERVICES
METALS

KEMRON Login No: L0505399

METHOD

Analysis: 7470A

HOLDING TIMES

Sample Preparation: All holding times were met.

Sample Analysis: All holding times were met.

PREPARATION

Sample preparation proceeded normally.

CALIBRATION

Initial Calibrations: All acceptance criteria were met.

Alternate Source Standards: All acceptance criteria were met.

Continuing Calibration: WG189622(7470A) - Due to a non-compliant CCB (23-MAY-2005 at 17:44) client samples 06(MSD) ,07, 08, 09, 10, 11(DUP) and 12(DUP) were reanalyzed later in the run (23-May-2005 starting at 17:59) where the bracketing CCB's were compliant.

BATCH QA/QC

Method Blank: All acceptance criteria were met.

Laboratory Control Sample: All acceptance criteria were met.

MS/MSD: WG189622(7470A) - Sample 01 was chosen by the client for MS/MSD analysis. Samples 03(MS) and 05(MSD) met all acceptance criteria. Sample 02 was chosen by the client for MS/MSD analysis. Samples 04(MS) and 06(MSD) met all acceptance criteria.

Serial Dilution/Post Digestion Spike: WG189622(7470A) - All acceptance criteria were met.

SAMPLES

All acceptance criteria were met.

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Analyst: CRC

Approved: 25-MAY-05
Maren Berry

KEMRON ENVIRONMENTAL SERVICES
METALS

KEMRON Login No: L0505399

METHOD

Analysis: 7470A

HOLDING TIMES

Sample Preparation: All holding times were met.

Sample Analysis: All holding times were met.

PREPARATION

Sample preparation proceeded normally.

CALIBRATION

Initial Calibrations: All acceptance criteria were met.

Alternate Source Standards: All acceptance criteria were met.

Continuing Calibration: WG189622(7470A) - Due to a non-compliant CCB (23-MAY-2005 at 17:44) client samples 06(MSD) ,07, 08, 09, 10, 11(DUP) and 12(DUP) were reanalyzed later in the run (23-May-2005 starting at 17:59) where the bracketing CCB's were compliant.

BATCH QA/QC

Method Blank: All acceptance criteria were met.

Laboratory Control Sample: All acceptance criteria were met.

MS/MSD: WG189622(7470A) - Sample 01 was chosen by the client for MS/MSD analysis. Samples 03(MS) and 05(MSD) met all acceptance criteria. Sample 02 was chosen by the client for MS/MSD analysis. Samples 04(MS) and 06(MSD) met all acceptance criteria.

Serial Dilution/Post Digestion Spike: WG189622(7470A) - All acceptance criteria were met.

SAMPLES

All acceptance criteria were met.

I certify that this data package is in compliance with the terms and conditions agreed to by the client and KEMRON Environmental Services, both technically and for completeness, except for the conditions noted above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designated person, as verified by the following signature.

Analyst: CRC

Approved: 25-MAY-05
Maren Berry

KEMRON ENVIRONMENTAL SERVICES
METALS

KEMRON Login No: L0505399

METHOD

Analysis: 7470A

HOLDING TIMES

Sample Preparation: All holding times were met.

Sample Analysis: All holding times were met.

PREPARATION

Sample preparation proceeded normally.

CALIBRATION

Initial Calibrations: All acceptance criteria were met.

Alternate Source Standards: All acceptance criteria were met.

Continuing Calibration: WG189622(7470A) - Due to a non-compliant CCB (23-MAY-2005 at 17:44) client samples 06(MSD) ,07, 08, 09, 10, 11(DUP) and 12(DUP) were reanalyzed later in the run (23-May-2005 starting at 17:59) where the bracketing CCB's were compliant.

BATCH QA/QC

Method Blank: All acceptance criteria were met.

Laboratory Control Sample: All acceptance criteria were met.

MS/MSD: WG189622(7470A) - Sample 01 was chosen by the client for MS/MSD analysis. Samples 03(MS) and 05(MSD) met all acceptance criteria. Sample 02 was chosen by the client for MS/MSD analysis. Samples 04(MS) and 06(MSD) met all acceptance criteria.

Serial Dilution/Post Digestion Spike: WG189622(7470A) - All acceptance criteria were met.

SAMPLES

All acceptance criteria were met.

I certify that this data package is in compliance with the terms and conditions agreed to by the client and KEMRON Environmental Services, both technically and for completeness, except for the conditions noted above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designated person, as verified by the following signature.

Analyst: CRC

Approved: 25-MAY-05
Maren Berry

Report Number: **L0505399**
Report Date : **May 25, 2005**

Sample Number: **L0505399-01**
Client ID: **49WW01-MAY05**
Matrix: **Water**
Workgroup Number: **WG189586**
Collect Date: **17-MAY-05**
Sample Tag: **01**

Prep Method: **3005A**
Analytical Method: **6010B**
Analyst: **KHR**
Dilution: **1**
Units: **mg/L**

Instrument: **PE-ICP**
Prep Date: **05/20/2005 10:00**
Cal Date: **05/23/2005 08:36**
Run Date: **05/23/2005 11:06**
File ID: **PE.052305.110643**

Analyte	CAS. Number	Result	Qual	RL	MDL
Aluminum, Total	7429-90-5	0.614		0.100	0.0500
Silver, Total	7440-22-4		U	0.0100	0.00500
Arsenic, Total	7440-38-2		U	0.00400	0.00200
Barium, Total	7440-39-3	0.0216		0.0100	0.00250
Beryllium, Total	7440-41-7		U	0.0100	0.000250
Calcium, Total	7440-70-2	394		0.200	0.100
Cadmium, Total	7440-43-9	0.00315	J	0.0100	0.00250
Cobalt, Total	7440-48-4	0.00669	J	0.0200	0.00250
Chromium, Total	7440-47-3	0.0248		0.0200	0.00250
Copper, Total	7440-50-8	0.0103	J	0.0200	0.00500
Iron, Total	7439-89-6	0.555		0.0400	0.0200
Potassium, Total	7440-09-7	9.70		1.00	0.250
Magnesium, Total	7439-95-4	303		0.500	0.250
Manganese, Total	7439-96-5	1.22		0.0100	0.00100
Nickel, Total	7440-02-0	0.0616		0.0400	0.00500
Lead, Total	7439-92-1	0.0100		0.00500	0.00250
Vanadium, Total	7440-62-2		U	0.0100	0.00500
Zinc, Total	7440-66-6		U	0.0200	0.00500

J The analyte was positively identified, but the quantitation was below the RL
U Not detected at or above adjusted sample detection limit

Sample Number: **L0505399-01**
Client ID: **49WW01-MAY05**
Matrix: **Water**
Workgroup Number: **WG189586**
Collect Date: **17-MAY-05**
Sample Tag: **DL01**

Prep Method: **3005A**
Analytical Method: **6010B**
Analyst: **MMB**
Dilution: **100**
Units: **mg/L**

Instrument: **PE-ICP2**
Prep Date: **05/20/2005 10:00**
Cal Date: **05/23/2005 10:48**
Run Date: **05/23/2005 16:39**
File ID: **P2.052305.163959**

Analyte	CAS. Number	Result	Qual	RL	MDL
Sodium, Total	7440-23-5	448		50.0	25.0

Sample Number: **L0505399-01**
Client ID: **49WW01-MAY05**
Matrix: **Water**
Workgroup Number: **WG189691**
Collect Date: **17-MAY-05**
Sample Tag: **01**

Prep Method: **3015**
Analytical Method: **6020**
Analyst: **JYH**
Dilution: **1**
Units: **mg/L**

Instrument: **ELAN-ICP**
Prep Date: **05/20/2005 09:30**
Cal Date: **05/24/2005 11:19**
Run Date: **05/24/2005 12:17**
File ID: **EL.052405.121724**

Analyte	CAS. Number	Result	Qual	RL	MDL
Antimony, Total	7440-36-0	0.000594	J	0.00100	0.000500
Selenium, Total	7782-49-2	0.0171		0.00100	0.000500
Thallium, Total	7440-28-0		U	0.000200	0.000100

J The analyte was positively identified, but the quantitation was below the RL
U Not detected at or above adjusted sample detection limit

Report Number: **L0505399**
Report Date : **May 25, 2005**

Sample Number: **L0505399-01** | Prep Method: **METHOD** | Instrument: **HYDRA**
Client ID: **49WW01-MAY05** | Analytical Method: **7470A** | Prep Date: **05/20/2005 10:45**
Matrix: **Water** | Analyst: **CRC** | Cal Date: **05/23/2005 16:37**
Workgroup Number: **WG189622** | Dilution: **1** | Run Date: **05/23/2005 16:59**
Collect Date: **17-MAY-05** | Units: **mg/L** | File ID: **HY.052305.165950**
Sample Tag: **01**

Analyte	CAS. Number	Result	Qual	RL	MDL
Mercury	7439-97-6		U	0.000200	0.000100

U Not detected at or above adjusted sample detection limit

Sample Number: **L0505399-02** | Prep Method: **3005A** | Instrument: **PE-ICP**
Client ID: **49WW01-MAY05** | Analytical Method: **6010B** | Prep Date: **05/20/2005 10:00**
Matrix: **Water** | Analyst: **KHR** | Cal Date: **05/23/2005 08:36**
Workgroup Number: **WG189586** | Dilution: **1** | Run Date: **05/23/2005 11:22**
Collect Date: **17-MAY-05** | Units: **mg/L** | File ID: **PE.052305.112216**
Sample Tag: **01**

Analyte	CAS. Number	Result	Qual	RL	MDL
Aluminum, Dissolved	7429-90-5	0.284		0.100	0.0500
Silver, Dissolved	7440-22-4		U	0.0100	0.00500
Arsenic, Dissolved	7440-38-2		U	0.00400	0.00200
Barium, Dissolved	7440-39-3	0.0768		0.0100	0.00250
Beryllium, Dissolved	7440-41-7		U	0.0100	0.000250
Calcium, Dissolved	7440-70-2	411		0.200	0.100
Cadmium, Dissolved	7440-43-9	0.00328	J	0.0100	0.00250
Cobalt, Dissolved	7440-48-4	0.00599	J	0.0200	0.00250
Chromium, Dissolved	7440-47-3		U	0.0200	0.00250
Copper, Dissolved	7440-50-8	0.00898	J	0.0200	0.00500
Iron, Dissolved	7439-89-6	0.0358	J	0.0400	0.0200
Potassium, Dissolved	7440-09-7	9.71		1.00	0.250
Magnesium, Dissolved	7439-95-4	316		0.500	0.250
Manganese, Dissolved	7439-96-5	1.20		0.0100	0.00100
Nickel, Dissolved	7440-02-0	0.0608		0.0400	0.00500
Lead, Dissolved	7439-92-1	0.0101		0.00500	0.00250
Vanadium, Dissolved	7440-62-2		U	0.0100	0.00500
Zinc, Dissolved	7440-66-6	0.00574	J	0.0200	0.00500

J The analyte was positively identified, but the quantitation was below the RL
U Not detected at or above adjusted sample detection limit

Sample Number: **L0505399-02** | Prep Method: **3005A** | Instrument: **PE-ICP2**
Client ID: **49WW01-MAY05** | Analytical Method: **6010B** | Prep Date: **05/20/2005 10:00**
Matrix: **Water** | Analyst: **MMB** | Cal Date: **05/23/2005 10:48**
Workgroup Number: **WG189586** | Dilution: **100** | Run Date: **05/23/2005 16:58**
Collect Date: **17-MAY-05** | Units: **mg/L** | File ID: **P2.052305.165854**
Sample Tag: **DL01**

Analyte	CAS. Number	Result	Qual	RL	MDL
Sodium, Dissolved	7440-23-5	462		50.0	25.0

Report Number: **L0505399**
Report Date : **May 25, 2005**

Sample Number: **L0505399-02**
Client ID: **49WW01-MAY05**
Matrix: **Water**
Workgroup Number: **WG189691**
Collect Date: **17-MAY-05**
Sample Tag: **01**

Prep Method: **3015**
Analytical Method: **6020**
Analyst: **JYH**
Dilution: **1**
Units: **mg/L**

Instrument: **ELAN-ICP**
Prep Date: **05/20/2005 09:30**
Cal Date: **05/24/2005 11:19**
Run Date: **05/24/2005 12:22**
File ID: **EL.052405.122247**

Analyte	CAS. Number	Result	Qual	RL	MDL
Antimony, Dissolved	7440-36-0		U	0.00100	0.000500
Selenium, Dissolved	7782-49-2	0.0142		0.00100	0.000500
Thallium, Dissolved	7440-28-0		U	0.000200	0.000100

U Not detected at or above adjusted sample detection limit

Sample Number: **L0505399-02**
Client ID: **49WW01-MAY05**
Matrix: **Water**
Workgroup Number: **WG189622**
Collect Date: **17-MAY-05**
Sample Tag: **01**

Prep Method: **METHOD**
Analytical Method: **7470A**
Analyst: **CRC**
Dilution: **1**
Units: **mg/L**

Instrument: **HYDRA**
Prep Date: **05/20/2005 10:45**
Cal Date: **05/23/2005 16:37**
Run Date: **05/23/2005 17:04**
File ID: **HY.052305.170450**

Analyte	CAS. Number	Result	Qual	RL	MDL
Mercury, Dissolved	7439-97-6		U	0.000200	0.000100

U Not detected at or above adjusted sample detection limit

Sample Number: **L0505399-03**
Client ID: **49WW01-MAY05-MS**
Matrix: **Water**
Workgroup Number: **WG189586**
Collect Date: **17-MAY-05**
Sample Tag: **01**

Prep Method: **3005A**
Analytical Method: **6010B**
Analyst: **KHR**
Dilution: **1**
Units: **mg/L**

Instrument: **PE-ICP**
Prep Date: **05/20/2005 10:00**
Cal Date: **05/23/2005 08:36**
Run Date: **05/23/2005 11:11**
File ID: **PE.052305.111153**

Analyte	CAS. Number	Result	Qual	RL	MDL
Aluminum, Total	7429-90-5	6.86		0.100	0.0500
Silver, Total	7440-22-4	0.230		0.0100	0.00500
Arsenic, Total	7440-38-2	0.227		0.00400	0.00200
Barium, Total	7440-39-3	0.517		0.0100	0.00250
Beryllium, Total	7440-41-7	0.0292		0.0100	0.000250
Calcium, Total	7440-70-2	410		0.200	0.100
Cadmium, Total	7440-43-9	0.0295		0.0100	0.00250
Cobalt, Total	7440-48-4	0.101		0.0200	0.00250
Chromium, Total	7440-47-3	0.274		0.0200	0.00250
Copper, Total	7440-50-8	0.293		0.0200	0.00500
Iron, Total	7439-89-6	2.44		0.0400	0.0200
Potassium, Total	7440-09-7	40.2		1.00	0.250
Magnesium, Total	7439-95-4	316		0.500	0.250
Manganese, Total	7439-96-5	1.49		0.0100	0.00100
Nickel, Total	7440-02-0	0.305		0.0400	0.00500
Lead, Total	7439-92-1	0.256		0.00500	0.00250
Vanadium, Total	7440-62-2	0.519		0.0100	0.00500
Zinc, Total	7440-66-6	0.486		0.0200	0.00500

Report Number: **L0505399**
Report Date : **May 25, 2005**

Sample Number: **L0505399-03** | Prep Method: **3005A** | Instrument: **PE-ICP2**
Client ID: **49WW01-MAY05-MS** | Analytical Method: **6010B** | Prep Date: **05/20/2005 10:00**
Matrix: **Water** | Analyst: **MMB** | Cal Date: **05/23/2005 10:48**
Workgroup Number: **WG189586** | Dilution: **100** | Run Date: **05/23/2005 16:46**
Collect Date: **17-MAY-05** | Units: **mg/L** | File ID: **P2.052305.164616**
Sample Tag: **DL01**

Analyte	CAS. Number	Result	Qual	RL	MDL
Sodium, Total	7440-23-5	402		50.0	25.0

Sample Number: **L0505399-03** | Prep Method: **3015** | Instrument: **ELAN-ICP**
Client ID: **49WW01-MAY05-MS** | Analytical Method: **6020** | Prep Date: **05/20/2005 09:30**
Matrix: **Water** | Analyst: **JYH** | Cal Date: **05/24/2005 11:19**
Workgroup Number: **WG189691** | Dilution: **1** | Run Date: **05/24/2005 12:28**
Collect Date: **17-MAY-05** | Units: **mg/L** | File ID: **EL.052405.122811**
Sample Tag: **01**

Analyte	CAS. Number	Result	Qual	RL	MDL
Antimony, Total	7440-36-0	0.143		0.00100	0.000500
Selenium, Total	7782-49-2	0.143		0.00100	0.000500
Thallium, Total	7440-28-0	0.116		0.000200	0.000100

Sample Number: **L0505399-03** | Prep Method: **METHOD** | Instrument: **HYDRA**
Client ID: **49WW01-MAY05-MS** | Analytical Method: **7470A** | Prep Date: **05/20/2005 10:45**
Matrix: **Water** | Analyst: **CRC** | Cal Date: **05/23/2005 16:37**
Workgroup Number: **WG189622** | Dilution: **1** | Run Date: **05/23/2005 17:07**
Collect Date: **17-MAY-05** | Units: **mg/L** | File ID: **HY.052305.170743**
Sample Tag: **01**

Analyte	CAS. Number	Result	Qual	RL	MDL
Mercury	7439-97-6	0.00457		0.000222	0.000111

Sample Number: **L0505399-04** | Prep Method: **3005A** | Instrument: **PE-ICP**
Client ID: **49WW01-MAY05-MS** | Analytical Method: **6010B** | Prep Date: **05/20/2005 10:00**
Matrix: **Water** | Analyst: **KHR** | Cal Date: **05/23/2005 08:36**
Workgroup Number: **WG189586** | Dilution: **1** | Run Date: **05/23/2005 11:27**
Collect Date: **17-MAY-05** | Units: **mg/L** | File ID: **PE.052305.112726**
Sample Tag: **01**

Analyte	CAS. Number	Result	Qual	RL	MDL
Aluminum, Dissolved	7429-90-5	6.13		0.100	0.0500
Silver, Dissolved	7440-22-4	0.227		0.0100	0.00500
Arsenic, Dissolved	7440-38-2	0.223		0.00400	0.00200
Barium, Dissolved	7440-39-3	0.579		0.0100	0.00250
Beryllium, Dissolved	7440-41-7	0.0287		0.0100	0.000250
Calcium, Dissolved	7440-70-2	408		0.200	0.100
Cadmium, Dissolved	7440-43-9	0.0291		0.0100	0.00250
Cobalt, Dissolved	7440-48-4	0.0990		0.0200	0.00250

Report Number: **L0505399**
Report Date : **May 25, 2005**

Sample Number: **L0505399-04**
Client ID: **49WW01-MAY05-MS**
Matrix: **Water**
Workgroup Number: **WG189586**
Collect Date: **17-MAY-05**
Sample Tag: **01**

Prep Method: **3005A**
Analytical Method: **6010B**
Analyst: **KHR**
Dilution: **1**
Units: **mg/L**

Instrument: **PE-ICP**
Prep Date: **05/20/2005 10:00**
Cal Date: **05/23/2005 08:36**
Run Date: **05/23/2005 11:27**
File ID: **PE.052305.112726**

Analyte	CAS. Number	Result	Qual	RL	MDL
Chromium, Dissolved	7440-47-3	0.244		0.0200	0.00250
Copper, Dissolved	7440-50-8	0.287		0.0200	0.00500
Iron, Dissolved	7439-89-6	1.96		0.0400	0.0200
Potassium, Dissolved	7440-09-7	37.8		1.00	0.250
Magnesium, Dissolved	7439-95-4	316		0.500	0.250
Manganese, Dissolved	7439-96-5	1.41		0.0100	0.00100
Nickel, Dissolved	7440-02-0	0.304		0.0400	0.00500
Lead, Dissolved	7439-92-1	0.253		0.00500	0.00250
Vanadium, Dissolved	7440-62-2	0.508		0.0100	0.00500
Zinc, Dissolved	7440-66-6	0.474		0.0200	0.00500

Sample Number: **L0505399-04**
Client ID: **49WW01-MAY05-MS**
Matrix: **Water**
Workgroup Number: **WG189586**
Collect Date: **17-MAY-05**
Sample Tag: **DL01**

Prep Method: **3005A**
Analytical Method: **6010B**
Analyst: **MMB**
Dilution: **100**
Units: **mg/L**

Instrument: **PE-ICP2**
Prep Date: **05/20/2005 10:00**
Cal Date: **05/23/2005 10:48**
Run Date: **05/23/2005 17:05**
File ID: **P2.052305.170513**

Analyte	CAS. Number	Result	Qual	RL	MDL
Sodium, Dissolved	7440-23-5	510		50.0	25.0

Sample Number: **L0505399-04**
Client ID: **49WW01-MAY05-MS**
Matrix: **Water**
Workgroup Number: **WG189691**
Collect Date: **17-MAY-05**
Sample Tag: **01**

Prep Method: **3015**
Analytical Method: **6020**
Analyst: **JYH**
Dilution: **1**
Units: **mg/L**

Instrument: **ELAN-ICP**
Prep Date: **05/20/2005 09:30**
Cal Date: **05/24/2005 11:19**
Run Date: **05/24/2005 12:33**
File ID: **EL.052405.123335**

Analyte	CAS. Number	Result	Qual	RL	MDL
Antimony, Dissolved	7440-36-0	0.152		0.00100	0.000500
Selenium, Dissolved	7782-49-2	0.152		0.00100	0.000500
Thallium, Dissolved	7440-28-0	0.124		0.000200	0.000100

Report Number: **L0505399**
Report Date : **May 25, 2005**

Sample Number: **L0505399-04**
Client ID: **49WW01-MAY05-MS**
Matrix: **Water**
Workgroup Number: **WG189622**
Collect Date: **17-MAY-05**
Sample Tag: **01**

Prep Method: **METHOD**
Analytical Method: **7470A**
Analyst: **CRC**
Dilution: **1**
Units: **mg/L**

Instrument: **HYDRA**
Prep Date: **05/20/2005 10:45**
Cal Date: **05/23/2005 16:37**
Run Date: **05/23/2005 17:10**
File ID: **HY.052305.171020**

Analyte	CAS. Number	Result	Qual	RL	MDL
Mercury, Dissolved	7439-97-6	0.00426		0.000222	0.000111

Sample Number: **L0505399-05**
Client ID: **49WW01-MAY05-MSD**
Matrix: **Water**
Workgroup Number: **WG189586**
Collect Date: **17-MAY-05**
Sample Tag: **01**

Prep Method: **3005A**
Analytical Method: **6010B**
Analyst: **KHR**
Dilution: **1**
Units: **mg/L**

Instrument: **PE-ICP**
Prep Date: **05/20/2005 10:00**
Cal Date: **05/23/2005 08:36**
Run Date: **05/23/2005 11:17**
File ID: **PE.052305.111703**

Analyte	CAS. Number	Result	Qual	RL	MDL
Aluminum, Total	7429-90-5	6.74		0.100	0.0500
Silver, Total	7440-22-4	0.229		0.0100	0.00500
Arsenic, Total	7440-38-2	0.227		0.00400	0.00200
Barium, Total	7440-39-3	0.512		0.0100	0.00250
Beryllium, Total	7440-41-7	0.0290		0.0100	0.000250
Calcium, Total	7440-70-2	408		0.200	0.100
Cadmium, Total	7440-43-9	0.0296		0.0100	0.00250
Cobalt, Total	7440-48-4	0.101		0.0200	0.00250
Chromium, Total	7440-47-3	0.271		0.0200	0.00250
Copper, Total	7440-50-8	0.292		0.0200	0.00500
Iron, Total	7439-89-6	2.41		0.0400	0.0200
Potassium, Total	7440-09-7	39.1		1.00	0.250
Magnesium, Total	7439-95-4	316		0.500	0.250
Manganese, Total	7439-96-5	1.47		0.0100	0.00100
Nickel, Total	7440-02-0	0.303		0.0400	0.00500
Lead, Total	7439-92-1	0.256		0.00500	0.00250
Vanadium, Total	7440-62-2	0.515		0.0100	0.00500
Zinc, Total	7440-66-6	0.483		0.0200	0.00500

Sample Number: **L0505399-05**
Client ID: **49WW01-MAY05-MSD**
Matrix: **Water**
Workgroup Number: **WG189586**
Collect Date: **17-MAY-05**
Sample Tag: **DL01**

Prep Method: **3005A**
Analytical Method: **6010B**
Analyst: **MMB**
Dilution: **100**
Units: **mg/L**

Instrument: **PE-ICP2**
Prep Date: **05/20/2005 10:00**
Cal Date: **05/23/2005 10:48**
Run Date: **05/23/2005 16:52**
File ID: **P2.052305.165238**

Analyte	CAS. Number	Result	Qual	RL	MDL
Sodium, Total	7440-23-5	479		50.0	25.0

Report Number: **L0505399**
Report Date : **May 25, 2005**

Sample Number: **L0505399-05**
Client ID: **49WW01-MAY05-MSD**
Matrix: **Water**
Workgroup Number: **WG189691**
Collect Date: **17-MAY-05**
Sample Tag: **01**

Prep Method: **3015**
Analytical Method: **6020**
Analyst: **JYH**
Dilution: **1**
Units: **mg/L**

Instrument: **ELAN-ICP**
Prep Date: **05/20/2005 09:30**
Cal Date: **05/24/2005 11:19**
Run Date: **05/24/2005 12:39**
File ID: **EL.052405.123900**

Analyte	CAS. Number	Result	Qual	RL	MDL
Antimony, Total	7440-36-0	0.152		0.00100	0.000500
Selenium, Total	7782-49-2	0.158		0.00100	0.000500
Thallium, Total	7440-28-0	0.123		0.000200	0.000100

Sample Number: **L0505399-05**
Client ID: **49WW01-MAY05-MSD**
Matrix: **Water**
Workgroup Number: **WG189622**
Collect Date: **17-MAY-05**
Sample Tag: **01**

Prep Method: **METHOD**
Analytical Method: **7470A**
Analyst: **CRC**
Dilution: **1**
Units: **mg/L**

Instrument: **HYDRA**
Prep Date: **05/20/2005 10:45**
Cal Date: **05/23/2005 16:37**
Run Date: **05/23/2005 17:13**
File ID: **HY.052305.171354**

Analyte	CAS. Number	Result	Qual	RL	MDL
Mercury	7439-97-6	0.00426		0.000222	0.000111

Sample Number: **L0505399-06**
Client ID: **49WW01-MAY05-MSD**
Matrix: **Water**
Workgroup Number: **WG189586**
Collect Date: **17-MAY-05**
Sample Tag: **01**

Prep Method: **3005A**
Analytical Method: **6010B**
Analyst: **KHR**
Dilution: **1**
Units: **mg/L**

Instrument: **PE-ICP**
Prep Date: **05/20/2005 10:00**
Cal Date: **05/23/2005 08:36**
Run Date: **05/23/2005 11:32**
File ID: **PE.052305.113242**

Analyte	CAS. Number	Result	Qual	RL	MDL
Aluminum, Dissolved	7429-90-5	6.25		0.100	0.0500
Silver, Dissolved	7440-22-4	0.231		0.0100	0.00500
Arsenic, Dissolved	7440-38-2	0.228		0.00400	0.00200
Barium, Dissolved	7440-39-3	0.569		0.0100	0.00250
Beryllium, Dissolved	7440-41-7	0.0293		0.0100	0.000250
Calcium, Dissolved	7440-70-2	416		0.200	0.100
Cadmium, Dissolved	7440-43-9	0.0297		0.0100	0.00250
Cobalt, Dissolved	7440-48-4	0.101		0.0200	0.00250
Chromium, Dissolved	7440-47-3	0.247		0.0200	0.00250
Copper, Dissolved	7440-50-8	0.292		0.0200	0.00500
Iron, Dissolved	7439-89-6	1.88		0.0400	0.0200
Potassium, Dissolved	7440-09-7	38.3		1.00	0.250
Magnesium, Dissolved	7439-95-4	321		0.500	0.250
Manganese, Dissolved	7439-96-5	1.42		0.0100	0.00100
Nickel, Dissolved	7440-02-0	0.302		0.0400	0.00500
Lead, Dissolved	7439-92-1	0.258		0.00500	0.00250
Vanadium, Dissolved	7440-62-2	0.519		0.0100	0.00500
Zinc, Dissolved	7440-66-6	0.481		0.0200	0.00500

Report Number: **L0505399**
Report Date : **May 25, 2005**

Sample Number: **L0505399-06** | Prep Method: **3005A** | Instrument: **PE-ICP2**
Client ID: **49WW01-MAY05-MSD** | Analytical Method: **6010B** | Prep Date: **05/20/2005 10:00**
Matrix: **Water** | Analyst: **MMB** | Cal Date: **05/23/2005 10:48**
Workgroup Number: **WG189586** | Dilution: **100** | Run Date: **05/23/2005 17:11**
Collect Date: **17-MAY-05** | Units: **mg/L** | File ID: **P2.052305.171130**
Sample Tag: **DL01**

Analyte	CAS. Number	Result	Qual	RL	MDL
Sodium, Dissolved	7440-23-5	492		50.0	25.0

Sample Number: **L0505399-06** | Prep Method: **3015** | Instrument: **ELAN-ICP**
Client ID: **49WW01-MAY05-MSD** | Analytical Method: **6020** | Prep Date: **05/20/2005 09:30**
Matrix: **Water** | Analyst: **JYH** | Cal Date: **05/24/2005 11:19**
Workgroup Number: **WG189691** | Dilution: **1** | Run Date: **05/24/2005 12:44**
Collect Date: **17-MAY-05** | Units: **mg/L** | File ID: **EL.052405.124425**
Sample Tag: **01**

Analyte	CAS. Number	Result	Qual	RL	MDL
Antimony, Dissolved	7440-36-0	0.150		0.00100	0.000500
Selenium, Dissolved	7782-49-2	0.158		0.00100	0.000500
Thallium, Dissolved	7440-28-0	0.126		0.000200	0.000100

Sample Number: **L0505399-06** | Prep Method: **METHOD** | Instrument: **HYDRA**
Client ID: **49WW01-MAY05-MSD** | Analytical Method: **7470A** | Prep Date: **05/20/2005 10:45**
Matrix: **Water** | Analyst: **CRC** | Cal Date: **05/23/2005 16:37**
Workgroup Number: **WG189622** | Dilution: **1** | Run Date: **05/23/2005 17:59**
Collect Date: **17-MAY-05** | Units: **mg/L** | File ID: **HY.052305.175909**
Sample Tag: **01**

Analyte	CAS. Number	Result	Qual	RL	MDL
Mercury, Dissolved	7439-97-6	0.00440		0.000222	0.000111

Sample Number: **L0505399-07** | Prep Method: **3005A** | Instrument: **PE-ICP**
Client ID: **49WW02-MAY05** | Analytical Method: **6010B** | Prep Date: **05/20/2005 10:00**
Matrix: **Water** | Analyst: **KHR** | Cal Date: **05/23/2005 08:36**
Workgroup Number: **WG189586** | Dilution: **1** | Run Date: **05/23/2005 11:37**
Collect Date: **17-MAY-05** | Units: **mg/L** | File ID: **PE.052305.113754**
Sample Tag: **01**

Analyte	CAS. Number	Result	Qual	RL	MDL
Aluminum, Total	7429-90-5	0.244		0.100	0.0500
Silver, Total	7440-22-4		U	0.0100	0.00500
Arsenic, Total	7440-38-2		U	0.00400	0.00200
Barium, Total	7440-39-3	0.0262		0.0100	0.00250
Beryllium, Total	7440-41-7		U	0.0100	0.000250
Calcium, Total	7440-70-2	401		0.200	0.100
Cadmium, Total	7440-43-9		U	0.0100	0.00250
Cobalt, Total	7440-48-4	0.00655	J	0.0200	0.00250

Sample Number: **L0505399-07**
Client ID: **49WW02-MAY05**
Matrix: **Water**
Workgroup Number: **WG189586**
Collect Date: **17-MAY-05**
Sample Tag: **01**

Prep Method: **3005A**
Analytical Method: **6010B**
Analyst: **KHR**
Dilution: **1**
Units: **mg/L**

Instrument: **PE-ICP**
Prep Date: **05/20/2005 10:00**
Cal Date: **05/23/2005 08:36**
Run Date: **05/23/2005 11:37**
File ID: **PE.052305.113754**

Analyte	CAS. Number	Result	Qual	RL	MDL
Chromium, Total	7440-47-3	0.0455		0.0200	0.00250
Copper, Total	7440-50-8	0.00696	J	0.0200	0.00500
Iron, Total	7439-89-6	0.370		0.0400	0.0200
Potassium, Total	7440-09-7	12.8		1.00	0.250
Magnesium, Total	7439-95-4	286		0.500	0.250
Manganese, Total	7439-96-5	0.244		0.0100	0.00100
Nickel, Total	7440-02-0	0.477		0.0400	0.00500
Lead, Total	7439-92-1	0.00881		0.00500	0.00250
Vanadium, Total	7440-62-2		U	0.0100	0.00500
Zinc, Total	7440-66-6		U	0.0200	0.00500

J The analyte was positively identified, but the quantitation was below the RL
U Not detected at or above adjusted sample detection limit

Sample Number: **L0505399-07**
Client ID: **49WW02-MAY05**
Matrix: **Water**
Workgroup Number: **WG189586**
Collect Date: **17-MAY-05**
Sample Tag: **DL01**

Prep Method: **3005A**
Analytical Method: **6010B**
Analyst: **MMB**
Dilution: **100**
Units: **mg/L**

Instrument: **PE-ICP2**
Prep Date: **05/20/2005 10:00**
Cal Date: **05/23/2005 10:48**
Run Date: **05/23/2005 17:17**
File ID: **P2.052305.171749**

Analyte	CAS. Number	Result	Qual	RL	MDL
Sodium, Total	7440-23-5	391		50.0	25.0

Sample Number: **L0505399-07**
Client ID: **49WW02-MAY05**
Matrix: **Water**
Workgroup Number: **WG189691**
Collect Date: **17-MAY-05**
Sample Tag: **01**

Prep Method: **3015**
Analytical Method: **6020**
Analyst: **JYH**
Dilution: **1**
Units: **mg/L**

Instrument: **ELAN-ICP**
Prep Date: **05/20/2005 09:30**
Cal Date: **05/24/2005 11:19**
Run Date: **05/24/2005 12:49**
File ID: **EL.052405.124950**

Analyte	CAS. Number	Result	Qual	RL	MDL
Antimony, Total	7440-36-0		U	0.00100	0.000500
Selenium, Total	7782-49-2	0.0157		0.00100	0.000500
Thallium, Total	7440-28-0	0.000486		0.000200	0.000100

U Not detected at or above adjusted sample detection limit

Sample Number: **L0505399-07**
Client ID: **49WW02-MAY05**
Matrix: **Water**
Workgroup Number: **WG189622**
Collect Date: **17-MAY-05**
Sample Tag: **01**

Prep Method: **METHOD**
Analytical Method: **7470A**
Analyst: **CRC**
Dilution: **1**
Units: **mg/L**

Instrument: **HYDRA**
Prep Date: **05/20/2005 10:45**
Cal Date: **05/23/2005 16:37**
Run Date: **05/23/2005 18:00**
File ID: **HY.052305.180047**

Analyte	CAS. Number	Result	Qual	RL	MDL
Mercury	7439-97-6		U	0.000200	0.000100

U Not detected at or above adjusted sample detection limit

Sample Number: **L0505399-08**
Client ID: **49WW02-MAY05**
Matrix: **Water**
Workgroup Number: **WG189586**
Collect Date: **17-MAY-05**
Sample Tag: **01**

Prep Method: **3005A**
Analytical Method: **6010B**
Analyst: **KHR**
Dilution: **1**
Units: **mg/L**

Instrument: **PE-ICP**
Prep Date: **05/20/2005 10:00**
Cal Date: **05/23/2005 08:36**
Run Date: **05/23/2005 12:03**
File ID: **PE.052305.120342**

Analyte	CAS. Number	Result	Qual	RL	MDL
Aluminum, Dissolved	7429-90-5	0.233		0.100	0.0500
Silver, Dissolved	7440-22-4		U	0.0100	0.00500
Arsenic, Dissolved	7440-38-2		U	0.00400	0.00200
Barium, Dissolved	7440-39-3	0.0920		0.0100	0.00250
Beryllium, Dissolved	7440-41-7		U	0.0100	0.000250
Calcium, Dissolved	7440-70-2	400		0.200	0.100
Cadmium, Dissolved	7440-43-9		U	0.0100	0.00250
Cobalt, Dissolved	7440-48-4	0.00624	J	0.0200	0.00250
Chromium, Dissolved	7440-47-3	0.0242		0.0200	0.00250
Copper, Dissolved	7440-50-8	0.00556	J	0.0200	0.00500
Iron, Dissolved	7439-89-6	0.0812		0.0400	0.0200
Potassium, Dissolved	7440-09-7	12.5		1.00	0.250
Magnesium, Dissolved	7439-95-4	287		0.500	0.250
Manganese, Dissolved	7439-96-5	0.233		0.0100	0.00100
Nickel, Dissolved	7440-02-0	0.482		0.0400	0.00500
Lead, Dissolved	7439-92-1	0.00885		0.00500	0.00250
Vanadium, Dissolved	7440-62-2		U	0.0100	0.00500
Zinc, Dissolved	7440-66-6		U	0.0200	0.00500

J The analyte was positively identified, but the quantitation was below the RL
U Not detected at or above adjusted sample detection limit

Sample Number: **L0505399-08**
Client ID: **49WW02-MAY05**
Matrix: **Water**
Workgroup Number: **WG189586**
Collect Date: **17-MAY-05**
Sample Tag: **DL01**

Prep Method: **3005A**
Analytical Method: **6010B**
Analyst: **MMB**
Dilution: **100**
Units: **mg/L**

Instrument: **PE-ICP2**
Prep Date: **05/20/2005 10:00**
Cal Date: **05/23/2005 10:48**
Run Date: **05/23/2005 17:24**
File ID: **P2.052305.172406**

Analyte	CAS. Number	Result	Qual	RL	MDL
Sodium, Dissolved	7440-23-5	401		50.0	25.0

Report Number: **L0505399**
Report Date : **May 25, 2005**

Sample Number: **L0505399-08**
Client ID: **49WW02-MAY05**
Matrix: **Water**
Workgroup Number: **WG189691**
Collect Date: **17-MAY-05**
Sample Tag: **01**

Prep Method: **3015**
Analytical Method: **6020**
Analyst: **JYH**
Dilution: **1**
Units: **mg/L**

Instrument: **ELAN-ICP**
Prep Date: **05/20/2005 09:30**
Cal Date: **05/24/2005 11:19**
Run Date: **05/24/2005 14:00**
File ID: **EL.052405.140050**

Analyte	CAS. Number	Result	Qual	RL	MDL
Antimony, Dissolved	7440-36-0		U	0.00100	0.000500
Selenium, Dissolved	7782-49-2	0.0142		0.00100	0.000500
Thallium, Dissolved	7440-28-0		U	0.000200	0.000100

U Not detected at or above adjusted sample detection limit

Sample Number: **L0505399-08**
Client ID: **49WW02-MAY05**
Matrix: **Water**
Workgroup Number: **WG189622**
Collect Date: **17-MAY-05**
Sample Tag: **01**

Prep Method: **METHOD**
Analytical Method: **7470A**
Analyst: **CRC**
Dilution: **1**
Units: **mg/L**

Instrument: **HYDRA**
Prep Date: **05/20/2005 10:45**
Cal Date: **05/23/2005 16:37**
Run Date: **05/23/2005 18:03**
File ID: **HY.052305.180315**

Analyte	CAS. Number	Result	Qual	RL	MDL
Mercury, Dissolved	7439-97-6		U	0.000200	0.000100

U Not detected at or above adjusted sample detection limit

Sample Number: **L0505399-09**
Client ID: **49WW03-MAY05**
Matrix: **Water**
Workgroup Number: **WG189586**
Collect Date: **17-MAY-05**
Sample Tag: **01**

Prep Method: **3005A**
Analytical Method: **6010B**
Analyst: **KHR**
Dilution: **1**
Units: **mg/L**

Instrument: **PE-ICP**
Prep Date: **05/20/2005 10:00**
Cal Date: **05/23/2005 08:36**
Run Date: **05/23/2005 12:08**
File ID: **PE.052305.120846**

Analyte	CAS. Number	Result	Qual	RL	MDL
Aluminum, Total	7429-90-5	0.431		0.100	0.0500
Silver, Total	7440-22-4		U	0.0100	0.00500
Barium, Total	7440-39-3	0.0687		0.0100	0.00250
Beryllium, Total	7440-41-7		U	0.0100	0.000250
Calcium, Total	7440-70-2	349		0.200	0.100
Cadmium, Total	7440-43-9		U	0.0100	0.00250
Cobalt, Total	7440-48-4	0.0120	J	0.0200	0.00250
Chromium, Total	7440-47-3	0.871		0.0200	0.00250
Copper, Total	7440-50-8	0.00998	J	0.0200	0.00500
Iron, Total	7439-89-6	2.55		0.0400	0.0200
Potassium, Total	7440-09-7	9.72		1.00	0.250
Magnesium, Total	7439-95-4	299		0.500	0.250
Manganese, Total	7439-96-5	1.69		0.0100	0.00100
Nickel, Total	7440-02-0	0.608		0.0400	0.00500
Lead, Total	7439-92-1	0.00942		0.00500	0.00250
Vanadium, Total	7440-62-2	0.00520	J	0.0100	0.00500
Zinc, Total	7440-66-6		U	0.0200	0.00500

J The analyte was positively identified, but the quantitation was below the RL
U Not detected at or above adjusted sample detection limit

Report Number: **L0505399**
Report Date : **May 25, 2005**

Sample Number: **L0505399-09** | Prep Method: **3005A** | Instrument: **PE-ICP**
Client ID: **49WW03-MAY05** | Analytical Method: **6010B** | Prep Date: **05/20/2005 10:00**
Matrix: **Water** | Analyst: **KHR** | Cal Date: **05/23/2005 08:36**
Workgroup Number: **WG189586** | Dilution: **5** | Run Date: **05/23/2005 13:21**
Collect Date: **17-MAY-05** | Units: **mg/L** | File ID: **PE.052305.132136**
Sample Tag: **DL01**

Analyte	CAS. Number	Result	Qual	RL	MDL
Arsenic, Total	7440-38-2		U	0.0200	0.0100

U Not detected at or above adjusted sample detection limit

Sample Number: **L0505399-09** | Prep Method: **3005A** | Instrument: **PE-ICP2**
Client ID: **49WW03-MAY05** | Analytical Method: **6010B** | Prep Date: **05/20/2005 10:00**
Matrix: **Water** | Analyst: **MMB** | Cal Date: **05/23/2005 10:48**
Workgroup Number: **WG189586** | Dilution: **100** | Run Date: **05/23/2005 17:55**
Collect Date: **17-MAY-05** | Units: **mg/L** | File ID: **P2.052305.175528**
Sample Tag: **DL02**

Analyte	CAS. Number	Result	Qual	RL	MDL
Sodium, Total	7440-23-5	451		50.0	25.0

Sample Number: **L0505399-09** | Prep Method: **3015** | Instrument: **ELAN-ICP**
Client ID: **49WW03-MAY05** | Analytical Method: **6020** | Prep Date: **05/20/2005 09:30**
Matrix: **Water** | Analyst: **JYH** | Cal Date: **05/24/2005 11:19**
Workgroup Number: **WG189691** | Dilution: **1** | Run Date: **05/24/2005 14:06**
Collect Date: **17-MAY-05** | Units: **mg/L** | File ID: **EL.052405.140615**
Sample Tag: **01**

Analyte	CAS. Number	Result	Qual	RL	MDL
Antimony, Total	7440-36-0		U	0.00100	0.000500
Selenium, Total	7782-49-2	0.0297		0.00100	0.000500
Thallium, Total	7440-28-0	0.000117	J	0.000200	0.000100

J The analyte was positively identified, but the quantitation was below the RL
U Not detected at or above adjusted sample detection limit

Sample Number: **L0505399-09** | Prep Method: **METHOD** | Instrument: **HYDRA**
Client ID: **49WW03-MAY05** | Analytical Method: **7470A** | Prep Date: **05/20/2005 10:45**
Matrix: **Water** | Analyst: **CRC** | Cal Date: **05/23/2005 16:37**
Workgroup Number: **WG189622** | Dilution: **1** | Run Date: **05/23/2005 18:04**
Collect Date: **17-MAY-05** | Units: **mg/L** | File ID: **HY.052305.180454**
Sample Tag: **01**

Analyte	CAS. Number	Result	Qual	RL	MDL
Mercury	7439-97-6		U	0.000200	0.000100

U Not detected at or above adjusted sample detection limit

Sample Number: **L0505399-10**
Client ID: **49WW03-MAY05-D**
Matrix: **Water**
Workgroup Number: **WG189586**
Collect Date: **17-MAY-05**
Sample Tag: **01**

Prep Method: **3005A**
Analytical Method: **6010B**
Analyst: **KHR**
Dilution: **1**
Units: **mg/L**

Instrument: **PE-ICP**
Prep Date: **05/20/2005 10:00**
Cal Date: **05/23/2005 08:36**
Run Date: **05/23/2005 12:18**
File ID: **PE.052305.121857**

Analyte	CAS. Number	Result	Qual	RL	MDL
Aluminum, Dissolved	7429-90-5	0.244		0.100	0.0500
Silver, Dissolved	7440-22-4		U	0.0100	0.00500
Arsenic, Dissolved	7440-38-2		U	0.00400	0.00200
Barium, Dissolved	7440-39-3	0.137		0.0100	0.00250
Beryllium, Dissolved	7440-41-7		U	0.0100	0.000250
Calcium, Dissolved	7440-70-2	356		0.200	0.100
Cadmium, Dissolved	7440-43-9		U	0.0100	0.00250
Cobalt, Dissolved	7440-48-4	0.00718	J	0.0200	0.00250
Chromium, Dissolved	7440-47-3	0.0105	J	0.0200	0.00250
Copper, Dissolved	7440-50-8	0.00554	J	0.0200	0.00500
Iron, Dissolved	7439-89-6		U	0.0400	0.0200
Potassium, Dissolved	7440-09-7	10.1		1.00	0.250
Magnesium, Dissolved	7439-95-4	306		0.500	0.250
Manganese, Dissolved	7439-96-5	1.55		0.0100	0.00100
Nickel, Dissolved	7440-02-0	0.562		0.0400	0.00500
Lead, Dissolved	7439-92-1	0.00903		0.00500	0.00250
Vanadium, Dissolved	7440-62-2		U	0.0100	0.00500
Zinc, Dissolved	7440-66-6		U	0.0200	0.00500

J The analyte was positively identified, but the quantitation was below the RL
U Not detected at or above adjusted sample detection limit

Sample Number: **L0505399-10**
Client ID: **49WW03-MAY05-D**
Matrix: **Water**
Workgroup Number: **WG189586**
Collect Date: **17-MAY-05**
Sample Tag: **DL01**

Prep Method: **3005A**
Analytical Method: **6010B**
Analyst: **MMB**
Dilution: **100**
Units: **mg/L**

Instrument: **PE-ICP2**
Prep Date: **05/20/2005 10:00**
Cal Date: **05/23/2005 10:48**
Run Date: **05/23/2005 18:08**
File ID: **P2.052305.180804**

Analyte	CAS. Number	Result	Qual	RL	MDL
Sodium, Dissolved	7440-23-5	435		50.0	25.0

Sample Number: **L0505399-10**
Client ID: **49WW03-MAY05-D**
Matrix: **Water**
Workgroup Number: **WG189691**
Collect Date: **17-MAY-05**
Sample Tag: **01**

Prep Method: **3015**
Analytical Method: **6020**
Analyst: **JYH**
Dilution: **1**
Units: **mg/L**

Instrument: **ELAN-ICP**
Prep Date: **05/20/2005 09:30**
Cal Date: **05/24/2005 11:19**
Run Date: **05/24/2005 14:11**
File ID: **EL.052405.141139**

Analyte	CAS. Number	Result	Qual	RL	MDL
Antimony, Dissolved	7440-36-0		U	0.00100	0.000500
Selenium, Dissolved	7782-49-2	0.0313		0.00100	0.000500
Thallium, Dissolved	7440-28-0		U	0.000200	0.000100

U Not detected at or above adjusted sample detection limit

Sample Number: **L0505399-10**
Client ID: **49WW03-MAY05-D**
Matrix: **Water**
Workgroup Number: **WG189622**
Collect Date: **17-MAY-05**
Sample Tag: **01**

Prep Method: **METHOD**
Analytical Method: **7470A**
Analyst: **CRC**
Dilution: **1**
Units: **mg/L**

Instrument: **HYDRA**
Prep Date: **05/20/2005 10:45**
Cal Date: **05/23/2005 16:37**
Run Date: **05/23/2005 18:07**
File ID: **HY.052305.180731**

Analyte	CAS. Number	Result	Qual	RL	MDL
Mercury, Dissolved	7439-97-6		U	0.000200	0.000100

U Not detected at or above adjusted sample detection limit

Sample Number: **L0505399-11**
Client ID: **49WW03-MAY05**
Matrix: **Water**
Workgroup Number: **WG189586**
Collect Date: **17-MAY-05**
Sample Tag: **01**

Prep Method: **3005A**
Analytical Method: **6010B**
Analyst: **KHR**
Dilution: **1**
Units: **mg/L**

Instrument: **PE-ICP**
Prep Date: **05/20/2005 10:00**
Cal Date: **05/23/2005 08:36**
Run Date: **05/23/2005 12:13**
File ID: **PE.052305.121351**

Analyte	CAS. Number	Result	Qual	RL	MDL
Aluminum, Total	7429-90-5	0.414		0.100	0.0500
Silver, Total	7440-22-4		U	0.0100	0.00500
Barium, Total	7440-39-3	0.0684		0.0100	0.00250
Beryllium, Total	7440-41-7		U	0.0100	0.000250
Calcium, Total	7440-70-2	353		0.200	0.100
Cadmium, Total	7440-43-9		U	0.0100	0.00250
Cobalt, Total	7440-48-4	0.0101	J	0.0200	0.00250
Chromium, Total	7440-47-3	0.296		0.0200	0.00250
Copper, Total	7440-50-8	0.0102	J	0.0200	0.00500
Iron, Total	7439-89-6	2.59		0.0400	0.0200
Potassium, Total	7440-09-7	10.1		1.00	0.250
Magnesium, Total	7439-95-4	303		0.500	0.250
Manganese, Total	7439-96-5	1.60		0.0100	0.00100
Nickel, Total	7440-02-0	0.609		0.0400	0.00500
Lead, Total	7439-92-1	0.00868		0.00500	0.00250
Vanadium, Total	7440-62-2		U	0.0100	0.00500
Zinc, Total	7440-66-6		U	0.0200	0.00500

J The analyte was positively identified, but the quantitation was below the RL
U Not detected at or above adjusted sample detection limit

Sample Number: **L0505399-11**
Client ID: **49WW03-MAY05**
Matrix: **Water**
Workgroup Number: **WG189586**
Collect Date: **17-MAY-05**
Sample Tag: **DL01**

Prep Method: **3005A**
Analytical Method: **6010B**
Analyst: **KHR**
Dilution: **5**
Units: **mg/L**

Instrument: **PE-ICP**
Prep Date: **05/20/2005 10:00**
Cal Date: **05/23/2005 08:36**
Run Date: **05/23/2005 13:26**
File ID: **PE.052305.132647**

Analyte	CAS. Number	Result	Qual	RL	MDL
Arsenic, Total	7440-38-2		U	0.0200	0.0100

U Not detected at or above adjusted sample detection limit

Report Number: **L0505399**
Report Date : **May 25, 2005**

Sample Number: **L0505399-11** | Prep Method: **3005A** | Instrument: **PE-ICP2**
Client ID: **49WW03-MAY05** | Analytical Method: **6010B** | Prep Date: **05/20/2005 10:00**
Matrix: **Water** | Analyst: **MMB** | Cal Date: **05/23/2005 10:48**
Workgroup Number: **WG189586** | Dilution: **100** | Run Date: **05/23/2005 18:01**
Collect Date: **17-MAY-05** | Units: **mg/L** | File ID: **P2.052305.180146**
Sample Tag: **DL02**

Analyte	CAS. Number	Result	Qual	RL	MDL
Sodium, Total	7440-23-5	459		50.0	25.0

Sample Number: **L0505399-11** | Prep Method: **3015** | Instrument: **ELAN-ICP**
Client ID: **49WW03-MAY05** | Analytical Method: **6020** | Prep Date: **05/20/2005 09:30**
Matrix: **Water** | Analyst: **JYH** | Cal Date: **05/24/2005 11:19**
Workgroup Number: **WG189691** | Dilution: **1** | Run Date: **05/24/2005 14:17**
Collect Date: **17-MAY-05** | Units: **mg/L** | File ID: **EL.052405.141704**
Sample Tag: **01**

Analyte	CAS. Number	Result	Qual	RL	MDL
Antimony, Total	7440-36-0		U	0.00100	0.000500
Selenium, Total	7782-49-2	0.0321		0.00100	0.000500
Thallium, Total	7440-28-0	0.000111	J	0.000200	0.000100

J The analyte was positively identified, but the quantitation was below the RL
U Not detected at or above adjusted sample detection limit

Sample Number: **L0505399-11** | Prep Method: **METHOD** | Instrument: **HYDRA**
Client ID: **49WW03-MAY05** | Analytical Method: **7470A** | Prep Date: **05/20/2005 10:45**
Matrix: **Water** | Analyst: **CRC** | Cal Date: **05/23/2005 16:37**
Workgroup Number: **WG189622** | Dilution: **1** | Run Date: **05/23/2005 18:09**
Collect Date: **17-MAY-05** | Units: **mg/L** | File ID: **HY.052305.180931**
Sample Tag: **01**

Analyte	CAS. Number	Result	Qual	RL	MDL
Mercury	7439-97-6		U	0.000200	0.000100

U Not detected at or above adjusted sample detection limit

Sample Number: **L0505399-12** | Prep Method: **3005A** | Instrument: **PE-ICP**
Client ID: **49WW03-MAY05-D** | Analytical Method: **6010B** | Prep Date: **05/20/2005 10:00**
Matrix: **Water** | Analyst: **KHR** | Cal Date: **05/23/2005 08:36**
Workgroup Number: **WG189586** | Dilution: **1** | Run Date: **05/23/2005 12:24**
Collect Date: **17-MAY-05** | Units: **mg/L** | File ID: **PE.052305.122403**
Sample Tag: **01**

Analyte	CAS. Number	Result	Qual	RL	MDL
Aluminum, Dissolved	7429-90-5	0.247		0.100	0.0500
Silver, Dissolved	7440-22-4		U	0.0100	0.00500
Arsenic, Dissolved	7440-38-2		U	0.00400	0.00200
Barium, Dissolved	7440-39-3	0.125		0.0100	0.00250
Beryllium, Dissolved	7440-41-7		U	0.0100	0.000250
Calcium, Dissolved	7440-70-2	370		0.200	0.100
Cadmium, Dissolved	7440-43-9		U	0.0100	0.00250

Report Number: **L0505399**
Report Date : **May 25, 2005**

Sample Number: **L0505399-12** | Prep Method: **3005A** | Instrument: **PE-ICP**
Client ID: **49WW03-MAY05-D** | Analytical Method: **6010B** | Prep Date: **05/20/2005 10:00**
Matrix: **Water** | Analyst: **KHR** | Cal Date: **05/23/2005 08:36**
Workgroup Number: **WG189586** | Dilution: **1** | Run Date: **05/23/2005 12:24**
Collect Date: **17-MAY-05** | Units: **mg/L** | File ID: **PE.052305.122403**
Sample Tag: **01**

Analyte	CAS. Number	Result	Qual	RL	MDL
Cobalt, Dissolved	7440-48-4	0.00747	J	0.0200	0.00250
Chromium, Dissolved	7440-47-3		U	0.0200	0.00250
Copper, Dissolved	7440-50-8	0.00584	J	0.0200	0.00500
Iron, Dissolved	7439-89-6		U	0.0400	0.0200
Potassium, Dissolved	7440-09-7	10.2		1.00	0.250
Magnesium, Dissolved	7439-95-4	314		0.500	0.250
Manganese, Dissolved	7439-96-5	1.48		0.0100	0.00100
Nickel, Dissolved	7440-02-0	0.590		0.0400	0.00500
Lead, Dissolved	7439-92-1	0.00901		0.00500	0.00250
Vanadium, Dissolved	7440-62-2		U	0.0100	0.00500
Zinc, Dissolved	7440-66-6		U	0.0200	0.00500

J The analyte was positively identified, but the quantitation was below the RL
U Not detected at or above adjusted sample detection limit

Sample Number: **L0505399-12** | Prep Method: **3005A** | Instrument: **PE-ICP2**
Client ID: **49WW03-MAY05-D** | Analytical Method: **6010B** | Prep Date: **05/20/2005 10:00**
Matrix: **Water** | Analyst: **MMB** | Cal Date: **05/23/2005 10:48**
Workgroup Number: **WG189586** | Dilution: **100** | Run Date: **05/23/2005 18:14**
Collect Date: **17-MAY-05** | Units: **mg/L** | File ID: **P2.052305.181422**
Sample Tag: **DL01**

Analyte	CAS. Number	Result	Qual	RL	MDL
Sodium, Dissolved	7440-23-5	474		50.0	25.0

Sample Number: **L0505399-12** | Prep Method: **3015** | Instrument: **ELAN-ICP**
Client ID: **49WW03-MAY05-D** | Analytical Method: **6020** | Prep Date: **05/20/2005 09:30**
Matrix: **Water** | Analyst: **JYH** | Cal Date: **05/24/2005 11:19**
Workgroup Number: **WG189691** | Dilution: **1** | Run Date: **05/24/2005 14:22**
Collect Date: **17-MAY-05** | Units: **mg/L** | File ID: **EL.052405.142229**
Sample Tag: **01**

Analyte	CAS. Number	Result	Qual	RL	MDL
Antimony, Dissolved	7440-36-0		U	0.00100	0.000500
Selenium, Dissolved	7782-49-2	0.0282		0.00100	0.000500
Thallium, Dissolved	7440-28-0		U	0.000200	0.000100

U Not detected at or above adjusted sample detection limit

Report Number: **L0505399**
Report Date : **May 25, 2005**

Sample Number: **L0505399-12**
Client ID: **49WW03-MAY05-D**
Matrix: **Water**
Workgroup Number: **WG189622**
Collect Date: **17-MAY-05**
Sample Tag: **01**

Prep Method: **METHOD**
Analytical Method: **7470A**
Analyst: **CRC**
Dilution: **1**
Units: **mg/L**

Instrument: **HYDRA**
Prep Date: **05/20/2005 10:45**
Cal Date: **05/23/2005 16:37**
Run Date: **05/23/2005 18:11**
File ID: **HY.052305.181118**

Analyte	CAS. Number	Result	Qual	RL	MDL
Mercury, Dissolved	7439-97-6		U	0.000200	0.000100

U Not detected at or above adjusted sample detection limit

WORKGROUP SUMMARY BY METHOD

WORKGROUP SUMMARY BY METHOD

Analysis: Metals Analysis
Extraction Method: 3005A
Workgroup: WG189460

Lab ID	Client ID	Tclp Date	Prep Date	Analysis Date	Tag	Inst Id	Analyst
L0505399-01	49WW01-MAY05		05/20/05 10:00			HOT BLOCK	REK
L0505399-02	49WW01-MAY05		05/20/05 10:00			HOT BLOCK	REK
L0505399-03	49WW01-MAY05-MS		05/20/05 10:00			HOT BLOCK	REK
L0505399-04	49WW01-MAY05-MS		05/20/05 10:00			HOT BLOCK	REK
L0505399-05	49WW01-MAY05-MSD		05/20/05 10:00			HOT BLOCK	REK
L0505399-06	49WW01-MAY05-MSD		05/20/05 10:00			HOT BLOCK	REK
L0505399-07	49WW02-MAY05		05/20/05 10:00			HOT BLOCK	REK
L0505399-08	49WW02-MAY05		05/20/05 10:00			HOT BLOCK	REK
L0505399-09	49WW03-MAY05		05/20/05 10:00			HOT BLOCK	REK
L0505399-10	49WW03-MAY05-D		05/20/05 10:00			HOT BLOCK	REK
L0505399-11	49WW03-MAY05		05/20/05 10:00			HOT BLOCK	REK
L0505399-12	49WW03-MAY05-D		05/20/05 10:00			HOT BLOCK	REK

Analysis: Metals Analysis
Extraction Method: 3015
Workgroup: WG189482

Lab ID	Client ID	Tclp Date	Prep Date	Analysis Date	Tag	Inst Id	Analyst
L0505399-01	49WW01-MAY05		05/20/05 09:30			MICROWAVE	VC
L0505399-02	49WW01-MAY05		05/20/05 09:30			MICROWAVE	VC
L0505399-03	49WW01-MAY05-MS		05/20/05 09:30			MICROWAVE	VC
L0505399-04	49WW01-MAY05-MS		05/20/05 09:30			MICROWAVE	VC
L0505399-05	49WW01-MAY05-MSD		05/20/05 09:30			MICROWAVE	VC
L0505399-06	49WW01-MAY05-MSD		05/20/05 09:30			MICROWAVE	VC
L0505399-07	49WW02-MAY05		05/20/05 09:30			MICROWAVE	VC
L0505399-08	49WW02-MAY05		05/20/05 09:30			MICROWAVE	VC
L0505399-09	49WW03-MAY05		05/20/05 09:30			MICROWAVE	VC
L0505399-10	49WW03-MAY05-D		05/20/05 09:30			MICROWAVE	VC
L0505399-11	49WW03-MAY05		05/20/05 09:30			MICROWAVE	VC
L0505399-12	49WW03-MAY05-D		05/20/05 09:30			MICROWAVE	VC

WORKGROUP SUMMARY BY METHOD

Analysis: Mercury, Dissolved
Extraction Method: METHOD
Workgroup: WG189489

Lab ID	Client ID	Tclp Date	Prep Date	Analysis Date	Tag	Inst Id	Analyst
L0505399-01	49WW01-MAY05		05/20/05 10:45			HOT BLOCK	REK
L0505399-02	49WW01-MAY05		05/20/05 10:45			HOT BLOCK	REK
L0505399-03	49WW01-MAY05-MS		05/20/05 10:45			HOT BLOCK	REK
L0505399-04	49WW01-MAY05-MS		05/20/05 10:45			HOT BLOCK	REK
L0505399-05	49WW01-MAY05-MSD		05/20/05 10:45			HOT BLOCK	REK
L0505399-06	49WW01-MAY05-MSD		05/20/05 10:45			HOT BLOCK	REK
L0505399-07	49WW02-MAY05		05/20/05 10:45			HOT BLOCK	REK
L0505399-08	49WW02-MAY05		05/20/05 10:45			HOT BLOCK	REK
L0505399-09	49WW03-MAY05		05/20/05 10:45			HOT BLOCK	REK
L0505399-10	49WW03-MAY05-D		05/20/05 10:45			HOT BLOCK	REK
L0505399-11	49WW03-MAY05		05/20/05 10:45			HOT BLOCK	REK
L0505399-12	49WW03-MAY05-D		05/20/05 10:45			HOT BLOCK	REK

WORKGROUP SUMMARY BY METHOD

Analysis: Metals Analysis
Analytical Method: 6010B
Workgroup: WG189586

Lab ID	Client ID	Tclp Date	Prep Date	Analysis Date	Tag	Inst Id	Analyst
L0505399-01	49WW01-MAY05		05/20/05 10:00	05/23/05 11:06	01	PE-ICP	KHR
L0505399-02	49WW01-MAY05		05/20/05 10:00	05/23/05 11:22	01	PE-ICP	KHR
L0505399-03	49WW01-MAY05-MS		05/20/05 10:00	05/23/05 11:11	01	PE-ICP	KHR
L0505399-04	49WW01-MAY05-MS		05/20/05 10:00	05/23/05 11:27	01	PE-ICP	KHR
L0505399-05	49WW01-MAY05-MSD		05/20/05 10:00	05/23/05 11:17	01	PE-ICP	KHR
L0505399-06	49WW01-MAY05-MSD		05/20/05 10:00	05/23/05 11:32	01	PE-ICP	KHR
L0505399-07	49WW02-MAY05		05/20/05 10:00	05/23/05 11:37	01	PE-ICP	KHR
L0505399-08	49WW02-MAY05		05/20/05 10:00	05/23/05 12:03	01	PE-ICP	KHR
L0505399-09	49WW03-MAY05		05/20/05 10:00	05/23/05 12:08	01	PE-ICP	KHR
L0505399-09	49WW03-MAY05		05/20/05 10:00	05/23/05 13:21	DL01	PE-ICP	KHR
L0505399-10	49WW03-MAY05-D		05/20/05 10:00	05/23/05 12:18	01	PE-ICP	KHR
L0505399-11	49WW03-MAY05		05/20/05 10:00	05/23/05 12:13	01	PE-ICP	KHR
L0505399-11	49WW03-MAY05		05/20/05 10:00	05/23/05 13:26	DL01	PE-ICP	KHR
L0505399-12	49WW03-MAY05-D		05/20/05 10:00	05/23/05 12:24	01	PE-ICP	KHR
L0505399-01	49WW01-MAY05		05/20/05 10:00	05/23/05 16:39	DL01	PE-ICP2	MMB
L0505399-02	49WW01-MAY05		05/20/05 10:00	05/23/05 16:58	DL01	PE-ICP2	MMB
L0505399-03	49WW01-MAY05-MS		05/20/05 10:00	05/23/05 16:46	DL01	PE-ICP2	MMB
L0505399-04	49WW01-MAY05-MS		05/20/05 10:00	05/23/05 17:05	DL01	PE-ICP2	MMB
L0505399-05	49WW01-MAY05-MSD		05/20/05 10:00	05/23/05 16:52	DL01	PE-ICP2	MMB
L0505399-06	49WW01-MAY05-MSD		05/20/05 10:00	05/23/05 17:11	DL01	PE-ICP2	MMB
L0505399-07	49WW02-MAY05		05/20/05 10:00	05/23/05 17:17	DL01	PE-ICP2	MMB
L0505399-08	49WW02-MAY05		05/20/05 10:00	05/23/05 17:24	DL01	PE-ICP2	MMB
L0505399-09	49WW03-MAY05		05/20/05 10:00	05/23/05 17:55	DL02	PE-ICP2	MMB
L0505399-10	49WW03-MAY05-D		05/20/05 10:00	05/23/05 18:08	DL01	PE-ICP2	MMB
L0505399-11	49WW03-MAY05		05/20/05 10:00	05/23/05 18:01	DL02	PE-ICP2	MMB
L0505399-12	49WW03-MAY05-D		05/20/05 10:00	05/23/05 18:14	DL01	PE-ICP2	MMB

WORKGROUP SUMMARY BY METHOD

Analysis: Mercury, Dissolved
Analytical Method: 7470A
Workgroup: WG189622

Lab ID	Client ID	Tclp Date	Prep Date	Analysis Date	Tag	Inst Id	Analyst
L0505399-01	49WW01-MAY05		05/20/05 10:45	05/23/05 16:59	01	HYDRA	CRC
L0505399-02	49WW01-MAY05		05/20/05 10:45	05/23/05 17:04	01	HYDRA	CRC
L0505399-03	49WW01-MAY05-MS		05/20/05 10:45	05/23/05 17:07	01	HYDRA	CRC
L0505399-04	49WW01-MAY05-MS		05/20/05 10:45	05/23/05 17:10	01	HYDRA	CRC
L0505399-05	49WW01-MAY05-MSD		05/20/05 10:45	05/23/05 17:13	01	HYDRA	CRC
L0505399-06	49WW01-MAY05-MSD		05/20/05 10:45	05/23/05 17:59	01	HYDRA	CRC
L0505399-07	49WW02-MAY05		05/20/05 10:45	05/23/05 18:00	01	HYDRA	CRC
L0505399-08	49WW02-MAY05		05/20/05 10:45	05/23/05 18:03	01	HYDRA	CRC
L0505399-09	49WW03-MAY05		05/20/05 10:45	05/23/05 18:04	01	HYDRA	CRC
L0505399-10	49WW03-MAY05-D		05/20/05 10:45	05/23/05 18:07	01	HYDRA	CRC
L0505399-11	49WW03-MAY05		05/20/05 10:45	05/23/05 18:09	01	HYDRA	CRC
L0505399-12	49WW03-MAY05-D		05/20/05 10:45	05/23/05 18:11	01	HYDRA	CRC

Analysis: Metals Analysis
Analytical Method: 6020
Workgroup: WG189691

Lab ID	Client ID	Tclp Date	Prep Date	Analysis Date	Tag	Inst Id	Analyst
L0505399-01	49WW01-MAY05		05/20/05 09:30	05/24/05 12:17	01	ELAN-ICP	JYH
L0505399-02	49WW01-MAY05		05/20/05 09:30	05/24/05 12:22	01	ELAN-ICP	JYH
L0505399-03	49WW01-MAY05-MS		05/20/05 09:30	05/24/05 12:28	01	ELAN-ICP	JYH
L0505399-04	49WW01-MAY05-MS		05/20/05 09:30	05/24/05 12:33	01	ELAN-ICP	JYH
L0505399-05	49WW01-MAY05-MSD		05/20/05 09:30	05/24/05 12:39	01	ELAN-ICP	JYH
L0505399-06	49WW01-MAY05-MSD		05/20/05 09:30	05/24/05 12:44	01	ELAN-ICP	JYH
L0505399-07	49WW02-MAY05		05/20/05 09:30	05/24/05 12:49	01	ELAN-ICP	JYH
L0505399-08	49WW02-MAY05		05/20/05 09:30	05/24/05 14:00	01	ELAN-ICP	JYH
L0505399-09	49WW03-MAY05		05/20/05 09:30	05/24/05 14:06	01	ELAN-ICP	JYH
L0505399-10	49WW03-MAY05-D		05/20/05 09:30	05/24/05 14:11	01	ELAN-ICP	JYH
L0505399-11	49WW03-MAY05		05/20/05 09:30	05/24/05 14:17	01	ELAN-ICP	JYH
L0505399-12	49WW03-MAY05-D		05/20/05 09:30	05/24/05 14:22	01	ELAN-ICP	JYH

Kemron Environmental Services
Analyst Listing May 25, 2005

AJF - AMANDA J. FICKIESEN
ALB - ANNIE L. BOCK
ALT - ANN L. THAYER
BRG - BRENDA R. GREGORY
CAF - CHERYL A. FLOWERS
CAK - CHERYL A. KOELSCH
CEB - CHAD E. BARNES
CLC - CHRYS L. CRAWFORD
CLK - CARL L. KING
CLS - CARA L. STRICKLER
CLW - CHARISSA L. WINTERS
CM - CHARLIE MARTIN
CMS - CRYSTAL M. STEPHENS
CPD - CHAD P. DAVIS
CRC - CARLA R. COCHRAN
CSH - CHRIS S. HILL
DAS - DALLAS A. SULLIVAN
DD - DIANE M. DENNIS
DDE - DEBRA D. ELLIOTT
DEL - DON E. LIGHTFRITZ
DEV - DAVID E. VANDENBERG
DGB - DOUGLAS G. BUTCHER
DIH - DEANNA I. HESSON
DLB - DAVID L. BUMGARNER
DLP - DOROTHY L. PAYNE
DLR - DIANNA L. RAUCH
DP - DEANNA L. PIERSON
DR - DEANNA ROBERTS
DRB - DOUG R. BARNETT
DSM - DAVID S. MOSSOR
DST - DENNIS S. TEPE
ECL - ERIC C. LAWSON
ED - EMILY E. DECKER
HAV - HEMA VILASAGAR
JAL - JOHN A. LENT
JJG - JOHN J. GREUEY
JKT - JANE K. THOMPSON
JLS - JANICE L. SCHIMMEL
JWR - JOHN W. RICHARDS
JWS - JACK W. SHEAVES
JYH - JI Y. HU
KEB - KATHRYN E. BARNES
KHR - KIM H. RHODES
KRA - KATHY R. ALBERTSON
LKN - LINDA K. NEDEFF
LSA - LUCINDA S. ARNOLD
LSB - LESLIE S. BUCINA
MAH - MICALYN A. HARRIS
MDA - MICHAEL D. ALBERTSON
MDC - MICHAEL D. COCHRAN
MES - MARY E. SCHILLING
MKZ - MARILYN K. ZUMBRO
MLR - MARY L. ROCHOTTE
MLS - MICHAEL L. SCHIMMEL
MMB - MAREN M. BEERY
MSW - MATT S. WILSON
NJB - NATALIE J. BOOTH
OGT - OKEY G. TUCKER
PAS - PATRICK A. STREET
RB - ROBERT BUCHANAN
RDC - REBECCA D. CUTLIP
REK - ROBERT E. KYER
RWC - RODNEY W. CAMPBELL
SCM - SUSAN C. MOELLENDICK
SK - SANDRA KEENER
SLM - STEPHANIE L. MOSSBURG
SLP - SHERI L. PFALZGRAF
SMH - SHAUNA M. HYDE
TD - TIMOTHY DYSERT
TMM - TAMMY M. MORRIS
VC - VICKI COLLIER
VKL - VICKY K. LAUER

KEMRON Environmental Services, Inc.
List of Valid Qualifiers
May 25, 2005

These are KEMRON's standard report qualifiers:

B	Present in the method blank
C	Confirmed by GC/MS
CG	Confluent growth
D	The analyte was quantified as a secondary dilution factor
DL	Surrogate or spike was diluted out
E	Estimated concentration due to sample matrix interference
FL	Free liquid
I	Semi-quantitative result, out of instrument calibration range
J	Present below normal reporting limit
L	Sample reporting limits elevated due to matrix interference
N	Tentatively Identified Compound (TIC)
NA	Not applicable
ND	Not detected at or above the reporting limit (RL)
NF	Not found
NFL	No free liquid
NI	Non-ignitable
NS	Not spiked
P	Concentration >40% difference between the two GC columns
QNS	Quantity not sufficient to perform analysis
RA	Reanalysis confirms reported results
RE	Reanalysis confirms sample matrix interference
S	Analyzed by method of standard addition
SMI	Sample matrix interference on surrogate
SP	Reported results are for spike compounds only
TNTC	Too numerous to count
U	Analyzed for but not detected
W	Post-digestion spike for furnace AA out out of control limits
X	Exceeds regulatory limit
Z	Can not be resolved from isomer.***
+	Correlation coefficient for the MSA is less than 0.995
<	Less than
>	Greater than
*	Surrogate or spike compound out of range

*****Special Notes for Organic Analytes**

1. Acrolein and acrylonitrile by method 624 are semi-quantitative screens only.
2. 1,2-Diphenylhydrazine is unstable and is reported as azobenzene.
3. N-nitrosodiphenylamine cannot be separated from diphenylamine.
4. 3-Methyphenol and 4-Methylphenol are unresolvable compounds.
5. m-Xylene and p-Xylene are unresolvable compounds.
6. The reporting limits for Appendix II/IX compounds by method 8270 are based on EPA estimated PQLs referenced in 40 CFR Part 264, Appendix IX. They are not always achievable for every compound and are matrix dependent.

AFCEE Qualifiers

These are KEMRON's AFCEE Report Qualifiers

J	The analyte was positively identified, the quantitiation is an estimation.
U	The analyte was analyzed for, but not detected. The associated numerical value is at or below the MDL
F	The anlyte was positively identified by the associated numerical value is below the RL
R	The data is unusable due to deficiencies in the ability to analyze the sample and meet QC criteria
B	The analyte was found in an associated blank, as well as in the sample
M	The matrix effect was present
S	To be applied to all field screening data
T	Tentatively identified compound (using GC/MS)

Inorganic QA/QC

KEMRON Environmental Services
Data Checklist

Date:	May 23, 2005
Analyst:	KIM H. RHODES
Method:	6010B
Instrument:	PE-ICP
Curve Workgroup:	189599
Analytical Workgroups:	189505, 189586, 189458

Run Log ID:	5080
Calibration/Linearity	✓
ICV/CCV	✓
ICB/CCB	✓
ICSA/ICSAB	✓
CRI	
Blank/LCS	✓
MS/MSD	✓
Post Spike/Serial Dilution	✓
Upload Results	✓
Data Qualifiers	
Generate PDF Instrument Data	✓
Sign/Annotate PDF Data	✓
Upload Curve Data	✓
Workgroup Forms	✓
Case Narrative	✓
Client Forms	✓
Level X	
Level 3	370, 399
Level 4	
Check for compliance with method and project specific requirements	✓
Check the completeness of reported information	✓
Check the information for the report narrative	✓
Primary Reviewer	KHR
Secondary Reviewer	LSB

Comments

Approved By:

Primary: May 23, 2005	Secondary: May 24, 2005
Kim H. Rhodes	Leslie Bucina

KEMRON Environmental Services
Data Checklist

Date:	May 23, 2005
Analyst:	MAREN M. BEERY
Method:	6010B
Instrument:	PE-ICP2
Curve Workgroup:	WG189604
Analytical Workgroups:	WG189569, WG189586

Run Log ID:	5117
Calibration/Linearity	✓
ICV/CCV	✓
ICB/CCB	✓
ICSA/ICSAB	✓
CRI	
Blank/LCS	✓
MS/MSD	✓
Post Spike/Serial Dilution	✓
Upload Results	✓
Data Qualifiers	
Generate PDF Instrument Data	✓
Sign/Annotate PDF Data	✓
Upload Curve Data	✓
Workgroup Forms	
Case Narrative	✓
Client Forms	✓
Level X	
Level 3	05-399
Level 4	
Check for compliance with method and project specific requirements	✓
Check the completeness of reported information	✓
Check the information for the report narrative	✓
Primary Reviewer	MMB
Secondary Reviewer	LSB

Comments

Approved By:

Primary: May 23, 2005	Secondary: May 25, 2005
Maren Beery	Leslie Bruins

KEMRON Environmental Services
HOLDING TIMES
EQUIVALENT TO AFCEE FORM 9

Analytical Method: 6010B **AAB#:** WG189586
Login Number: L0505399

Client ID	Date Collected	Date Received	Date Extracted	Max Hold Time Ext.	Time Held Ext.	Date Analyzed	Max Hold Time Anal	Time Held Anal.	Q
49WW01-MAY05	05/17/05	05/18/05	05/20/05	180	2.97	05/23/05	180	3.05	
49WW01-MAY05	05/17/05	05/18/05	05/20/05	180	2.97	05/23/05	180	3.28	
49WW01-MAY05	05/17/05	05/18/05	05/20/05	180	2.97	05/23/05	180	3.06	
49WW01-MAY05	05/17/05	05/18/05	05/20/05	180	2.97	05/23/05	180	3.29	
49WW01-MAY05-MS	05/17/05	05/18/05	05/20/05	180	2.97	05/23/05	180	3.05	
49WW01-MAY05-MS	05/17/05	05/18/05	05/20/05	180	2.97	05/23/05	180	3.28	
49WW01-MAY05-MS	05/17/05	05/18/05	05/20/05	180	2.97	05/23/05	180	3.06	
49WW01-MAY05-MS	05/17/05	05/18/05	05/20/05	180	2.97	05/23/05	180	3.30	
49WW01-MAY05-MSD	05/17/05	05/18/05	05/20/05	180	2.97	05/23/05	180	3.05	
49WW01-MAY05-MSD	05/17/05	05/18/05	05/20/05	180	2.97	05/23/05	180	3.29	
49WW01-MAY05-MSD	05/17/05	05/18/05	05/20/05	180	2.97	05/23/05	180	3.06	
49WW01-MAY05-MSD	05/17/05	05/18/05	05/20/05	180	2.97	05/23/05	180	3.30	
49WW02-MAY05	05/17/05	05/18/05	05/20/05	180	2.87	05/23/05	180	3.07	
49WW02-MAY05	05/17/05	05/18/05	05/20/05	180	2.87	05/23/05	180	3.30	
49WW02-MAY05	05/17/05	05/18/05	05/20/05	180	2.87	05/23/05	180	3.09	
49WW02-MAY05	05/17/05	05/18/05	05/20/05	180	2.87	05/23/05	180	3.31	
49WW03-MAY05	05/17/05	05/18/05	05/20/05	180	3.04	05/23/05	180	3.09	
49WW03-MAY05	05/17/05	05/18/05	05/20/05	180	3.04	05/23/05	180	3.14	
49WW03-MAY05	05/17/05	05/18/05	05/20/05	180	3.04	05/23/05	180	3.33	
49WW03-MAY05-D	05/17/05	05/18/05	05/20/05	180	3.04	05/23/05	180	3.10	
49WW03-MAY05-D	05/17/05	05/18/05	05/20/05	180	3.04	05/23/05	180	3.34	
49WW03-MAY05	05/17/05	05/18/05	05/20/05	180	3.04	05/23/05	180	3.09	
49WW03-MAY05	05/17/05	05/18/05	05/20/05	180	3.04	05/23/05	180	3.14	
49WW03-MAY05	05/17/05	05/18/05	05/20/05	180	3.04	05/23/05	180	3.33	
49WW03-MAY05-D	05/17/05	05/18/05	05/20/05	180	3.04	05/23/05	180	3.10	
49WW03-MAY05-D	05/17/05	05/18/05	05/20/05	180	3.04	05/23/05	180	3.34	

*** EXT = SEE PROJECT QAPP REQUIREMENTS**
***ANAL = SEE PROJECT QAPP REQUIREMENTS**

KEMRON Environmental Services
METHOD BLANK SUMMARY

Login Number: L0505399
Blank File ID: PE.052305.105627
Date Analyzed: 05/23/05
Time Analyzed: 10:56
Analyst: KHR

Work Group: WG189586
Blank Sample ID: WG189460-05
Instrument ID: PE-ICP
Method: 6010B

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG189460-06	PE.052305.110133	05/23/05 11:01	01
49WW01-MAY05	L0505399-01	PE.052305.110643	05/23/05 11:06	01
49WW01-MAY05-MS	L0505399-03	PE.052305.111153	05/23/05 11:11	01
49WW01-MAY05-MSD	L0505399-05	PE.052305.111703	05/23/05 11:17	01
49WW01-MAY05	L0505399-02	PE.052305.112216	05/23/05 11:22	01
49WW01-MAY05-MS	L0505399-04	PE.052305.112726	05/23/05 11:27	01
49WW01-MAY05-MSD	L0505399-06	PE.052305.113242	05/23/05 11:32	01
49WW02-MAY05	L0505399-07	PE.052305.113754	05/23/05 11:37	01
49WW02-MAY05	L0505399-08	PE.052305.120342	05/23/05 12:03	01
49WW03-MAY05	L0505399-09	PE.052305.120846	05/23/05 12:08	01
49WW03-MAY05	L0505399-11	PE.052305.121351	05/23/05 12:13	01
DUP	WG189460-11	PE.052305.121351	05/23/05 12:13	01
49WW03-MAY05-D	L0505399-10	PE.052305.121857	05/23/05 12:18	01
49WW03-MAY05-D	L0505399-12	PE.052305.122403	05/23/05 12:24	01
DUP	WG189460-12	PE.052305.122403	05/23/05 12:24	02
49WW03-MAY05	L0505399-09	PE.052305.132136	05/23/05 13:21	DL01
49WW03-MAY05	L0505399-11	PE.052305.132647	05/23/05 13:26	DL01
DUP	WG189460-11	PE.052305.132647	05/23/05 13:26	DL01
LCS	WG189460-06	P2.052305.163341	05/23/05 16:33	02
49WW01-MAY05	L0505399-01	P2.052305.163959	05/23/05 16:39	DL01
49WW01-MAY05-MS	L0505399-03	P2.052305.164616	05/23/05 16:46	DL01
49WW01-MAY05-MSD	L0505399-05	P2.052305.165238	05/23/05 16:52	DL01
49WW01-MAY05	L0505399-02	P2.052305.165854	05/23/05 16:58	DL01
49WW01-MAY05-MS	L0505399-04	P2.052305.170513	05/23/05 17:05	DL01
49WW01-MAY05-MSD	L0505399-06	P2.052305.171130	05/23/05 17:11	DL01
49WW02-MAY05	L0505399-07	P2.052305.171749	05/23/05 17:17	DL01
49WW02-MAY05	L0505399-08	P2.052305.172406	05/23/05 17:24	DL01
49WW03-MAY05	L0505399-09	P2.052305.175528	05/23/05 17:55	DL02
49WW03-MAY05	L0505399-11	P2.052305.180146	05/23/05 18:01	DL02
DUP	WG189460-11	P2.052305.180146	05/23/05 18:01	DL02
49WW03-MAY05-D	L0505399-10	P2.052305.180804	05/23/05 18:08	DL01
49WW03-MAY05-D	L0505399-12	P2.052305.181422	05/23/05 18:14	DL01
DUP	WG189460-12	P2.052305.181422	05/23/05 18:14	DL03

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KEMRON Environmental Services
METHOD BLANK SUMMARY

Login Number: L0505399 | Work Group: WG189586
Blank File ID: P2.052305.162724 | Blank Sample ID: WG189460-05
Date Analyzed: 05/23/05 | Instrument ID: PE-ICP2
Time Analyzed: 16:27 | Method: 6010B
Analyst: MMB

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG189460-06	PE.052305.110133	05/23/05 11:01	01
49WW01-MAY05	L0505399-01	PE.052305.110643	05/23/05 11:06	01
49WW01-MAY05-MS	L0505399-03	PE.052305.111153	05/23/05 11:11	01
49WW01-MAY05-MSD	L0505399-05	PE.052305.111703	05/23/05 11:17	01
49WW01-MAY05	L0505399-02	PE.052305.112216	05/23/05 11:22	01
49WW01-MAY05-MS	L0505399-04	PE.052305.112726	05/23/05 11:27	01
49WW01-MAY05-MSD	L0505399-06	PE.052305.113242	05/23/05 11:32	01
49WW02-MAY05	L0505399-07	PE.052305.113754	05/23/05 11:37	01
49WW02-MAY05	L0505399-08	PE.052305.120342	05/23/05 12:03	01
49WW03-MAY05	L0505399-09	PE.052305.120846	05/23/05 12:08	01
49WW03-MAY05	L0505399-11	PE.052305.121351	05/23/05 12:13	01
DUP	WG189460-11	PE.052305.121351	05/23/05 12:13	01
49WW03-MAY05-D	L0505399-10	PE.052305.121857	05/23/05 12:18	01
49WW03-MAY05-D	L0505399-12	PE.052305.122403	05/23/05 12:24	01
DUP	WG189460-12	PE.052305.122403	05/23/05 12:24	02
49WW03-MAY05	L0505399-09	PE.052305.132136	05/23/05 13:21	DL01
49WW03-MAY05	L0505399-11	PE.052305.132647	05/23/05 13:26	DL01
DUP	WG189460-11	PE.052305.132647	05/23/05 13:26	DL01
LCS	WG189460-06	P2.052305.163341	05/23/05 16:33	02
49WW01-MAY05	L0505399-01	P2.052305.163959	05/23/05 16:39	DL01
49WW01-MAY05-MS	L0505399-03	P2.052305.164616	05/23/05 16:46	DL01
49WW01-MAY05-MSD	L0505399-05	P2.052305.165238	05/23/05 16:52	DL01
49WW01-MAY05	L0505399-02	P2.052305.165854	05/23/05 16:58	DL01
49WW01-MAY05-MS	L0505399-04	P2.052305.170513	05/23/05 17:05	DL01
49WW01-MAY05-MSD	L0505399-06	P2.052305.171130	05/23/05 17:11	DL01
49WW02-MAY05	L0505399-07	P2.052305.171749	05/23/05 17:17	DL01
49WW02-MAY05	L0505399-08	P2.052305.172406	05/23/05 17:24	DL01
49WW03-MAY05	L0505399-09	P2.052305.175528	05/23/05 17:55	DL02
49WW03-MAY05	L0505399-11	P2.052305.180146	05/23/05 18:01	DL02
DUP	WG189460-11	P2.052305.180146	05/23/05 18:01	DL02
49WW03-MAY05-D	L0505399-10	P2.052305.180804	05/23/05 18:08	DL01
49WW03-MAY05-D	L0505399-12	P2.052305.181422	05/23/05 18:14	DL01
DUP	WG189460-12	P2.052305.181422	05/23/05 18:14	DL03

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KEMRON Environmental Services

METHOD BLANK REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189460-05
Instrument ID: PE-ICP Run Time: 10:56 Prep Method: 3005A
File ID: PE.052305.105627 Analyst: KHR Method: 6010B
Workgroup (AAB#): WG189586 Matrix: Water Units: mg/L
Contract #: DACA56-94-D-0020 Cal ID: PE-ICP-23-MAY-05

Analytes	MDL	RL	Concentration	Dilution	Qualifier
Aluminum	0.0500	0.100	0.0567	1	J
Silver	0.00500	0.0100	0.00500	1	U
Arsenic	0.00200	0.00400	0.00200	1	U
Barium	0.00250	0.0100	0.00250	1	U
Beryllium	0.000250	0.0100	0.000250	1	U
Calcium	0.100	0.200	0.100	1	U
Cadmium	0.00250	0.0100	0.00250	1	U
Cobalt	0.00250	0.0200	0.00250	1	U
Chromium	0.00250	0.0200	0.00250	1	U
Copper	0.00500	0.0200	0.00500	1	U
Iron	0.0200	0.0400	0.0200	1	U
Potassium	0.250	1.00	0.250	1	U
Magnesium	0.250	0.500	0.250	1	U
Manganese	0.00100	0.0100	0.00100	1	U
Nickel	0.00500	0.0400	0.00500	1	U
Lead	0.00250	0.00500	0.00250	1	U
Vanadium	0.00500	0.0100	0.00500	1	U
Zinc	0.00500	0.0200	0.00500	1	U

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KEMRON Environmental Services

METHOD BLANK REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189460-05
Instrument ID: PE-ICP2 Run Time: 16:27 Prep Method: 3005A
File ID: P2.052305.162724 Analyst: MMB Method: 6010B
Workgroup (AAB#): WG189586 Matrix: Water Units: mg/L
Contract #: DACA56-94-D-0020 Cal ID: PE-ICP-23-MAY-05

Analytes	MDL	RL	Concentration	Dilution	Qualifier
Sodium	0.250	0.500	0.250	1	U

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KEMRON Environmental Services

LABORATORY CONTROL SAMPLE

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189460-06
Instrument ID: PE-ICP Run Time: 11:01 Prep Method: 3005A
File ID: PE.052305.110133 Analyst: KHR Method: 6010B
Workgroup (AAB#): WG189586 Matrix: Water Units: mg/L
Contract #: DACA56-94-D-0020 Cal ID: PE-ICP-23-MAY-2005 08:36

Analytes	Expected	Found	% Rec	LCS Limits	Q
Aluminum	5.00	4.92	98.4	80 - 120	
Silver	0.200	0.201	101	80 - 120	
Arsenic	0.200	0.202	101	80 - 120	
Barium	0.500	0.503	101	80 - 120	
Beryllium	0.0250	0.0259	104	80 - 120	
Calcium	5.00	5.22	104	80 - 120	
Cadmium	0.0250	0.0247	98.8	80 - 120	
Cobalt	0.100	0.100	100	80 - 120	
Chromium	0.250	0.258	103	80 - 120	
Copper	0.250	0.262	105	80 - 120	
Iron	2.00	2.01	100	80 - 120	
Potassium	25.0	25.9	103	80 - 120	
Magnesium	5.00	4.91	98.2	80 - 120	
Manganese	0.250	0.262	105	80 - 120	
Nickel	0.250	0.262	105	80 - 120	
Lead	0.250	0.259	103	80 - 120	
Vanadium	0.500	0.511	102	80 - 120	
Zinc	0.500	0.511	102	80 - 120	

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KEMRON Environmental Services

LABORATORY CONTROL SAMPLE

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189460-06
Instrument ID: PE-ICP2 Run Time: 16:33 Prep Method: 3005A
File ID: P2.052305.163341 Analyst: MMB Method: 6010B
Workgroup (AAB#): WG189586 Matrix: Water Units: mg/L
Contract #: DACA56-94-D-0020 Cal ID: PE-ICP-23-MAY-2005 10:48

Analytes	Expected	Found	% Rec	LCS Limits	Q
Sodium	25.0	21.6	86.3	80 - 120	

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KEMRON Environmental Services

MS/MSD REPORT

Loginnum:L0505399 Cal ID: PE-ICP2-23-MAY-05 Worknum:WG189586
Instrument ID:PE-ICP2 Contract #:DACA56-94-D-0020 Prep Method:3005A
Parent ID:L0505399-01 File ID:P2.052305.163959 Dil:100 Method:6010B
Sample ID:L0505399-03 MS File ID:P2.052305.164616 Dil:100 Matrix:Water
Sample ID:L0505399-05 MSD File ID:P2.052305.165238 Dil:100 Units:mg/L

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Sodium, Total	448	25.0	402	-184	25.0	479	123	17.5	75 - 125	20	*

* FAILS %REC LIMIT

FAILS RPD LIMIT

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KEMRON Environmental Services

MS/MSD REPORT

Loginnum:L0505399 Cal ID: PE-ICP-23-MAY-05 Worknum:WG189586
Instrument ID:PE-ICP Contract #:DACA56-94-D-0020 Prep Method:3005A
Parent ID:L0505399-01 File ID:PE.052305.110643 Dil:1 Method:6010B
Sample ID:L0505399-03 MS File ID:PE.052305.111153 Dil:1 Matrix:Water
Sample ID:L0505399-05 MSD File ID:PE.052305.111703 Dil:1 Units:mg/L

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Aluminum, Total	0.614	5.00	6.86	125	5.00	6.74	123	1.76	75 - 125	20	
Silver, Total	ND	0.200	0.230	115	0.200	0.229	114	0.413	75 - 125	20	
Arsenic, Total	ND	0.200	0.227	114	0.200	0.227	113	0.0576	75 - 125	20	
Barium, Total	0.0216	0.500	0.517	99.1	0.500	0.512	98.1	1.01	75 - 125	20	
Beryllium, Total	ND	0.0250	0.0292	117	0.0250	0.0290	116	0.585	75 - 125	20	
Calcium, Total	394	5.00	410	317	5.00	408	271	0.563	75 - 125	20	*
Cadmium, Total	0.00315	0.0250	0.0295	106	0.0250	0.0296	106	0.111	75 - 125	20	
Cobalt, Total	0.00669	0.100	0.101	93.9	0.100	0.101	94.2	0.351	75 - 125	20	
Chromium, Total	0.0248	0.250	0.274	99.8	0.250	0.271	98.6	1.10	75 - 125	20	
Copper, Total	0.0103	0.250	0.293	113	0.250	0.292	113	0.513	75 - 125	20	
Iron, Total	0.555	2.00	2.44	94.4	2.00	2.41	92.9	1.18	75 - 125	20	
Potassium, Total	9.70	25.0	40.2	122	25.0	39.1	118	2.76	75 - 125	20	
Magnesium, Total	303	5.00	316	246	5.00	316	248	0.0314	75 - 125	20	*
Manganese, Total	1.22	0.250	1.49	108	0.250	1.47	101	1.14	75 - 125	20	
Nickel, Total	0.0616	0.250	0.305	97.5	0.250	0.303	96.6	0.794	75 - 125	20	
Lead, Total	0.0100	0.250	0.256	98.3	0.250	0.256	98.2	0.103	75 - 125	20	
Vanadium, Total	ND	0.500	0.519	104	0.500	0.515	103	0.796	75 - 125	20	
Zinc, Total	ND	0.500	0.486	97.2	0.500	0.483	96.5	0.725	75 - 125	20	

* FAILS %REC LIMIT

FAILS RPD LIMIT

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KEMRON Environmental Services

MS/MSD REPORT

Loginnum:L0505399 Cal ID: PE-ICP2-23-MAY-05 Worknum:WG189586
Instrument ID:PE-ICP2 Contract #:DACA56-94-D-0020 Prep Method:3005A
Parent ID:L0505399-02 File ID:P2.052305.165854 Dil:100 Method:6010B
Sample ID:L0505399-04 MS File ID:P2.052305.170513 Dil:100 Matrix:Water
Sample ID:L0505399-06 MSD File ID:P2.052305.171130 Dil:100 Units:mg/L

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Sodium, Dissolved	462	25.0	510	195	25.0	492	122	3.60	75 - 125	20	*

* FAILS %REC LIMIT

FAILS RPD LIMIT

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KEMRON Environmental Services

MS/MSD REPORT

Loginnum:L0505399 Cal ID: PE-ICP-23-MAY-05 Worknum:WG189586
Instrument ID:PE-ICP Contract #:DACA56-94-D-0020 Prep Method:3005A
Parent ID:L0505399-02 File ID:PE.052305.112216 Dil:1 Method:6010B
Sample ID:L0505399-04 MS File ID:PE.052305.112726 Dil:1 Matrix:Water
Sample ID:L0505399-06 MSD File ID:PE.052305.113242 Dil:1 Units:mg/L

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Aluminum, Dissolved	0.284	5.00	6.13	117	5.00	6.25	119	1.87	75 - 125	20	
Silver, Dissolved	ND	0.200	0.227	114	0.200	0.231	116	1.67	75 - 125	20	
Arsenic, Dissolved	ND	0.200	0.223	111	0.200	0.228	114	2.34	75 - 125	20	
Barium, Dissolved	0.0768	0.500	0.579	100	0.500	0.569	98.5	1.65	75 - 125	20	
Beryllium, Dissolved	ND	0.0250	0.0287	115	0.0250	0.0293	117	2.02	75 - 125	20	
Calcium, Dissolved	411	5.00	408	-56.2	5.00	416	92.0	1.80	75 - 125	20	*
Cadmium, Dissolved	0.00328	0.0250	0.0291	103	0.0250	0.0297	106	2.15	75 - 125	20	
Cobalt, Dissolved	0.00599	0.100	0.0990	93.0	0.100	0.101	95.0	2.07	75 - 125	20	
Chromium, Dissolved	ND	0.250	0.244	97.7	0.250	0.247	98.9	1.24	75 - 125	20	
Copper, Dissolved	0.00898	0.250	0.287	111	0.250	0.292	113	1.80	75 - 125	20	
Iron, Dissolved	0.0358	2.00	1.96	96.4	2.00	1.88	92.2	4.30	75 - 125	20	
Potassium, Dissolved	9.71	25.0	37.8	112	25.0	38.3	114	1.33	75 - 125	20	
Magnesium, Dissolved	316	5.00	316	-2.92	5.00	321	105	1.70	75 - 125	20	*
Manganese, Dissolved	1.20	0.250	1.41	85.7	0.250	1.42	88.3	0.459	75 - 125	20	
Nickel, Dissolved	0.0608	0.250	0.304	97.1	0.250	0.302	96.4	0.629	75 - 125	20	
Lead, Dissolved	0.0101	0.250	0.253	97.1	0.250	0.258	99.0	1.91	75 - 125	20	
Vanadium, Dissolved	ND	0.500	0.508	102	0.500	0.519	104	2.13	75 - 125	20	
Zinc, Dissolved	0.00574	0.500	0.474	93.6	0.500	0.481	95.0	1.39	75 - 125	20	

* FAILS %REC LIMIT

FAILS RPD LIMIT

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KEMRON Environmental Services

DUPLICATE REPORT

Login Number: L0505399 Worknum: WG189586
Instrument ID: PE-ICP Method: 6010B
Sample ID: L0505399-09 File ID: PE.052305.120846 Dil: 1 Matrix: Water
Duplicate ID: L0505399-11 File ID: PE.052305.121351 Dil: 1 Units: mg/L

Analyte	Sample	Duplicate	RPD	RPD Limit	Q
Aluminum, Total	0.431	0.414	3.97	20	
Barium, Total	0.0687	0.0684	0.376	20	
Beryllium, Total	ND	ND	0	20	
Cadmium, Total	ND	ND	0	20	
Calcium, Total	349	353	1.30	20	
Chromium, Total	0.871	0.296	98.5	20	#
Cobalt, Total	0.0120	0.0101	16.8	20	
Copper, Total	0.00998	0.0102	2.45	20	
Iron, Total	2.55	2.59	1.64	20	
Lead, Total	0.00942	0.00868	8.21	20	
Magnesium, Total	299	303	1.08	20	
Manganese, Total	1.69	1.60	5.11	20	
Nickel, Total	0.608	0.609	0.215	20	
Potassium, Total	9.72	10.1	3.93	20	
Silver, Total	ND	ND	0	20	
Vanadium, Total	0.00520	ND	200	20	#
Zinc, Total	ND	ND	0	20	

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KEMRON Environmental Services

DUPLICATE REPORT

Login Number: L0505399 Worknum: WG189586
Instrument ID: PE-ICP Method: 6010B
Sample ID: L0505399-09 File ID: PE.052305.132136 Dil: 5 Matrix: Water
Duplicate ID: L0505399-11 File ID: PE.052305.132647 Dil: 5 Units: mg/L

Analyte	Sample	Duplicate	RPD	RPD Limit	Q
Arsenic, Total	ND	ND	0	20	

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KEMRON Environmental Services

DUPLICATE REPORT

Login Number: L0505399 Worknum: WG189586
Instrument ID: PE-ICP2 Method: 6010B
Sample ID: L0505399-09 File ID: P2.052305.175528 Dil: 100 Matrix: Water
Duplicate ID: L0505399-11 File ID: P2.052305.180146 Dil: 100 Units: mg/L

Analyte	Sample	Duplicate	RPD	RPD Limit	Q
Sodium, Total	451	459	1.84	20	

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KEMRON Environmental Services

DUPLICATE REPORT

Login Number: L0505399 Worknum: WG189586
Instrument ID: PE-ICP Method: 6010B
Sample ID: L0505399-10 File ID: PE.052305.121857 Dil: 1 Matrix: Water
Duplicate ID: L0505399-12 File ID: PE.052305.122403 Dil: 1 Units: mg/L

Analyte	Sample	Duplicate	RPD	RPD Limit	Q
Aluminum, Dissolved	0.244	0.247	1.01	20	
Arsenic, Dissolved	ND	ND	0	20	
Barium, Dissolved	0.137	0.125	8.55	20	
Beryllium, Dissolved	ND	ND	0	20	
Cadmium, Dissolved	ND	ND	0	20	
Calcium, Dissolved	356	370	3.72	20	
Chromium, Dissolved	0.0105	ND	200	20	#
Cobalt, Dissolved	0.00718	0.00747	4.06	20	
Copper, Dissolved	0.00554	0.00584	5.26	20	
Iron, Dissolved	ND	ND	0	20	
Lead, Dissolved	0.00903	0.00901	0.221	20	
Magnesium, Dissolved	306	314	2.83	20	
Manganese, Dissolved	1.55	1.48	4.34	20	
Nickel, Dissolved	0.562	0.590	4.75	20	
Potassium, Dissolved	10.1	10.2	1.03	20	
Silver, Dissolved	ND	ND	0	20	
Vanadium, Dissolved	ND	ND	0	20	
Zinc, Dissolved	ND	ND	0	20	

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KEMRON Environmental Services

DUPLICATE REPORT

Login Number: L0505399 Worknum: WG189586
Instrument ID: PE-ICP2 Method: 6010B
Sample ID: L0505399-10 File ID: P2.052305.180804 Dil: 100 Matrix: Water
Duplicate ID: L0505399-12 File ID: P2.052305.181422 Dil: 100 Units: mg/L

Analyte	Sample	Duplicate	RPD	RPD Limit	Q
Sodium, Dissolved	435	474	8.45	20	

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KEMRON Environmental Services

MS/MSD REPORT

Loginnum:L0505399 Cal ID:PE-ICP-23-MAY-2005 08:36 Worknum:WG189586
Instrument ID:PE-ICP Contract #:DACA56-94-D-0020 Method:6010B
Parent ID:WG189460-01 File ID:PE.052305.110643 Dil:1 Matrix:WATER
Sample ID:WG189460-07 MS File ID:PE.052305.111153 Dil:1 Units:mg/L
Sample ID:WG189460-09 MSD File ID:PE.052305.111703 Dil:1

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Aluminum, Total	0.614	5.00	6.86	125	5.00	6.74	123	1.76	75 - 125	20	
Arsenic, Total	ND	0.200	0.227	114	0.200	0.227	113	0.0576	75 - 125	20	
Barium, Total	0.0216	0.500	0.517	99.1	0.500	0.512	98.1	1.01	75 - 125	20	
Beryllium, Total	ND	0.0250	0.0292	117	0.0250	0.0290	116	0.585	75 - 125	20	
Cadmium, Total	0.00315	0.0250	0.0295	106	0.0250	0.0296	106	0.111	75 - 125	20	
Calcium, Total	394	5.00	410	317	5.00	408	271	0.563	75 - 125	20	*
Chromium, Total	0.0248	0.250	0.274	99.8	0.250	0.271	98.6	1.10	75 - 125	20	
Cobalt, Total	0.00669	0.100	0.101	93.9	0.100	0.101	94.2	0.351	75 - 125	20	
Copper, Total	0.0103	0.250	0.293	113	0.250	0.292	113	0.513	75 - 125	20	
Iron, Total	0.555	2.00	2.44	94.4	2.00	2.41	92.9	1.18	75 - 125	20	
Lead, Total	0.0100	0.250	0.256	98.3	0.250	0.256	98.2	0.103	75 - 125	20	
Magnesium, Total	303	5.00	316	246	5.00	316	248	0.0314	75 - 125	20	*
Manganese, Total	1.22	0.250	1.49	108	0.250	1.47	101	1.14	75 - 125	20	
Nickel, Total	0.0616	0.250	0.305	97.5	0.250	0.303	96.6	0.794	75 - 125	20	
Potassium, Total	9.70	25.0	40.2	122	25.0	39.1	118	2.76	75 - 125	20	
Silver, Total	ND	0.200	0.230	115	0.200	0.229	114	0.413	75 - 125	20	
Vanadium, Total	ND	0.500	0.519	104	0.500	0.515	103	0.796	75 - 125	20	
Zinc, Total	ND	0.500	0.486	97.2	0.500	0.483	96.5	0.725	75 - 125	20	

* FAILS %REC LIMIT

FAILS RPD LIMIT

KEMRON FORMS - Modified 03/21/2005
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KEMRON Environmental Services

MS/MSD REPORT

Loginnum:L0505399 Cal ID:PE-ICP-23-MAY-2005 08:36 Worknum:WG189586
Instrument ID:PE-ICP Contract #:DACA56-94-D-0020 Method:6010B
Parent ID:WG189460-02 File ID:PE.052305.112216 Dil:1 Matrix:WATER
Sample ID:WG189460-08 MS File ID:PE.052305.112726 Dil:1 Units:mg/L
Sample ID:WG189460-10 MSD File ID:PE.052305.113242 Dil:1

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Aluminum, Dissolved	0.284	5.00	6.13	117	5.00	6.25	119	1.87	75 - 125	20	
Arsenic, Dissolved	ND	0.200	0.223	111	0.200	0.228	114	2.34	75 - 125	20	
Barium, Dissolved	0.0768	0.500	0.579	100	0.500	0.569	98.5	1.65	75 - 125	20	
Beryllium, Dissolved	ND	0.0250	0.0287	115	0.0250	0.0293	117	2.02	75 - 125	20	
Cadmium, Dissolved	0.00328	0.0250	0.0291	103	0.0250	0.0297	106	2.15	75 - 125	20	
Calcium, Dissolved	411	5.00	408	-56.2	5.00	416	92.0	1.80	75 - 125	20	*
Chromium, Dissolved	ND	0.250	0.244	97.7	0.250	0.247	98.9	1.24	75 - 125	20	
Cobalt, Dissolved	0.00599	0.100	0.0990	93.0	0.100	0.101	95.0	2.07	75 - 125	20	
Copper, Dissolved	0.00898	0.250	0.287	111	0.250	0.292	113	1.80	75 - 125	20	
Iron, Dissolved	0.0358	2.00	1.96	96.4	2.00	1.88	92.2	4.30	75 - 125	20	
Lead, Dissolved	0.0101	0.250	0.253	97.1	0.250	0.258	99.0	1.91	75 - 125	20	
Magnesium, Dissolved	316	5.00	316	-2.92	5.00	321	105	1.70	75 - 125	20	*
Manganese, Dissolved	1.20	0.250	1.41	85.7	0.250	1.42	88.3	0.459	75 - 125	20	
Nickel, Dissolved	0.0608	0.250	0.304	97.1	0.250	0.302	96.4	0.629	75 - 125	20	
Potassium, Dissolved	9.71	25.0	37.8	112	25.0	38.3	114	1.33	75 - 125	20	
Silver, Dissolved	ND	0.200	0.227	114	0.200	0.231	116	1.67	75 - 125	20	
Vanadium, Dissolved	ND	0.500	0.508	102	0.500	0.519	104	2.13	75 - 125	20	
Zinc, Dissolved	0.00574	0.500	0.474	93.6	0.500	0.481	95.0	1.39	75 - 125	20	

* FAILS %REC LIMIT

FAILS RPD LIMIT

KEMRON FORMS - Modified 03/21/2005
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Report generated 05/23/2005 13:28

KEMRON ENVIRONMENTAL SERVICES
SERIAL DILUTION REPORT

Sample Login ID:L0505399 Worknum:WG189586
Instrument ID:PE-ICP Method:6010B
Sample ID:L0505399-07 File ID:PE.052305.113754 Dil:1 Units:mg/L
Serial Dilution ID:WG189586-02 File ID:PE.052305.115834 Dil:5

Analyte	Sample	C	Serial Dilution	C	% Difference	Q
Aluminum	0.244	X	0.472	F	93.4	
Arsenic	ND	U	ND	U		
Barium	0.0262	X	0.0243	F	7.25	
Beryllium	ND	U	ND	U		
Cadmium	0.000199	U	0.000424	U	113	
Calcium	401		396		1.25	
Chromium	0.0455	X	0.0407	F	10.5	
Cobalt	0.00655	F	0.00720	U	9.92	
Copper	0.00696	F	0.00958	U	37.6	
Iron	0.370	X	0.359	X	2.97	
Lead	0.00881	X	0.0186	F	111	
Magnesium	286		285		0.350	
Manganese	0.244		0.239	X	2.05	
Nickel	0.477		0.482	X	1.05	
Potassium	12.8		9.89	X	22.7	E
Silver	0.00328	U	0.00812	U	148	
Sodium	100000000		469		100	E
Vanadium	0.000241	U	0.00180	U	647	
Zinc	ND	U	0.0133	U	209	

U = Result is below MDL
F = Result is between MDL and RL
X = Result is greater than RL and less than 50 times the MDL
E = %D exceeds control limit of 10% and initial
sample result is greater than or equal to 50 times the MDL

KEMRON FORMS - Modified 04/29/2005
Version 1.3 PDF File ID: 241791
Report generated 05/24/2005 13:23

KEMRON ENVIRONMENTAL SERVICES
SERIAL DILUTION REPORT

Sample Login ID:L0505399 Worknum:WG189586
Instrument ID:PE-ICP2 Method:6010B
Sample ID:L0505399-08 File ID:P2.052305.172406 Dil:100 Units:mg/L
Serial Dilution ID:WG189586-04 File ID:P2.052305.174911 Dil:500

Analyte	Sample	C	Serial Dilution	C	% Difference	Q
Aluminum	2.95	U	5.51	U	86.8	E
Arsenic	0.461	X	1.50	F	225	E
Barium	0.226	U	0.374	U	65.5	E
Beryllium	0.00922	U	ND	U		
Cadmium	0.0221	U	0.0866	U	292	
Calcium	377	X	361	X	4.24	
Chromium	0.139	U	0.425	U	206	E
Cobalt	0.0248	U	0.141	U	469	
Copper	0.236	U	1.32	U	459	
Iron	2.43	F	5.65	U	133	E
Lead	2.17	X	1.65	F	24.0	E
Magnesium	301	X	296	X	1.66	
Manganese	0.828	F	0.842	F	1.69	
Nickel	0.595	F	0.742	U	24.7	E
Potassium	18.5	U	56.1	U	203	E
Silver	0.352	U	1.62	U	360	E
Sodium	401	X	444	X	10.7	E
Vanadium	0.328	U	1.64	U	400	E
Zinc	0.371	U	1.19	U	221	E

U = Result is below MDL
F = Result is between MDL and RL
X = Result is greater than RL and less than 50 times the MDL
E = %D exceeds control limit of 10% and initial
sample result is greater than or equal to 50 times the MDL

KEMRON FORMS - Modified 04/29/2005
Version 1.3 PDF File ID: 241791
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KEMRON ENVIRONMENTAL SERVICES
POST SPIKE REPORT

Sample Login ID: L0505399 Worknum: WG189586
Instrument ID: PE-ICP Method: 6010B
Post Spike ID: WG189586-01 File ID: PE.052305.114305 Dil: 1 Units: mg/L
Sample ID: L0505399-07 File ID: PE.052305.113754 Dil: 1 Matrix: Water

Analyte	Control Limit %R	Post Spike Result	C	Sample Result	C	Spike Added(SA)	% R	Q
Aluminum	75 - 125	6.08		0.244		5.0	117	
Arsenic	75 - 125	0.223		ND	U	0.2	112	
Barium	75 - 125	0.514		0.0262		0.5	98.1	
Beryllium	75 - 125	0.0287		ND	U	0.025	115	
Cadmium	75 - 125	0.0263		0	U	0.025	105	
Calcium	75 - 125	367		401		5.0	122	
Chromium	75 - 125	0.289		0.0455		0.25	99.2	
Cobalt	75 - 125	0.101		0.00655	F	0.1	95.1	
Copper	75 - 125	0.285		0.00696	F	0.25	111	
Iron	75 - 125	2.17		0.370		2.0	91.9	
Lead	75 - 125	0.254		0.00881		0.25	98.4	
Magnesium	75 - 125	266		286		5.0	172	N
Manganese	75 - 125	0.474		0.244		0.25	102	
Nickel	75 - 125	0.670		0.477		0.25	96.3	
Potassium	75 - 125	40.1		12.8		25.0	114	
Silver	75 - 125	0.226		0	U	0.2	113	
Sodium	75 - 125	100000000		100000000		25.0	40000000	N
Vanadium	75 - 125	0.512		0	U	0.5	102	
Zinc	75 - 125	0.470		ND	U	0.5	94.0	

N = % Recoverv exceeds control limits of 75% - 125%
F = Result is between MDL and RL
U = Sample result is below MDL. A value of zero is used in the calculation.

KEMRON FORMS - Modified 05/11/2005
Version 1.3 PDF File ID: 241792
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KEMRON ENVIRONMENTAL SERVICES
POST SPIKE REPORT

Sample Login ID: L0505399 Worknum: WG189586
Instrument ID: PE-ICP2 Method: 6010B
Post Spike ID: WG189586-03 File ID: P2.052305.174252 Dil: 100 Units: mg/L
Sample ID: L0505399-08 File ID: P2.052305.172406 Dil: 100 Matrix: Water

Analyte	Control Limit %R	Post Spike Result	C	Sample Result	C	Spike Added(SA)	% R	Q
Aluminum	75 - 125	515		2.95		500.0	102	
Arsenic	75 - 125	20.6		0.461		20.0	101	
Barium	75 - 125	50.8		0.226		50.0	101	
Beryllium	75 - 125	2.76		0.00922		2.5	110	
Cadmium	75 - 125	2.43		0.0221		2.5	96.3	
Calcium	75 - 125	895		377		500.0	104	
Chromium	75 - 125	25.7		0.139		25.0	102	
Cobalt	75 - 125	10.0		0.0248		10.0	99.8	
Copper	75 - 125	24.9		0.236		25.0	98.7	
Iron	75 - 125	222		2.43		200.0	110	
Lead	75 - 125	26.1		2.17		25.0	95.7	
Magnesium	75 - 125	850		301		500.0	110	
Manganese	75 - 125	26.0		0.828		25.0	101	
Nickel	75 - 125	26.5		0.595		25.0	104	
Potassium	75 - 125	2350		18.5		2500.0	93.3	
Silver	75 - 125	20.1		0.352		20.0	98.7	
Sodium	75 - 125	2560		401		2500.0	86.4	
Vanadium	75 - 125	50.5		0.328		50.0	100	
Zinc	75 - 125	50.8		0.371		50.0	101	

N = % Recoverv exceeds control limits of 75% - 125%
F = Result is between MDL and RL
U = Sample result is below MDL. A value of zero is used in the calculation.

KEMRON FORMS - Modified 05/11/2005
Version 1.3 PDF File ID: 241792
Report generated 05/24/2005 13:24

KEMRON Environmental Services

INITIAL CALIBRATION

Login Number: L0505399 **Workgroup (AAB#):** WG189586

Analytical Method: 6010B **Instrument ID:** PE-ICP

ICAL Worknum: WG189599 **Initial Calibration Date:** 23-MAY-2005 08:36:14

Analyte	WG189599-01		WG189599-02		WG189599-03		WG189599-04			
	STD	INT	STD	INT	STD	INT	STD	INT	R	Q
Aluminum	0	1782.8	.1	2169.1	10	227515.3	20	471141.7	0.999845	
Arsenic	0	-44	.004	27.6	.4	2214.4	.8	4498.1	0.999966	
Barium	0	402	.01	3948.8	1	401841.4	2	801129.3	0.999999	
Beryllium	0	-1895	.0005	1253	.05	117700.5	.1	232814.5	0.999984	
Cadmium	0	117.7	.0005	134.7	.05	13079	.1	26224.6	0.999999	
Calcium	0	322.7	.1	61.9	10	7482.5	20	14845.7	0.999990	
Chromium	0	-1917.6	.005	1251.1	.5	110839.7	1	220193	0.999994	
Cobalt	0	-35.2	.002	161.2	.2	16256.2	.4	32656.3	0.999997	
Copper	0	2868.3	.005	2077.5	.5	264355.5	1	528297.8	0.999999	
Iron	0	-607.9	.04	464.6	4	65774.5	8	133285.7	0.999979	
Lead	0	49.6	.005	74	.5	8104.4	1	16353.8	0.999990	
Magnesium	0	-1283.9	.1	4359.3	10	439019.8	20	902006.9	0.999906	
Manganese	0	-2251.3	.005	5385.1	.5	526621.6	1	1043320.3	0.999988	
Nickel	0	-170.1	.005	631.8	.5	60915.7	1	121529.6	0.999999	
Potassium	0	624.1	.5	7385.4	50	709378.4	100	1420799.8	1.00000	
Silver	0	2031.5	.004	3343.7	.4	357707	.8	726713.6	0.999969	
Sodium	0	1471.3	.5	16471.9	50	1510456.5	100	3002568.4	1.00000	
Vanadium	0	-183.7	.01	3704.8	1	383482.8	2	766247.8	1.00000	
Zinc	0	2189.7	.01	3789.2	1	218069	2	435251.1	0.999995	

INT = Instrument intensity
R = Coefficient of correlation
Q = Data Qualifier
*** = Out of Compliance; R < 0.995**

KEMRON FORMS - Modified 05/09/2005
Version 1.5 PDF File ID: 241801
Report generated 05/24/2005 14:00

KEMRON Environmental Services

INITIAL CALIBRATION

Login Number: L0505399 **Workgroup (AAB#):** WG189586

Analytical Method: 6010B **Instrument ID:** PE-ICP2

ICAL Worknum: WG189604 **Initial Calibration Date:** 23-MAY-2005 10:48:48

Analyte	WG189604-01		WG189604-02		WG189604-03		WG189604-04		WG189604-05			
	STD	INT	STD	INT	STD	INT	STD	INT	STD	INT	R	Q
Aluminum	0	-91.6260194	.1	993.7871239	.2	2280.484063	10	107646.4552	20	216250.7582	0.999997	
Arsenic	0	-16.9659659	0	8.259703229	.008	13.02207802	.4	669.8160706	.8	1386.242716	0.999863	
Barium	0	-238.997100	.01	1184.275258	.02	2449.514339	1	125860.3724	2	251814.038	1.00000	
Beryllium	0	-2977.69767	.0005	888.5951733	.001	1845.450909	.05	110009.9682	.1	220486.8693	0.999999	
Cadmium	0	81.30847434	.0005	24.68456823	.001	55.41658754	.05	2943.340769	.1	6004.383066	0.999957	
Calcium	0	-53.2616074	.1	21.22226825	.2	33.98272098	10	1782.19033	20	3664.087342	0.999911	
Chromium	0	119.8399966	.005	297.7761051	.01	633.5455183	.5	31145.26177	1	62886.28133	0.999989	
Cobalt	0	-122.013564	.002	79.54033949	.004	165.0121088	.2	8505.625548	.4	17158.61537	0.999992	
Copper	0	60.51566951	.005	388.2588229	.01	887.3508255	.5	45554.47686	1	93645.77736	0.999915	
Iron	0	-.902993755	.04	12.8277091	.08	22.68081566	4	1304.434988	8	2598.057806	0.999997	
Lead	0	17.60670678	0	18.12405982	.01	42.8465512	.5	2265.51744	1	4531.985376	1.00000	
Magnesium	0	-18.6694285	.1	98.33140892	.2	194.420272	10	10056.63113	20	20007.45593	0.999997	
Manganese	0	-130.650343	.005	3998.566347	.01	8133.687637	.5	409903.3759	1	817232.6209	0.999999	
Nickel	0	51.27540099	.005	115.921846	.01	238.5110583	.5	11652.02443	1	23281.3309	1.00000	
Potassium	0	-621.237534	.5	1791.844755	1	3943.390973	50	217679.0712	100	443116.8991	1.00000	
Silver	0	-5737.34189	.004	591.4486662	.008	1138.627218	.4	62460.35879	.8	128343.5836	0.999918	
Sodium	0	3714.282211	.5	8152.160394	1	16295.83607	50	851620.4309	100	1673453.826	1.00000	
Vanadium	0	3209.562277	.01	1371.736084	.02	2679.967788	1	139235.5663	2	280529.2434	0.999994	
Zinc	0	-34.4056489	.01	280.1121934	.02	530.8754384	1	26376.73914	2	52918.89893	0.999999	

INT = Instrument intensity
R = Coefficient of correlation
Q = Data Qualifier
*** = Out of Compliance; R < 0.995**

KEMRON FORMS - Modified 05/09/2005
Version 1.5 PDF File ID: 241801
Report generated 05/24/2005 14:00

KEMRON Environmental Services

INITIAL CALIBRATION BLANK REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189599-06
Instrument ID: PE-ICP Run Time: 08:46 Method: 6010B
File ID: PE.052305.084643 Analyst: KHR Units: mg/L
Workgroup (AAB#): WG189586 Cal ID: PE-ICP - 23-MAY-05

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Aluminum	0.0500	0.100	.065	1	F
Silver	0.00500	0.0100	.00117	1	U
Arsenic	0.00200	0.00400	.00143	1	U
Barium	0.00250	0.0100	-.000478	1	U
Beryllium	0.000250	0.0100	-.0000643	1	U
Calcium	0.100	0.200	-.0145	1	U
Cadmium	0.00250	0.0100	.0000317	1	U
Cobalt	0.00250	0.0200	.000103	1	U
Chromium	0.00250	0.0200	-.000616	1	U
Copper	0.00500	0.0200	.000258	1	U
Iron	0.0200	0.0400	.015	1	U
Potassium	0.250	1.00	.0171	1	U
Magnesium	0.250	0.500	.0514	1	U
Manganese	0.00100	0.0100	-.000851	1	U
Sodium	0.250	0.500	-.00248	1	U
Nickel	0.00500	0.0400	-.000265	1	U
Lead	0.00250	0.00500	.00114	1	U
Vanadium	0.00500	0.0100	.000172	1	U
Zinc	0.00500	0.0200	-.00423	1	U

U = Result is less than MDL
F = Result is between MDL and RL

KEMRON FORMS - Modified 04/04/2005
Version 1.5 PDF File ID: 241803
Report generated 05/24/2005 14:00

KEMRON Environmental Services

INITIAL CALIBRATION BLANK REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189604-07
Instrument ID: PE-ICP2 Run Time: 11:01 Method: 6010B
File ID: P2.052305.110128 Analyst: MMB Units: mg/L
Workgroup (AAB#): WG189586 Cal ID: PE-ICP - 23-MAY-05

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Aluminum	0.0500	0.100	.00455	1	U
Silver	0.00500	0.0100	.00254	1	U
Arsenic	0.00200	0.00400	.00206	1	F
Barium	0.00250	0.0100	.000353	1	U
Beryllium	0.000250	0.0100	-.0000133	1	U
Calcium	0.100	0.200	.0621	1	U
Cadmium	0.00250	0.0100	.000197	1	U
Cobalt	0.00250	0.0200	.00014	1	U
Chromium	0.00250	0.0200	.000728	1	U
Copper	0.00500	0.0200	.00281	1	U
Iron	0.0200	0.0400	.00645	1	U
Potassium	0.250	1.00	.102	1	U
Magnesium	0.250	0.500	-.00152	1	U
Manganese	0.00100	0.0100	-.0000692	1	U
Sodium	0.250	0.500	.0588	1	U
Nickel	0.00500	0.0400	.000315	1	U
Lead	0.00250	0.00500	-.000155	1	U
Vanadium	0.00500	0.0100	.00294	1	U
Zinc	0.00500	0.0200	.000466	1	U

U = Result is less than MDL
F = Result is between MDL and RL

KEMRON FORMS - Modified 04/04/2005
Version 1.5 PDF File ID: 241803
Report generated 05/24/2005 14:00

KEMRON Environmental Services

CONTINUING CALIBRATION BLANK REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189599-10
Instrument ID: PE-ICP Run Time: 09:06 Method: 6010B
File ID: PE.052305.090630 Analyst: KHR Units: mg/L
Workgroup (AAB#): WG189586 Cal ID: PE-ICP - 23-MAY-05

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Aluminum	0.0500	0.100	.0651	1	F
Silver	0.00500	0.0100	.00116	1	U
Arsenic	0.00200	0.00400	.00128	1	U
Barium	0.00250	0.0100	-.000511	1	U
Beryllium	0.000250	0.0100	-.000077	1	U
Calcium	0.100	0.200	-.00345	1	U
Cadmium	0.00250	0.0100	.0000264	1	U
Cobalt	0.00250	0.0200	.000106	1	U
Chromium	0.00250	0.0200	-.000614	1	U
Copper	0.00500	0.0200	.000175	1	U
Iron	0.0200	0.0400	.0175	1	U
Potassium	0.250	1.00	.00215	1	U
Magnesium	0.250	0.500	.0525	1	U
Manganese	0.00100	0.0100	-.000882	1	U
Sodium	0.250	0.500	-.028	1	U
Nickel	0.00500	0.0400	-.000192	1	U
Lead	0.00250	0.00500	.000822	1	U
Vanadium	0.00500	0.0100	.000105	1	U
Zinc	0.00500	0.0200	-.00457	1	U

U = Result is less than MDL
F = Result is between MDL and RL

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CONTINUING CALIBRATION BLANK REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189599-14
Instrument ID: PE-ICP Run Time: 10:38 Method: 6010B
File ID: PE.052305.103822 Analyst: KHR Units: mg/L
Workgroup (AAB#): WG189586 Cal ID: PE-ICP - 23-MAY-05

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Aluminum	0.0500	0.100	.063	1	F
Silver	0.00500	0.0100	.00129	1	U
Arsenic	0.00200	0.00400	.00168	1	U
Barium	0.00250	0.0100	-.000502	1	U
Beryllium	0.000250	0.0100	-.0000747	1	U
Calcium	0.100	0.200	-.00848	1	U
Cadmium	0.00250	0.0100	.0000256	1	U
Cobalt	0.00250	0.0200	.000241	1	U
Chromium	0.00250	0.0200	-.000737	1	U
Copper	0.00500	0.0200	.000204	1	U
Iron	0.0200	0.0400	.0117	1	U
Potassium	0.250	1.00	.0383	1	U
Magnesium	0.250	0.500	.0516	1	U
Manganese	0.00100	0.0100	-.000906	1	U
Sodium	0.250	0.500	.0746	1	U
Nickel	0.00500	0.0400	-.000415	1	U
Lead	0.00250	0.00500	.000601	1	U
Vanadium	0.00500	0.0100	.000121	1	U
Zinc	0.00500	0.0200	-.0048	1	U

U = Result is less than MDL
F = Result is between MDL and RL

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KEMRON Environmental Services

CONTINUING CALIBRATION BLANK REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189599-16
Instrument ID: PE-ICP Run Time: 11:53 Method: 6010B
File ID: PE.052305.115330 Analyst: KHR Units: mg/L
Workgroup (AAB#): WG189586 Cal ID: PE-ICP - 23-MAY-05

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Aluminum	0.0500	0.100	.0646	1	F
Silver	0.00500	0.0100	.00121	1	U
Arsenic	0.00200	0.00400	.000263	1	U
Barium	0.00250	0.0100	-.000475	1	U
Beryllium	0.000250	0.0100	-.000107	1	U
Calcium	0.100	0.200	-.000165	1	U
Cadmium	0.00250	0.0100	.00003	1	U
Cobalt	0.00250	0.0200	.000131	1	U
Chromium	0.00250	0.0200	-.000589	1	U
Copper	0.00500	0.0200	.000228	1	U
Iron	0.0200	0.0400	.012	1	U
Potassium	0.250	1.00	.0778	1	U
Magnesium	0.250	0.500	.0503	1	U
Manganese	0.00100	0.0100	-.00103	1	F
Sodium	0.250	0.500	.298	1	F
Nickel	0.00500	0.0400	-.000385	1	U
Lead	0.00250	0.00500	.000788	1	U
Vanadium	0.00500	0.0100	.000126	1	U
Zinc	0.00500	0.0200	-.00513	1	F

U = Result is less than MDL
F = Result is between MDL and RL

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KEMRON Environmental Services

CONTINUING CALIBRATION BLANK REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189599-18
Instrument ID: PE-ICP Run Time: 12:44 Method: 6010B
File ID: PE.052305.124441 Analyst: KHR Units: mg/L
Workgroup (AAB#): WG189586 Cal ID: PE-ICP - 23-MAY-05

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Aluminum	0.0500	0.100	.0644	1	F
Silver	0.00500	0.0100	.00122	1	U
Arsenic	0.00200	0.00400	.00157	1	U
Barium	0.00250	0.0100	-.000505	1	U
Beryllium	0.000250	0.0100	-.000101	1	U
Calcium	0.100	0.200	.00178	1	U
Cadmium	0.00250	0.0100	.0000257	1	U
Cobalt	0.00250	0.0200	.000119	1	U
Chromium	0.00250	0.0200	-.000486	1	U
Copper	0.00500	0.0200	.000307	1	U
Iron	0.0200	0.0400	.0109	1	U
Potassium	0.250	1.00	.112	1	U
Magnesium	0.250	0.500	.0495	1	U
Manganese	0.00100	0.0100	-.00105	1	F
Sodium	0.250	0.500	.665	1	
Nickel	0.00500	0.0400	-.000302	1	U
Lead	0.00250	0.00500	.000604	1	U
Vanadium	0.00500	0.0100	.0000967	1	U
Zinc	0.00500	0.0200	-.00521	1	F

U = Result is less than MDL
F = Result is between MDL and RL

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Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189604-11
Instrument ID: PE-ICP2 Run Time: 11:24 Method: 6010B
File ID: P2.052305.112437 Analyst: MMB Units: mg/L
Workgroup (AAB#): WG189586 Cal ID: PE-ICP - 23-MAY-05

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Aluminum	0.0500	0.100	.00372	1	U
Silver	0.00500	0.0100	.000637	1	U
Arsenic	0.00200	0.00400	.00225	1	F
Barium	0.00250	0.0100	.000313	1	U
Beryllium	0.000250	0.0100	.0000202	1	U
Calcium	0.100	0.200	.033	1	U
Cadmium	0.00250	0.0100	.000198	1	U
Cobalt	0.00250	0.0200	.000209	1	U
Chromium	0.00250	0.0200	.000718	1	U
Copper	0.00500	0.0200	.00304	1	U
Iron	0.0200	0.0400	.00601	1	U
Potassium	0.250	1.00	.0872	1	U
Magnesium	0.250	0.500	-.000673	1	U
Manganese	0.00100	0.0100	-.000146	1	U
Sodium	0.250	0.500	.062	1	U
Nickel	0.00500	0.0400	.000324	1	U
Lead	0.00250	0.00500	.000962	1	U
Vanadium	0.00500	0.0100	.00331	1	U
Zinc	0.00500	0.0200	.000382	1	U

U = Result is less than MDL
F = Result is between MDL and RL

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KEMRON Environmental Services

CONTINUING CALIBRATION BLANK REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189599-20
Instrument ID: PE-ICP Run Time: 13:37 Method: 6010B
File ID: PE.052305.133717 Analyst: KHR Units: mg/L
Workgroup (AAB#): WG189586 Cal ID: PE-ICP - 23-MAY-05

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Aluminum	0.0500	0.100	.0656	1	F
Silver	0.00500	0.0100	.00117	1	U
Arsenic	0.00200	0.00400	.00108	1	U
Barium	0.00250	0.0100	-.00047	1	U
Beryllium	0.000250	0.0100	-.000108	1	U
Calcium	0.100	0.200	.0142	1	U
Cadmium	0.00250	0.0100	.0000298	1	U
Cobalt	0.00250	0.0200	.000122	1	U
Chromium	0.00250	0.0200	-.00085	1	U
Copper	0.00500	0.0200	.000379	1	U
Iron	0.0200	0.0400	.0101	1	U
Potassium	0.250	1.00	.0298	1	U
Magnesium	0.250	0.500	.0501	1	U
Manganese	0.00100	0.0100	-.00109	1	F
Sodium	0.250	0.500	.167	1	U
Nickel	0.00500	0.0400	-.000224	1	U
Lead	0.00250	0.00500	.000886	1	U
Vanadium	0.00500	0.0100	.0000903	1	U
Zinc	0.00500	0.0200	-.00493	1	U

U = Result is less than MDL
F = Result is between MDL and RL

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KEMRON Environmental Services

CONTINUING CALIBRATION BLANK REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189604-20
Instrument ID: PE-ICP2 Run Time: 16:21 Method: 6010B
File ID: P2.052305.162109 Analyst: MMB Units: mg/L
Workgroup (AAB#): WG189586 Cal ID: PE-ICP - 23-MAY-05

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Aluminum	0.0500	0.100	.00317	1	U
Silver	0.00500	0.0100	.00253	1	U
Arsenic	0.00200	0.00400	.00416	1	
Barium	0.00250	0.0100	.000251	1	U
Beryllium	0.000250	0.0100	.00000403	1	U
Calcium	0.100	0.200	-.0561	1	U
Cadmium	0.00250	0.0100	.000164	1	U
Cobalt	0.00250	0.0200	.000174	1	U
Chromium	0.00250	0.0200	.000589	1	U
Copper	0.00500	0.0200	.00268	1	U
Iron	0.0200	0.0400	.00605	1	U
Potassium	0.250	1.00	.121	1	U
Magnesium	0.250	0.500	.00426	1	U
Manganese	0.00100	0.0100	-.000155	1	U
Sodium	0.250	0.500	.0545	1	U
Nickel	0.00500	0.0400	.000159	1	U
Lead	0.00250	0.00500	-.0000906	1	U
Vanadium	0.00500	0.0100	.00273	1	U
Zinc	0.00500	0.0200	.000146	1	U

U = Result is less than MDL
F = Result is between MDL and RL

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KEMRON Environmental Services

CONTINUING CALIBRATION BLANK REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189604-22
Instrument ID: PE-ICP2 Run Time: 17:36 Method: 6010B
File ID: P2.052305.173641 Analyst: MMB Units: mg/L
Workgroup (AAB#): WG189586 Cal ID: PE-ICP - 23-MAY-05

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Aluminum	0.0500	0.100	-.0322	1	U
Silver	0.00500	0.0100	.00354	1	U
Arsenic	0.00200	0.00400	.00202	1	F
Barium	0.00250	0.0100	.00028	1	U
Beryllium	0.000250	0.0100	.0000245	1	U
Calcium	0.100	0.200	-.0477	1	U
Cadmium	0.00250	0.0100	.000205	1	U
Cobalt	0.00250	0.0200	.000195	1	U
Chromium	0.00250	0.0200	.000615	1	U
Copper	0.00500	0.0200	.00139	1	U
Iron	0.0200	0.0400	.00494	1	U
Potassium	0.250	1.00	-.00239	1	U
Magnesium	0.250	0.500	-.00127	1	U
Manganese	0.00100	0.0100	-.000202	1	U
Sodium	0.250	0.500	.0885	1	U
Nickel	0.00500	0.0400	.000268	1	U
Lead	0.00250	0.00500	-.00164	1	U
Vanadium	0.00500	0.0100	.00296	1	U
Zinc	0.00500	0.0200	.000131	1	U

U = Result is less than MDL
F = Result is between MDL and RL

KEMRON FORMS - Modified 04/04/2005
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Report generated 05/24/2005 14:00

KEMRON Environmental Services

CONTINUING CALIBRATION BLANK REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189604-24
Instrument ID: PE-ICP2 Run Time: 18:26 Method: 6010B
File ID: P2.052305.182656 Analyst: MMB Units: mg/L
Workgroup (AAB#): WG189586 Cal ID: PE-ICP - 23-MAY-05

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Aluminum	0.0500	0.100	-.00298	1	U
Silver	0.00500	0.0100	.00404	1	U
Arsenic	0.00200	0.00400	.0027	1	F
Barium	0.00250	0.0100	.000259	1	U
Beryllium	0.000250	0.0100	.0000586	1	U
Calcium	0.100	0.200	-.0562	1	U
Cadmium	0.00250	0.0100	.00033	1	U
Cobalt	0.00250	0.0200	.000328	1	U
Chromium	0.00250	0.0200	.000727	1	U
Copper	0.00500	0.0200	.00247	1	U
Iron	0.0200	0.0400	.00528	1	U
Potassium	0.250	1.00	.0901	1	U
Magnesium	0.250	0.500	-.00653	1	U
Manganese	0.00100	0.0100	-.000222	1	U
Sodium	0.250	0.500	.0531	1	U
Nickel	0.00500	0.0400	.000447	1	U
Lead	0.00250	0.00500	-.00157	1	U
Vanadium	0.00500	0.0100	.00228	1	U
Zinc	0.00500	0.0200	.0000319	1	U

U = Result is less than MDL
F = Result is between MDL and RL

KEMRON FORMS - Modified 04/04/2005
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Report generated 05/24/2005 14:00

KEMRON Environmental Services

INITIAL CALIBRATION REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189599-05
Instrument ID: PE-ICP Run Time: 08:41 Method: 6010B
File ID: PE.052305.084128 Analyst: KHR Units: mg/L
Workgroup (AAB#): WG189586 Cal ID: PE-ICP - 23-MAY-05

Analyte		Expected	Found	%REC	LIMITS	Q
Aluminum		10	9.82	98.2	90 - 110	
Silver		.4	0.393	98.4	90 - 110	
Arsenic		.4	0.389	97.4	90 - 110	
Barium		1	1.02	102	90 - 110	
Beryllium		.05	0.0503	101	90 - 110	
Calcium		10	9.89	98.9	90 - 110	
Cadmium		.05	0.0485	97.0	90 - 110	
Cobalt		.2	0.202	101	90 - 110	
Chromium		.5	0.513	103	90 - 110	
Copper		.5	0.520	104	90 - 110	
Iron		4	3.99	99.8	90 - 110	
Potassium		50	50.5	101	90 - 110	
Magnesium		10	9.88	98.8	90 - 110	
Manganese		.5	0.511	102	90 - 110	
Sodium		50	52.9	106	90 - 110	
Nickel		.5	0.529	106	90 - 110	
Lead		.5	0.510	102	90 - 110	
Vanadium		1	1.01	101	90 - 110	
Zinc		1	1.00	100	90 - 110	

* Exceeds LIMITS Limit

KEMRON FORMS - Modified 03/31/2005
Version 1.3 PDF File ID: 241802
Report generated 05/24/2005 14:00

KEMRON Environmental Services

INITIAL CALIBRATION REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189604-06
Instrument ID: PE-ICP2 Run Time: 10:55 Method: 6010B
File ID: P2.052305.105510 Analyst: MMB Units: mg/L
Workgroup (AAB#): WG189586 Cal ID: PE-ICP - 23-MAY-05

Analyte		Expected	Found	%REC	LIMITS	Q
Aluminum		10	9.98	99.8	90 - 110	
Silver		.4	0.396	99.0	90 - 110	
Arsenic		.4	0.398	99.6	90 - 110	
Barium		1	1.02	102	90 - 110	
Beryllium		.05	0.0531	106	90 - 110	
Calcium		10	10.3	103	90 - 110	
Cadmium		.05	0.0481	96.2	90 - 110	
Cobalt		.2	0.195	97.5	90 - 110	
Chromium		.5	0.505	101	90 - 110	
Copper		.5	0.504	101	90 - 110	
Iron		4	3.89	97.4	90 - 110	
Potassium		50	52.5	105	90 - 110	
Magnesium		10	9.80	98.0	90 - 110	
Manganese		.5	0.513	103	90 - 110	
Sodium		50	52.1	104	90 - 110	
Nickel		.5	0.518	104	90 - 110	
Lead		.5	0.514	103	90 - 110	
Vanadium		1	0.999	99.9	90 - 110	
Zinc		1	1.01	101	90 - 110	

* Exceeds LIMITS Limit

KEMRON FORMS - Modified 03/31/2005
Version 1.3 PDF File ID: 241802
Report generated 05/24/2005 14:00

KEMRON Environmental Services

CONTINUING CALIBRATION REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189599-09
Instrument ID: PE-ICP Run Time: 09:01 Method: 6010B
File ID: PE.052305.090117 Analyst: KHR
Workgroup (AAB#): WG189586 Cal ID: PE-ICP - 23-MAY-05

Analyte		Expected	Found	%REC	LIMITS	UNITS	Q
Aluminum		10	9.78	97.8	90 - 110	mg/L	
Silver		.4	0.392	97.9	90 - 110	mg/L	
Arsenic		.4	0.389	97.3	90 - 110	mg/L	
Barium		1	1.01	101	90 - 110	mg/L	
Beryllium		.05	0.0503	101	90 - 110	mg/L	
Calcium		10	9.91	99.1	90 - 110	mg/L	
Cadmium		.05	0.0485	97.0	90 - 110	mg/L	
Cobalt		.2	0.200	99.9	90 - 110	mg/L	
Chromium		.5	0.511	102	90 - 110	mg/L	
Copper		.5	0.518	104	90 - 110	mg/L	
Iron		4	4.01	100	90 - 110	mg/L	
Potassium		50	50.2	100	90 - 110	mg/L	
Magnesium		10	9.83	98.3	90 - 110	mg/L	
Manganese		.5	0.510	102	90 - 110	mg/L	
Sodium		50	52.4	105	90 - 110	mg/L	
Nickel		.5	0.528	106	90 - 110	mg/L	
Lead		.5	0.508	102	90 - 110	mg/L	
Vanadium		1	1.01	101	90 - 110	mg/L	
Zinc		1	0.999	99.9	90 - 110	mg/L	

* Exceeds LIMITS Limit

KEMRON FORMS - Modified 03/21/2005
Version 1.3 PDF File ID: 241805
Report generated 05/24/2005 14:00

KEMRON Environmental Services

CONTINUING CALIBRATION REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189599-13
Instrument ID: PE-ICP Run Time: 10:33 Method: 6010B
File ID: PE.052305.103309 Analyst: KHR
Workgroup (AAB#): WG189586 Cal ID: PE-ICP - 23-MAY-05

Analyte		Expected	Found	%REC	LIMITS	UNITS	Q
Aluminum		10	9.80	98.0	90 - 110	mg/L	
Silver		.4	0.392	97.9	90 - 110	mg/L	
Arsenic		.4	0.391	97.8	90 - 110	mg/L	
Barium		1	1.02	102	90 - 110	mg/L	
Beryllium		.05	0.0504	101	90 - 110	mg/L	
Calcium		10	10.0	100	90 - 110	mg/L	
Cadmium		.05	0.0483	96.6	90 - 110	mg/L	
Cobalt		.2	0.194	97.2	90 - 110	mg/L	
Chromium		.5	0.509	102	90 - 110	mg/L	
Copper		.5	0.517	103	90 - 110	mg/L	
Iron		4	4.04	101	90 - 110	mg/L	
Potassium		50	50.7	101	90 - 110	mg/L	
Magnesium		10	9.87	98.7	90 - 110	mg/L	
Manganese		.5	0.516	103	90 - 110	mg/L	
Sodium		50	53.4	107	90 - 110	mg/L	
Nickel		.5	0.528	106	90 - 110	mg/L	
Lead		.5	0.509	102	90 - 110	mg/L	
Vanadium		1	1.02	102	90 - 110	mg/L	
Zinc		1	1.01	101	90 - 110	mg/L	

* Exceeds LIMITS Limit

KEMRON FORMS - Modified 03/21/2005
Version 1.3 PDF File ID: 241805
Report generated 05/24/2005 14:00

KEMRON Environmental Services

CONTINUING CALIBRATION REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189599-15
Instrument ID: PE-ICP Run Time: 11:48 Method: 6010B
File ID: PE.052305.114817 Analyst: KHR
Workgroup (AAB#): WG189586 Cal ID: PE-ICP - 23-MAY-05

Analyte		Expected	Found	%REC	LIMITS	UNITS	Q
Aluminum		10	9.93	99.3	90 - 110	mg/L	
Silver		.4	0.397	99.4	90 - 110	mg/L	
Arsenic		.4	0.395	98.8	90 - 110	mg/L	
Barium		1	1.03	103	90 - 110	mg/L	
Beryllium		.05	0.0510	102	90 - 110	mg/L	
Calcium		10	10.1	101	90 - 110	mg/L	
Cadmium		.05	0.0492	98.5	90 - 110	mg/L	
Cobalt		.2	0.201	101	90 - 110	mg/L	
Chromium		.5	0.517	103	90 - 110	mg/L	
Copper		.5	0.528	106	90 - 110	mg/L	
Iron		4	4.06	101	90 - 110	mg/L	
Potassium		50	52.2	104	90 - 110	mg/L	
Magnesium		10	9.94	99.4	90 - 110	mg/L	
Manganese		.5	0.516	103	90 - 110	mg/L	
Sodium		50	55.8	112	90 - 110	mg/L	*
Nickel		.5	0.533	107	90 - 110	mg/L	
Lead		.5	0.514	103	90 - 110	mg/L	
Vanadium		1	1.02	102	90 - 110	mg/L	
Zinc		1	1.01	101	90 - 110	mg/L	

* Exceeds LIMITS Limit

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KEMRON Environmental Services

CONTINUING CALIBRATION REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189599-17
Instrument ID: PE-ICP Run Time: 12:39 Method: 6010B
File ID: PE.052305.123928 Analyst: KHR
Workgroup (AAB#): WG189586 Cal ID: PE-ICP - 23-MAY-05

Analyte		Expected	Found	%REC	LIMITS	UNITS	Q
Aluminum		10	9.94	99.4	90 - 110	mg/L	
Silver		.4	0.398	99.4	90 - 110	mg/L	
Arsenic		.4	0.396	99.0	90 - 110	mg/L	
Barium		1	1.03	103	90 - 110	mg/L	
Beryllium		.05	0.0510	102	90 - 110	mg/L	
Calcium		10	10.2	102	90 - 110	mg/L	
Cadmium		.05	0.0494	98.8	90 - 110	mg/L	
Cobalt		.2	0.204	102	90 - 110	mg/L	
Chromium		.5	0.517	103	90 - 110	mg/L	
Copper		.5	0.528	106	90 - 110	mg/L	
Iron		4	4.02	101	90 - 110	mg/L	
Potassium		50	51.5	103	90 - 110	mg/L	
Magnesium		10	9.93	99.3	90 - 110	mg/L	
Manganese		.5	0.516	103	90 - 110	mg/L	
Sodium		50	55.6	111	90 - 110	mg/L	*
Nickel		.5	0.532	106	90 - 110	mg/L	
Lead		.5	0.515	103	90 - 110	mg/L	
Vanadium		1	1.02	102	90 - 110	mg/L	
Zinc		1	1.01	101	90 - 110	mg/L	

* Exceeds LIMITS Limit

KEMRON FORMS - Modified 03/21/2005
Version 1.3 PDF File ID: 241805
Report generated 05/24/2005 14:00

KEMRON Environmental Services

CONTINUING CALIBRATION REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189604-10
Instrument ID: PE-ICP2 Run Time: 11:18 Method: 6010B
File ID: P2.052305.111819 Analyst: MMB
Workgroup (AAB#): WG189586 Cal ID: PE-ICP - 23-MAY-05

Analyte		Expected	Found	%REC	LIMITS	UNITS	Q
Aluminum		10	10.1	101	90 - 110	mg/L	
Silver		.4	0.402	101	90 - 110	mg/L	
Arsenic		.4	0.402	100	90 - 110	mg/L	
Barium		1	1.04	104	90 - 110	mg/L	
Beryllium		.05	0.0542	108	90 - 110	mg/L	
Calcium		10	10.3	103	90 - 110	mg/L	
Cadmium		.05	0.0487	97.4	90 - 110	mg/L	
Cobalt		.2	0.200	100	90 - 110	mg/L	
Chromium		.5	0.516	103	90 - 110	mg/L	
Copper		.5	0.511	102	90 - 110	mg/L	
Iron		4	4.01	100	90 - 110	mg/L	
Potassium		50	52.2	104	90 - 110	mg/L	
Magnesium		10	10.2	102	90 - 110	mg/L	
Manganese		.5	0.523	105	90 - 110	mg/L	
Sodium		50	53.9	108	90 - 110	mg/L	
Nickel		.5	0.531	106	90 - 110	mg/L	
Lead		.5	0.523	105	90 - 110	mg/L	
Vanadium		1	1.02	102	90 - 110	mg/L	
Zinc		1	1.03	103	90 - 110	mg/L	

* Exceeds LIMITS Limit

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KEMRON Environmental Services

CONTINUING CALIBRATION REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189599-19
Instrument ID: PE-ICP Run Time: 13:32 Method: 6010B
File ID: PE.052305.133203 Analyst: KHR
Workgroup (AAB#): WG189586 Cal ID: PE-ICP - 23-MAY-05

Analyte		Expected	Found	%REC	LIMITS	UNITS	Q
Aluminum		10	10.0	100	90 - 110	mg/L	
Silver		.4	0.399	99.6	90 - 110	mg/L	
Arsenic		.4	0.400	100	90 - 110	mg/L	
Barium		1	1.04	104	90 - 110	mg/L	
Beryllium		.05	0.0514	103	90 - 110	mg/L	
Calcium		10	10.2	102	90 - 110	mg/L	
Cadmium		.05	0.0494	98.8	90 - 110	mg/L	
Cobalt		.2	0.207	103	90 - 110	mg/L	
Chromium		.5	0.521	104	90 - 110	mg/L	
Copper		.5	0.528	106	90 - 110	mg/L	
Iron		4	4.06	101	90 - 110	mg/L	
Potassium		50	52.5	105	90 - 110	mg/L	
Magnesium		10	10.0	100	90 - 110	mg/L	
Manganese		.5	0.520	104	90 - 110	mg/L	
Sodium		50	55.7	111	90 - 110	mg/L	*
Nickel		.5	0.538	108	90 - 110	mg/L	
Lead		.5	0.521	104	90 - 110	mg/L	
Vanadium		1	1.02	102	90 - 110	mg/L	
Zinc		1	1.02	102	90 - 110	mg/L	

* Exceeds LIMITS Limit

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KEMRON Environmental Services

CONTINUING CALIBRATION REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189604-19
Instrument ID: PE-ICP2 Run Time: 16:14 Method: 6010B
File ID: P2.052305.161452 Analyst: MMB
Workgroup (AAB#): WG189586 Cal ID: PE-ICP - 23-MAY-05

Analyte		Expected	Found	%REC	LIMITS	UNITS	Q
Aluminum		10	10.4	104	90 - 110	mg/L	
Silver		.4	0.405	101	90 - 110	mg/L	
Arsenic		.4	0.404	101	90 - 110	mg/L	
Barium		1	1.03	103	90 - 110	mg/L	
Beryllium		.05	0.0547	109	90 - 110	mg/L	
Calcium		10	10.4	104	90 - 110	mg/L	
Cadmium		.05	0.0497	99.4	90 - 110	mg/L	
Cobalt		.2	0.200	100	90 - 110	mg/L	
Chromium		.5	0.525	105	90 - 110	mg/L	
Copper		.5	0.515	103	90 - 110	mg/L	
Iron		4	4.26	106	90 - 110	mg/L	
Potassium		50	48.4	96.8	90 - 110	mg/L	
Magnesium		10	10.6	106	90 - 110	mg/L	
Manganese		.5	0.519	104	90 - 110	mg/L	
Sodium		50	50.4	101	90 - 110	mg/L	
Nickel		.5	0.541	108	90 - 110	mg/L	
Lead		.5	0.535	107	90 - 110	mg/L	
Vanadium		1	1.03	103	90 - 110	mg/L	
Zinc		1	1.01	101	90 - 110	mg/L	

* Exceeds LIMITS Limit

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KEMRON Environmental Services

CONTINUING CALIBRATION REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189604-21
Instrument ID: PE-ICP2 Run Time: 17:30 Method: 6010B
File ID: P2.052305.173024 Analyst: MMB
Workgroup (AAB#): WG189586 Cal ID: PE-ICP - 23-MAY-05

Analyte		Expected	Found	%REC	LIMITS	UNITS	Q
Aluminum		10	10.4	104	90 - 110	mg/L	
Silver		.4	0.404	101	90 - 110	mg/L	
Arsenic		.4	0.404	101	90 - 110	mg/L	
Barium		1	1.04	104	90 - 110	mg/L	
Beryllium		.05	0.0545	109	90 - 110	mg/L	
Calcium		10	10.3	103	90 - 110	mg/L	
Cadmium		.05	0.0496	99.3	90 - 110	mg/L	
Cobalt		.2	0.200	100	90 - 110	mg/L	
Chromium		.5	0.523	105	90 - 110	mg/L	
Copper		.5	0.514	103	90 - 110	mg/L	
Iron		4	4.27	107	90 - 110	mg/L	
Potassium		50	47.4	94.8	90 - 110	mg/L	
Magnesium		10	10.7	107	90 - 110	mg/L	
Manganese		.5	0.513	103	90 - 110	mg/L	
Sodium		50	49.0	98.0	90 - 110	mg/L	
Nickel		.5	0.538	108	90 - 110	mg/L	
Lead		.5	0.528	106	90 - 110	mg/L	
Vanadium		1	1.02	102	90 - 110	mg/L	
Zinc		1	1.02	102	90 - 110	mg/L	

* Exceeds LIMITS Limit

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KEMRON Environmental Services

CONTINUING CALIBRATION REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189604-23
Instrument ID: PE-ICP2 Run Time: 18:20 Method: 6010B
File ID: P2.052305.182040 Analyst: MMB
Workgroup (AAB#): WG189586 Cal ID: PE-ICP - 23-MAY-05

Analyte		Expected	Found	%REC	LIMITS	UNITS	Q
Aluminum		10	10.4	104	90 - 110	mg/L	
Silver		.4	0.404	101	90 - 110	mg/L	
Arsenic		.4	0.401	100	90 - 110	mg/L	
Barium		1	1.03	103	90 - 110	mg/L	
Beryllium		.05	0.0540	108	90 - 110	mg/L	
Calcium		10	10.2	102	90 - 110	mg/L	
Cadmium		.05	0.0494	98.8	90 - 110	mg/L	
Cobalt		.2	0.200	100	90 - 110	mg/L	
Chromium		.5	0.522	104	90 - 110	mg/L	
Copper		.5	0.512	102	90 - 110	mg/L	
Iron		4	4.36	109	90 - 110	mg/L	
Potassium		50	47.0	94.0	90 - 110	mg/L	
Magnesium		10	10.9	109	90 - 110	mg/L	
Manganese		.5	0.515	103	90 - 110	mg/L	
Sodium		50	47.0	94.0	90 - 110	mg/L	
Nickel		.5	0.536	107	90 - 110	mg/L	
Lead		.5	0.523	105	90 - 110	mg/L	
Vanadium		1	1.01	101	90 - 110	mg/L	
Zinc		1	1.02	102	90 - 110	mg/L	

* Exceeds LIMITS Limit

KEMRON FORMS - Modified 03/21/2005
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KEMRON ENVIRONMENTAL SERVICES
INTERFERENCE CHECK SAMPLES

Login number: L0505399 **Workgroup (AAB#):** WG189586
Instrument ID: PE-ICP **Method:** 6010B
Sol. A : WG189599-07 **File ID:** PE.052305.085149 **Units:** mg/L
Sol. AB : WG189599-08 **File ID:** PE.052305.085701

	Sol. A			Sol. AB			
ANALYTE	True	Found	%Recovery	True	Found	%Recovery	Q
Aluminum	250	276	110	250	274	110	
Arsenic	NS	0.00281	NS	0.250	0.274	110	
Barium	NS	0.00174	NS	0.250	0.261	104	
Beryllium	NS	-0.000160	NS	0.250	0.297	119	
Cadmium	NS	-0.000190	NS	0.500	0.521	104	
Calcium	250	276	110	250	274	110	
Chromium	NS	-0.00241	NS	0.250	0.253	101	
Cobalt	NS	0.00378	NS	0.250	0.239	95.6	
Copper	NS	-0.00618	NS	0.250	0.269	108	
Iron	100	98.2	98.2	100	97.6	97.6	
Lead	NS	-0.00940	NS	0.500	0.499	99.8	
Magnesium	250	271	108	250	268	107	
Manganese	NS	-0.000340	NS	0.250	0.259	104	
Nickel	NS	0	NS	0.500	0.482	96.4	
Potassium	NS	-0.390	NS	5.00	5.18	104	
Silver	NS	0.000120	NS	0.500	0.557	111	
Sodium	NS	-0.169	NS	5.00	5.12	102	
Vanadium	NS	-0.00177	NS	0.250	0.254	102	
Zinc	NS	0.00380	NS	0.500	0.491	98.2	

NS = Not spiked
*** = Recovery of spiked element is outside acceptance limit of 80% - 120% of true value.**
 # = Result for unspiked element is outside the acceptance limits of (+/-) 2x the project reporting limit (RL).

KEMRON ENVIRONMENTAL SERVICES
INTERFERENCE CHECK SAMPLES

Login number: L0505399 **Workgroup (AAB#):** WG189586
Instrument ID: PE-ICP2 **Method:** 6010B
Sol. A : WG189604-08 **File ID:** P2.052305.110743 **Units:** mg/L
Sol. AB : WG189604-09 **File ID:** P2.052305.111300

	Sol. A			Sol. AB			
ANALYTE	True	Found	%Recovery	True	Found	%Recovery	Q
Aluminum	250	251	100	250	252	101	
Arsenic	NS	-0.00536	NS	0.250	0.238	95.2	
Barium	NS	-0.000330	NS	0.250	0.254	102	
Beryllium	NS	0.000100	NS	0.250	0.279	112	
Cadmium	NS	-0.0000500	NS	0.500	0.462	92.4	
Calcium	250	284	114	250	285	114	
Chromium	NS	0.000770	NS	0.250	0.251	100	
Cobalt	NS	-0.0000100	NS	0.250	0.234	93.6	
Copper	NS	0.000850	NS	0.250	0.250	100	
Iron	100	99.7	99.7	100	98.8	98.8	
Lead	NS	0.00399	NS	0.500	0.506	101	
Magnesium	250	260	104	250	258	103	
Manganese	NS	-0.000430	NS	0.250	0.252	101	
Nickel	NS	0.000620	NS	0.500	0.481	96.2	
Potassium	NS	-0.412	NS	5.00	5.51	110	
Silver	NS	-0.00268	NS	0.500	0.509	102	
Sodium	NS	-0.325	NS	5.00	5.15	103	
Vanadium	NS	0.00165	NS	0.250	0.252	101	
Zinc	NS	0.0103	NS	0.500	0.493	98.6	

NS = Not spiked
*** = Recovery of spiked element is outside acceptance limit of 80% - 120% of true value.**
 # = Result for unspiked element is outside the acceptance limits of (+/-) 2x the project reporting limit (RL).

KEMRON Environmental Services

INTERELEMENT CORRECTION FACTORS (ANNUALLY)

Login Number: L0505399 **Date:** 03/22/2005

Insturment ID: PE-ICP **Method:** 6010B

Analyte	Wave Length	AL	AS	BA	BE	CA
ALUMINUM	237.30	0	0	0	130	0
ANTIMONY	206.80	0.0800	0	0	0	0
ARSENIC	189.00	-0.0170	0	0	0	0
BARIUM	230.40	0.00200	0	0	0	0
BERYLLIUM	234.90	0.00195	0	0	0	0
CADMIUM	228.80	0	4.90	0	0	0
CALCIUM	227.50	0.866	0	0	0	0
CHROMIUM	267.70	0	0	0	0	0
COBALT	228.60	0	0	-1.20	0	-0.000500
COPPER	327.40	0.00920	0	0	0	0
IRON	261.40	0.0200	0	0	0	0
LEAD	220.40	-0.104	0	0	0	0
MAGNESIUM	279.10	-0.0100	0	0	0	0.105
MANGANESE	257.60	-0.0528	0	0	0	0.000400
MOLYBDENUM	202.00	0.00260	0	0	0	0
NICKEL	231.60	0	0	0	0	0
POTASSIUM	766.50	0	0	0	0	0
SELENIUM	196.00	0.0180	0	0	0	0
SILICON	288.20	-0.350	0	0	0	-0.500
SILVER	328.10	0	0	0	0	0
SODIUM	589.60	0	0	0	0	0
STRONTIUM	407.80	-0.210	0	0	0	-0.100
THALLIUM	190.80	0	0	0	0	0
TIN	189.90	0.0800	0	0	0	-0.0100
TITANIUM	337.30	0	0	0	0	-0.00160
VANADIUM	292.40	0.00100	0	0	0	0
ZINC	206.20	0	0	0	0	0

KEMRON Environmental Services

INTERELEMENT CORRECTION FACTORS (ANNUALLY)

Login Number: L0505399 **Date:** 03/22/2005

Insturment ID: PE-ICP **Method:** 6010B

Analyte	Wave Length	CD	CO	CR	CU	FE
ALUMINUM	237.30	0	-5.40	0	0	5.80
ANTIMONY	206.80	0	0	19.0	0	0.100
ARSENIC	189.00	0	0	-4.12	0	-0.120
BARIUM	230.40	0	0.644	0	0	-0.0200
BERYLLIUM	234.90	0	0	0	0	0.0800
CADMIUM	228.80	0	-3.96	0.140	0	-0.00100
CALCIUM	227.50	0	232	0	0	10.8
CHROMIUM	267.70	0	0	0	0	-0.121
COBALT	228.60	0	0	0.0750	0	-0.00500
COPPER	327.40	0	0	0	0	0
IRON	261.40	-0.0240	-119	-7.90	0	0
LEAD	220.40	0	0	-0.568	0	0.180
MAGNESIUM	279.10	0	0	0	0	0
MANGANESE	257.60	0	0	0.580	0	0.00600
MOLYBDENUM	202.00	0	0	0	0	0
NICKEL	231.60	0	0	-0.0800	0	-0.0130
POTASSIUM	766.50	0	0	0	0	0
SELENIUM	196.00	0	0	0	0	0.250
SILICON	288.20	0	0	0	0	0
SILVER	328.10	0	0	0	0	0
SODIUM	589.60	0	0	0	0	2.00
STRONTIUM	407.80	0	0	0	0	-4.70
THALLIUM	190.80	0	0	0	0	-0.200
TIN	189.90	0	0	0	0	0
TITANIUM	337.30	0	0	0	0	-0.0400
VANADIUM	292.40	0	0	-3.78	0	0.0180
ZINC	206.20	0	0	-3.50	0	-0.0733

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KEMRON Environmental Services

INTERELEMENT CORRECTION FACTORS (ANNUALLY)

Login Number: L0505399 **Date:** 03/22/2005

Insturment ID: PE-ICP **Method:** 6010B

Analyte	Wave Length	MG	MN	MO	NI	PB
ALUMINUM	237.30	-0.340	0	0	0	0
ANTIMONY	206.80	0	0.370	3.67	-3.00	0
ARSENIC	189.00	0	-0.00250	5.00	0	0
BARIUM	230.40	0	0	3.30	0	0
BERYLLIUM	234.90	0	0	-0.120	0	0
CADMIUM	228.80	0.000800	0	0	0	0
CALCIUM	227.50	0	0	0	-8.00	0
CHROMIUM	267.70	-0.0201	0	0	0	0
COBALT	228.60	-0.000500	0	-0.920	0	0
COPPER	327.40	0	0	0	0	0
IRON	261.40	-0.100	-5.00	0	0	-5.55
LEAD	220.40	0	0	-1.30	0	0
MAGNESIUM	279.10	0	0	45.0	0	0
MANGANESE	257.60	0.0100	0	0.0900	0	0
MOLYBDENUM	202.00	0	0	0	0	0
NICKEL	231.60	0	0	0	0	0
POTASSIUM	766.50	1.70	0	0	0	0
SELENIUM	196.00	0	0	0	0.960	0
SILICON	288.20	0	0	0	0	0
SILVER	328.10	0	0	0	0	0
SODIUM	589.60	0	0	0	0	0
STRONTIUM	407.80	-0.360	0	165	0	0
THALLIUM	190.80	0	-6.90	0	0	0
TIN	189.90	0	0	0	0	0
TITANIUM	337.30	0	0	4.34	0	0
VANADIUM	292.40	0	0	-0.900	0	0
ZINC	206.20	0.0500	0	0	0	0

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Version 1.5 PDF File ID: 241800
Report generated 05/25/2005 14:23

KEMRON Environmental Services

INTERELEMENT CORRECTION FACTORS (ANNUALLY)

Login Number: L0505399 **Date:** 03/22/2005

Insturment ID: PE-ICP **Method:** 6010B

Analyte	Wave Length	TI	TL	V
ALUMINUM	237.30	4.50	0	0
ANTIMONY	206.80	-1.58	0	-2.10
ARSENIC	189.00	2.30	0	0.100
BARIUM	230.40	-1.00	0	0
BERYLLIUM	234.90	-0.00100	0	0
CADMIUM	228.80	0.300	0	0.190
CALCIUM	227.50	4.50	0	60.0
CHROMIUM	267.70	0	0	0
COBALT	228.60	2.30	0	-0.0700
COPPER	327.40	-0.800	0	0
IRON	261.40	0	0	-9.66
LEAD	220.40	-0.710	-0.200	-0.200
MAGNESIUM	279.10	-7.60	0	4.60
MANGANESE	257.60	0.0700	0	-0.0200
MOLYBDENUM	202.00	0	0	0
NICKEL	231.60	-0.160	0	-0.0700
POTASSIUM	766.50	0	0	0
SELENIUM	196.00	-0.200	0	0.940
SILICON	288.20	0	0	0
SILVER	328.10	0	0	0
SODIUM	589.60	0	0	0
STRONTIUM	407.80	0	0	0
THALLIUM	190.80	-4.00	0	-6.83
TIN	189.90	-6.00	0	0
TITANIUM	337.30	0	0	0
VANADIUM	292.40	0.500	0	0
ZINC	206.20	2.20	0	3.50

KEMRON Environmental Services

INTERELEMENT CORRECTION FACTORS (ANNUALLY)

Login Number: L0505399 **Date:** 04/29/2005

Insturment ID: PE-ICP2 **Method:** 6010B

Analyte	Wave Length	AG	AL	AS	B	BA
ALUMINUM	396.15	0	0	0	0	0
ANTIMONY	206.84	0	0.0346	0	0	0
ARSENIC	188.98	0	0	0	0	0
BARIUM	233.53	0	0	0	0	0
BERYLLIUM	313.11	0	-0.00123	0	0	0
BORON	249.68	0	0.123	0	0	0
CADMIUM	228.80	0	0	8.00	0	4.00
CALCIUM	317.93	0	0	6.00	0	0
CHROMIUM	267.72	0	0	0	0	0
COBALT	228.62	0	0	0	0	0
COPPER	327.39	0.687	0	0	0	0
GALLIUM	417.21	0	0	0	0	0
IRON	239.56	0	0	0	0	0
LEAD	220.35	0	-0.136	0	0	0
MAGNESIUM	279.08	0	0	0	0	0
MANGANESE	257.61	0	0	0	0	0
MOLYBDENUM	202.03	0	0	0	0	0
NICKEL	231.60	0	0	0	0	0
POTASSIUM	766.49	0	0	0	0	0
SELENIUM	196.03	0.863	0	0.170	0	0.536
SILICON	251.61	0	0	0	0	0
SILVER	328.07	0	0	0	0	0
SODIUM	589.59	0	0	0	0	0
STRONTIUM	407.77	0	0	0	0	0
THALLIUM	190.80	0	-0.0203	0	0	0
TIN	189.93	0	0	0	0	5.80
TITANIUM	334.94	0	0	0	0	0
VANADIUM	290.88	0	0	0	0	0
YTTRIUM	371.03	0	0	0	0	0
ZINC	206.20	0	0	0.161	0	0

KEMRON Environmental Services

INTERELEMENT CORRECTION FACTORS (ANNUALLY)

Login Number: L0505399 **Date:** 04/29/2005

Insturment ID: PE-ICP2 **Method:** 6010B

Analyte	Wave Length	BE	CA	CD	CO	CR
ALUMINUM	396.15	0	-0.184	0	0	0
ANTIMONY	206.84	0	0	1.19	0	15.0
ARSENIC	188.98	0	0.100	0	0	-9.80
BARIUM	233.53	0	0	0	0	0
BERYLLIUM	313.11	0	0	0	0	0
BORON	249.68	-2.00	0.0498	0	4.62	0
CADMIUM	228.80	0	0	0	-6.10	0
CALCIUM	317.93	5.00	0	0	200	0
CHROMIUM	267.72	0	0	0	0	0
COBALT	228.62	0	0	0	0	0
COPPER	327.39	0	-0.0134	0	0.335	0
GALLIUM	417.21	0	0	0	0	0
IRON	239.56	0	0	0	2.03	0
LEAD	220.35	0	-0.00533	0	0	-0.103
MAGNESIUM	279.08	0	0	0	0	0
MANGANESE	257.61	0	0	0	0	0
MOLYBDENUM	202.03	0	0	0	0	0
NICKEL	231.60	0	0	0	1.08	0
POTASSIUM	766.49	0	0	0	0	0
SELENIUM	196.03	0	-0.150	0.704	-0.254	0
SILICON	251.61	0	0	0	0	0
SILVER	328.07	0	-0.00558	0	0	0
SODIUM	589.59	0	0	0	0	0
STRONTIUM	407.77	0	0	0	0	0
THALLIUM	190.80	0	-0.0138	0	-0.813	0.119
TIN	189.93	0	-0.0407	0	0	0
TITANIUM	334.94	0	-0.00758	0	0	0.231
VANADIUM	290.88	0	0	0	0	-1.54
YTTRIUM	371.03	0	0	0	0	0
ZINC	206.20	0	0	0	0	-4.93

KEMRON Environmental Services

INTERELEMENT CORRECTION FACTORS (ANNUALLY)

Login Number: L0505399 **Date:** 04/29/2005

Insturment ID: PE-ICP2 **Method:** 6010B

Analyte	Wave Length	CU	FE	GA	K	MG
ALUMINUM	396.15	0	0	0	0	0
ANTIMONY	206.84	0	0	0	0	0
ARSENIC	188.98	0	-0.260	0	0	0
BARIUM	233.53	0	0.0139	0	0	0
BERYLLIUM	313.11	0	0	0	0	0
BORON	249.68	0	-3.51	0	0.833	0.106
CADMIUM	228.80	0	0	0	0	0
CALCIUM	317.93	0	0	0	0	0.700
CHROMIUM	267.72	0	0.0244	0	0	0
COBALT	228.62	0	0	0	0	0
COPPER	327.39	0	-0.0158	0	0	0
GALLIUM	417.21	0	0	0	0	0
IRON	239.56	0	0	0	0	0
LEAD	220.35	0.744	0	0	0	0
MAGNESIUM	279.08	0	-0.289	0	0	0
MANGANESE	257.61	0	0	0	0	0.0164
MOLYBDENUM	202.03	0	-0.0391	0	0	0
NICKEL	231.60	0	0.0163	0	0	0
POTASSIUM	766.49	0	0	0	0	1.70
SELENIUM	196.03	0	-0.193	0	0	0
SILICON	251.61	0	0	0	0	0
SILVER	328.07	0	-0.200	0	0	0
SODIUM	589.59	0	4.00	0	0	0.210
STRONTIUM	407.77	0	0	0	0	0
THALLIUM	190.80	0	-0.0470	0	0	0
TIN	189.93	0.589	-0.119	0	0	0
TITANIUM	334.94	0	0	0	0	0.0211
VANADIUM	290.88	0	0.120	0	0	0
YTTRIUM	371.03	0	0	0	0	0
ZINC	206.20	0	0.0100	0	0	0

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KEMRON Environmental Services

INTERELEMENT CORRECTION FACTORS (ANNUALLY)

Login Number: L0505399 **Date:** 04/29/2005

Insturment ID: PE-ICP2 **Method:** 6010B

Analyte	Wave Length	MN	MO	NA	NI	PB
ALUMINUM	396.15	0	45.4	0	0	0
ANTIMONY	206.84	0	-1.54	0	-0.653	0
ARSENIC	188.98	0	2.53	0	0	0
BARIUM	233.53	0	0.171	0	0	0
BERYLLIUM	313.11	0	0	0	0	0
BORON	249.68	1.95	-2.54	0.751	0	1.40
CADMIUM	228.80	0	0	0	-0.0800	0
CALCIUM	317.93	0	-15.0	0	-1000	0
CHROMIUM	267.72	0.231	0.187	0	0	0
COBALT	228.62	0	-0.272	0	0.157	0
COPPER	327.39	0	-0.108	0	0.279	0
GALLIUM	417.21	0	0	0	0	0
IRON	239.56	-1.63	0	0	0	0
LEAD	220.35	0	-2.54	0	0	0
MAGNESIUM	279.08	-4.45	-5.59	0	0	0
MANGANESE	257.61	0	0	0	0	0
MOLYBDENUM	202.03	0	0	0	0	0
NICKEL	231.60	0	0	0	0	0
POTASSIUM	766.49	0	0	0	0	0
SELENIUM	196.03	0.633	0.253	0	0	0
SILICON	251.61	0	12.2	0	0	0
SILVER	328.07	0.201	-0.122	0	0	0
SODIUM	589.59	0	3.16	0	0	0
STRONTIUM	407.77	0	0	0	0	0
THALLIUM	190.80	-1.38	1.73	0	0	0
TIN	189.93	0	0	0	0.316	0
TITANIUM	334.94	0	0	0	0	0
VANADIUM	290.88	0	0.900	0	0	0
YTTRIUM	371.03	0	0	0	0	0
ZINC	206.20	0	0	0	0.169	0

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KEMRON Environmental Services

INTERELEMENT CORRECTION FACTORS (ANNUALLY)

Login Number: L0505399 **Date:** 04/29/2005

Insturment ID: PE-ICP2 **Method:** 6010B

Analyte	Wave Length	SB	SE	SI	SN	SR
ALUMINUM	396.15	0	0	0	0	0
ANTIMONY	206.84	0	0.732	0	-4.23	0
ARSENIC	188.98	0	0	0	0	0
BARIUM	233.53	0	0	0	0	0
BERYLLIUM	313.11	0	0	0	0	0
BORON	249.68	0	0	7.59	0	23.5
CADMIUM	228.80	0	0	0	0	0
CALCIUM	317.93	0	5.00	0	0	0
CHROMIUM	267.72	0	0	0	0	0
COBALT	228.62	1.37	0	0	0	0
COPPER	327.39	0.176	0.116	0	0	0
GALLIUM	417.21	0	0	0	0	0
IRON	239.56	0	0	0	0	0
LEAD	220.35	-0.157	0	0	0	0
MAGNESIUM	279.08	0	0	0	0	0
MANGANESE	257.61	0	0	0	0	0
MOLYBDENUM	202.03	0	0	0	0	0
NICKEL	231.60	-0.285	0	0	0	0
POTASSIUM	766.49	0	0	0	0	0
SELENIUM	196.03	0.159	0	0	0	0
SILICON	251.61	0	0	0	3.24	0
SILVER	328.07	0	0	0	0	0
SODIUM	589.59	0	0	0	0	0
STRONTIUM	407.77	0	0	0	0	0
THALLIUM	190.80	0	0	0	0	0
TIN	189.93	0.300	0.246	0	0	0
TITANIUM	334.94	0	0	0	0	0
VANADIUM	290.88	0	0	0	0	0
YTTRIUM	371.03	0	0	0	0	0
ZINC	206.20	0	0	0	0	0

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KEMRON Environmental Services

INTERELEMENT CORRECTION FACTORS (ANNUALLY)

Login Number: L0505399 **Date:** 04/29/2005

Insturment ID: PE-ICP2 **Method:** 6010B

Analyte	Wave Length	TI	TL	V	ZN
ALUMINUM	396.15	0	0	0	0
ANTIMONY	206.84	-0.330	0.264	-2.66	0
ARSENIC	188.98	0	0	0	0
BARIUM	233.53	0	0	-2.23	0
BERYLLIUM	313.11	-3.58	0	-0.0257	0
BORON	249.68	5.10	0	0	1.45
CADMIUM	228.80	0	0	0.0859	0
CALCIUM	317.93	0	0	16.0	0
CHROMIUM	267.72	0	0	-0.433	0
COBALT	228.62	2.12	0	0	0
COPPER	327.39	-0.770	0.112	-0.223	0
GALLIUM	417.21	0	0	0	0
IRON	239.56	0	0	0	0
LEAD	220.35	0	0	0	0
MAGNESIUM	279.08	0	0	0	0
MANGANESE	257.61	0	0	0	0
MOLYBDENUM	202.03	0.861	0	-0.196	0
NICKEL	231.60	0	0.309	0	0
POTASSIUM	766.49	0	0	0	0
SELENIUM	196.03	0	0.248	0.398	0
SILICON	251.61	7.31	0	0	0
SILVER	328.07	0	0	-3.90	0
SODIUM	589.59	0	0	0	0
STRONTIUM	407.77	0	0	0	0
THALLIUM	190.80	-4.51	0	-0.742	0
TIN	189.93	-5.54	0	0	0
TITANIUM	334.94	0	0	0	0
VANADIUM	290.88	0	0	0	0
YTTRIUM	371.03	0	0	0	0
ZINC	206.20	0	0	0	0

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KEMRON Environmental Services

LINEAR RANGE (QUARTERLY)

Login Number: L0505399 **Date:** 03/09/2005

Insturment ID: PE-ICP **Method:** 6010B

Analyte	Integration Time (Sec.)	Concentration (mg/L)
Aluminum	10.00	500.0
Antimony	10.00	6.0
Arsenic	10.00	2.0
Barium	10.00	10.0
Beryllium	10.00	1.0
Cadmium	10.00	1.0
Calcium	10.00	500.0
Chromium	10.00	10.0
Cobalt	10.00	10.0
Copper	10.00	10.0
Iron	10.00	50.0
Lead	10.00	100.0
Magnesium	10.00	500.0
Manganese	10.00	5.0
Molybdenum	10.00	10.0
Nickel	10.00	10.0
Potassium	10.00	250.0
Selenium	10.00	1.0
Silicon	10.00	10.0
Silver	10.00	2.0
Sodium	10.00	250.0
Strontium	10.00	5.0
Thallium	10.00	1.0
Tin	10.00	1.0
Titanium	10.00	5.0
Vanadium	10.00	10.0
Zinc	10.00	10.0

Comments:

KEMRON Environmental Services

LINEAR RANGE (QUARTERLY)

Login Number: L0505399 **Date:** 03/14/2005

Insturment ID: PE-ICP2 **Method:** 6010B

Analyte	Integration Time (Sec.)	Concentration (mg/L)
Aluminum	10.00	500.0
Antimony	10.00	40.0
Arsenic	10.00	40.0
Barium	10.00	10.0
Beryllium	10.00	2.0
Boron	10.00	50.0
Cadmium	10.00	10.0
Calcium	10.00	500.0
Chromium	10.00	50.0
Cobalt	10.00	50.0
Copper	10.00	50.0
Iron	10.00	400.0
Lead	10.00	50.0
Magnesium	10.00	500.0
Manganese	10.00	30.0
Molybdenum	10.00	50.0
Nickel	10.00	50.0
Potassium	10.00	200.0
Selenium	10.00	50.0
Silicon	10.00	10.0
Silver	10.00	10.0
Sodium	10.00	200.0
Strontium	10.00	3.0
Thallium	10.00	50.0
Tin	10.00	50.0
Titanium	10.00	10.0
Vanadium	10.00	50.0
Zinc	10.00	50.0

Comments:

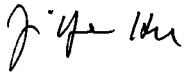
KEMRON Environmental Services
Data Checklist

Date:	May 24, 2005
Analyst:	JI Y. HU
Method:	6020A
Instrument:	ELAN-ICP
Curve Workgroup:	189724
Analytical Workgroups:	189691,189601,189572,189720,189269

Run Log ID:	5111
Calibration/Linearity	✓
ICV/CCV	✓
ICB/CCB	✓
ICSA/ICSAB	✓
CRI	✓
Blank/LCS	✓
MS/MSD	✓
Post Spike/Serial Dilution	✓
Upload Results	✓
Data Qualifiers	
Generate PDF Instrument Data	✓
Sign/Annotate PDF Data	✓
Upload Curve Data	
Workgroup Forms	✓
Case Narrative	✓
Client Forms	
Level X	359,303
Level 3	399
Level 4	418,458
Check for compliance with method and project specific requirements	✓
Check the completeness of reported information	✓
Check the information for the report narrative	✓
Primary Reviewer	JYH
Secondary Reviewer	LSB

Comments

Approved By:

Primary: May 24, 2005	Secondary: May 25, 2005
	

KEMRON Environmental Services
HOLDING TIMES
EQUIVALENT TO AFCEE FORM 9

Analytical Method: 6020 **AAB#:** WG189691
Login Number: L0505399

Client ID	Date Collected	Date Received	Date Extracted	Max Hold Time Ext.	Time Held Ext.	Date Analyzed	Max Hold Time Anal	Time Held Anal.	Q
49WW01-MAY05	05/17/05	05/18/05	05/20/05	180	2.95	05/24/05	180	4.12	
49WW01-MAY05	05/17/05	05/18/05	05/20/05	180	2.95	05/24/05	180	4.12	
49WW01-MAY05-MS	05/17/05	05/18/05	05/20/05	180	2.95	05/24/05	180	4.12	
49WW01-MAY05-MS	05/17/05	05/18/05	05/20/05	180	2.95	05/24/05	180	4.13	
49WW01-MAY05-MSD	05/17/05	05/18/05	05/20/05	180	2.95	05/24/05	180	4.13	
49WW01-MAY05-MSD	05/17/05	05/18/05	05/20/05	180	2.95	05/24/05	180	4.14	
49WW02-MAY05	05/17/05	05/18/05	05/20/05	180	2.85	05/24/05	180	4.14	
49WW02-MAY05	05/17/05	05/18/05	05/20/05	180	2.85	05/24/05	180	4.19	
49WW03-MAY05	05/17/05	05/18/05	05/20/05	180	3.02	05/24/05	180	4.19	
49WW03-MAY05-D	05/17/05	05/18/05	05/20/05	180	3.02	05/24/05	180	4.20	
49WW03-MAY05	05/17/05	05/18/05	05/20/05	180	3.02	05/24/05	180	4.20	
49WW03-MAY05-D	05/17/05	05/18/05	05/20/05	180	3.02	05/24/05	180	4.20	

*** EXT = SEE PROJECT QAPP REQUIREMENTS**
***ANAL = SEE PROJECT QAPP REQUIREMENTS**

KEMRON Environmental Services
METHOD BLANK SUMMARY

Login Number: L0505399
Work Group: WG189691
Blank File ID: EL.052405.120638
Blank Sample ID: WG189482-05
Date Analyzed: 05/24/05
Instrument ID: ELAN-ICP
Time Analyzed: 12:06
Method: 6020
Analyst: JYH

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG189482-06	EL.052405.121201	05/24/05 12:12	DL01
49WW01-MAY05	L0505399-01	EL.052405.121724	05/24/05 12:17	01
49WW01-MAY05	L0505399-02	EL.052405.122247	05/24/05 12:22	01
49WW01-MAY05-MS	L0505399-03	EL.052405.122811	05/24/05 12:28	01
49WW01-MAY05-MS	L0505399-04	EL.052405.123335	05/24/05 12:33	01
49WW01-MAY05-MSD	L0505399-05	EL.052405.123900	05/24/05 12:39	01
49WW01-MAY05-MSD	L0505399-06	EL.052405.124425	05/24/05 12:44	01
49WW02-MAY05	L0505399-07	EL.052405.124950	05/24/05 12:49	01
49WW02-MAY05	L0505399-08	EL.052405.140050	05/24/05 14:00	01
49WW03-MAY05	L0505399-09	EL.052405.140615	05/24/05 14:06	01
49WW03-MAY05-D	L0505399-10	EL.052405.141139	05/24/05 14:11	01
49WW03-MAY05	L0505399-11	EL.052405.141704	05/24/05 14:17	01
DUP	WG189482-11	EL.052405.141704	05/24/05 14:17	01
49WW03-MAY05-D	L0505399-12	EL.052405.142229	05/24/05 14:22	01
DUP	WG189482-12	EL.052405.142229	05/24/05 14:22	02

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KEMRON Environmental Services

METHOD BLANK REPORT

Login Number: L0505399 Run Date: 05/24/2005 Sample ID: WG189482-05
Instrument ID: ELAN-ICP Run Time: 12:06 Prep Method: 3015
File ID: EL.052405.120638 Analyst: JYH Method: 6020
Workgroup (AAB#): WG189691 Matrix: Water Units: mg/L
Contract #: DACA56-94-D-0020 Cal ID: ELAN-I-24-MAY-05

Analytes	MDL	RL	Concentration	Dilution	Qualifier
Antimony	0.000500	0.00100	0.000500	1	U
Selenium	0.000500	0.00100	0.000500	1	U
Thallium	0.000100	0.000200	0.000100	1	U

KEMRON FORMS - Modified 05/17/2005
Version 1.5 PDF File ID: 243162
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KEMRON Environmental Services

LABORATORY CONTROL SAMPLE

Login Number: L0505399 Run Date: 05/24/2005 Sample ID: WG189482-06
Instrument ID: ELAN-ICP Run Time: 12:12 Prep Method: 3015
File ID: EL.052405.121201 Analyst: JYH Method: 6020
Workgroup (AAB#): WG189691 Matrix: Water Units: mg/L
Contract #: DACA56-94-D-0020 Cal ID: ELAN-I-24-MAY-2005 11:19

Analytes	Expected	Found	% Rec	LCS Limits	Q
Antimony	0.125	0.134	107	80 - 120	
Selenium	0.125	0.130	104	80 - 120	
Thallium	0.125	0.129	103	80 - 120	

KEMRON FORMS - Modified 03/30/2005
Version 1.5 PDF File ID: 243163
Report generated 05/24/2005 19:48

KEMRON Environmental Services

MS/MSD REPORT

Loginnum:L0505399 Cal ID: ELAN-ICP-24-MAY-05 Worknum:WG189691
Instrument ID:ELAN-ICP Contract #:DACA56-94-D-0020 Prep Method:3015
Parent ID:L0505399-01 File ID:EL.052405.121724 Dil:1 Method:6020
Sample ID:L0505399-03 MS File ID:EL.052405.122811 Dil:1 Matrix:Water
Sample ID:L0505399-05 MSD File ID:EL.052405.123900 Dil:1 Units:mg/L

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Antimony, Total	0.000594	0.125	0.143	114	0.125	0.152	121	5.54	75 - 125	20	
Selenium, Total	0.0171	0.125	0.143	101	0.125	0.158	113	9.69	75 - 125	20	
Thallium, Total	ND	0.125	0.116	92.5	0.125	0.123	98.5	6.20	75 - 125	20	

* FAILS %REC LIMIT

FAILS RPD LIMIT

KEMRON FORMS - Modified 03/16/2005
Version 1.5 PDF File ID: 243164
Report generated 05/24/2005 19:48

KEMRON Environmental Services

MS/MSD REPORT

Loginnum:L0505399 Cal ID: ELAN-ICP-24-MAY-05 Worknum:WG189691
Instrument ID:ELAN-ICP Contract #:DACA56-94-D-0020 Prep Method:3015
Parent ID:L0505399-02 File ID:EL.052405.122247 Dil:1 Method:6020
Sample ID:L0505399-04 MS File ID:EL.052405.123335 Dil:1 Matrix:Water
Sample ID:L0505399-06 MSD File ID:EL.052405.124425 Dil:1 Units:mg/L

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Antimony, Dissolved	ND	0.125	0.152	122	0.125	0.150	120	1.78	75 - 125	20	
Selenium, Dissolved	0.0142	0.125	0.152	110	0.125	0.158	115	4.18	75 - 125	20	
Thallium, Dissolved	ND	0.125	0.124	99.1	0.125	0.126	101	1.46	75 - 125	20	

* FAILS %REC LIMIT

FAILS RPD LIMIT

KEMRON FORMS - Modified 03/16/2005
Version 1.5 PDF File ID: 243164
Report generated 05/24/2005 19:48

KEMRON Environmental Services

DUPLICATE REPORT

Login Number: L0505399 Worknum: WG189691
Instrument ID: ELAN-ICP Method: 6020
Sample ID: L0505399-09 File ID: EL.052405.140615 Dil: 1 Matrix: Water
Duplicate ID: L0505399-11 File ID: EL.052405.141704 Dil: 1 Units: mg/L

Analyte	Sample	Duplicate	RPD	RPD Limit	Q
Antimony, Total	ND	ND	0	20	
Selenium, Total	0.0297	0.0321	7.61	20	
Thallium, Total	0.000117	0.000111	5.04	20	

KEMRON FORMS - Modified 11/05/2004
Version 1.5 PDF File ID: 243173
Report generated 05/24/2005 19:48

KEMRON Environmental Services

DUPLICATE REPORT

Login Number: L0505399 Worknum: WG189691
Instrument ID: ELAN-ICP Method: 6020
Sample ID: L0505399-10 File ID: EL.052405.141139 Dil: 1 Matrix: Water
Duplicate ID: L0505399-12 File ID: EL.052405.142229 Dil: 1 Units: mg/L

Analyte	Sample	Duplicate	RPD	RPD Limit	Q
Antimony, Dissolved	ND	ND	0	20	
Selenium, Dissolved	0.0313	0.0282	10.6	20	
Thallium, Dissolved	ND	ND	0	20	

KEMRON FORMS - Modified 11/05/2004
Version 1.5 PDF File ID: 243173
Report generated 05/24/2005 19:48

KEMRON Environmental Services

MS/MSD REPORT

Loginnum:L0505399 Cal ID: ELAN-ICP-24-MAY-2005 11:19 Worknum:WG189691
Instrument ID:ELAN-ICP Contract #:DACA56-94-D-0020 Method:6020
Parent ID:WG189482-01 File ID:EL.052405.121724 Dil:1 Matrix:WATER
Sample ID:WG189482-07 MS File ID:EL.052405.122811 Dil:1 Units:mg/L
Sample ID:WG189482-08 MSD File ID:EL.052405.123900 Dil:1

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Antimony, Total	0.000594	0.125	0.143	114	0.125	0.152	121	5.54	75 - 125	20	
Selenium, Total	0.0171	0.125	0.143	101	0.125	0.158	113	9.69	75 - 125	20	
Thallium, Total	ND	0.125	0.116	92.5	0.125	0.123	98.5	6.20	75 - 125	20	

* FAILS %REC LIMIT

FAILS RPD LIMIT

KEMRON FORMS - Modified 03/21/2005
Version 1.5 PDF File ID: 243165
Report generated 05/24/2005 19:48

KEMRON Environmental Services

MS/MSD REPORT

Loginnum:L0505399 Cal ID: ELAN-ICP-24-MAY-2005 11:19 Worknum:WG189691
Instrument ID:ELAN-ICP Contract #:DACA56-94-D-0020 Method:6020
Parent ID:WG189482-02 File ID:EL.052405.122247 Dil:1 Matrix:WATER
Sample ID:WG189482-09 MS File ID:EL.052405.123335 Dil:1 Units:mg/L
Sample ID:WG189482-10 MSD File ID:EL.052405.124425 Dil:1

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Antimony, Dissolved	ND	0.125	0.152	122	0.125	0.150	120	1.78	75 - 125	20	
Selenium, Dissolved	0.0142	0.125	0.152	110	0.125	0.158	115	4.18	75 - 125	20	
Thallium, Dissolved	ND	0.125	0.124	99.1	0.125	0.126	101	1.46	75 - 125	20	

* FAILS %REC LIMIT

FAILS RPD LIMIT

KEMRON FORMS - Modified 03/21/2005
Version 1.5 PDF File ID: 243165
Report generated 05/24/2005 19:48

KEMRON ENVIRONMENTAL SERVICES
SERIAL DILUTION REPORT

Sample Login ID: L0505399 Worknum: WG189691
Instrument ID: ELAN-ICP Method: 6020
Sample ID: L0505399-07 File ID: EL.052405.124950 Dil: 1 Units: ug/L
Serial Dilution ID: WG189691-02 File ID: EL.052405.131140 Dil: 5

Analyte	Sample	C	Serial Dilution	C	% Difference	Q
Antimony	0.0455	U	3.91	X	8490	
Selenium	6.27	X	7.71	X	23.0	
Thallium	0.194	X	1.67	X	761	

U = Result is below MDL
F = Result is between MDL and RL
X = Result is greater than RL and less than 100 times the MDL
E = %D exceeds control limit of 10% and initial
sample result is greater than or equal to 100 times the MDL

KEMRON FORMS - Modified 04/29/2005
Version 1.3 PDF File ID: 243158
Report generated 05/24/2005 19:48

KEMRON ENVIRONMENTAL SERVICES
POST SPIKE REPORT

Sample Login ID: L0505399 Worknum: WG189691
Instrument ID: ELAN-ICP Method: 6020
Post Spike ID: WG189691-01 File ID: EL.052405.125513 Dil: 1 Units: ug/L
Sample ID: L0505399-07 File ID: EL.052405.124950 Dil: 1 Matrix: Water

Analyte	Control Limit %R	Post Spike Result	C	Sample Result	C	Spike Added(SA)	% R	Q
Antimony	75 - 125	60.1		0	U	50.0	120	
Selenium	75 - 125	62.7		6.27		50.0	113	
Thallium	75 - 125	55.1		0.194		50.0	110	

N = % Recoverv exceeds control limits of 75% - 125%
F = Result is between MDL and RL
U = Sample result is below MDL. A value of zero is used in the calculation.

KEMRON FORMS - Modified 05/24/2005
Version 1.3 PDF File ID: 243159
Report generated 05/24/2005 19:48

KEMRON Environmental Services

INITIAL CALIBRATION

Login Number: L0505399 **Workgroup (AAB#):** WG189691

Analytical Method: 6020 **Instrument ID:** ELAN-ICP

ICAL Worknum: WG189724 **Initial Calibration Date:** 24-MAY-2005 11:19:54

Analyte	WG189724-01		WG189724-02		WG189724-03		WG189724-04			
	STD	INT	STD	INT	STD	INT	STD	INT	R	Q
Antimony	0	153.459	.5	2685.802	50	260107.064	100	522609.964	0.999980	
Selenium	0	-1.467	.5	81.582	50	8019.933	100	16224.52	0.999962	
Thallium	0	41.667	.5	2462.661	50	245338.796	100	490918.296	1.00000	

INT = Instrument intensity
R = Coefficient of correlation
Q = Data Qualifier
*** = Out of Compliance; R < 0.995**

KEMRON FORMS - Modified 05/09/2005
Version 1.5 PDF File ID: 243167
Report generated 05/24/2005 19:48

KEMRON Environmental Services

INITIAL CALIBRATION BLANK REPORT

Login Number: L0505399 Run Date: 05/24/2005 Sample ID: WG189724-06
Instrument ID: ELAN-ICP Run Time: 11:29 Method: 6020
File ID: EL.052405.112910 Analyst: JYH Units: ug/L
Workgroup (AAB#): WG189691 Cal ID: ELAN-I - 24-MAY-05

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Antimony	0.200	0.400	.174	1	U
Selenium	0.200	0.400	.0641	1	U
Thallium	0.0400	0.0800	.0093	1	U

U = Result is less than MDL
F = Result is between MDL and RL

KEMRON FORMS - Modified 04/04/2005
Version 1.5 PDF File ID: 243169
Report generated 05/24/2005 19:48

KEMRON Environmental Services

CONTINUING CALIBRATION BLANK REPORT

Login Number: L0505399 Run Date: 05/24/2005 Sample ID: WG189724-11
Instrument ID: ELAN-ICP Run Time: 11:57 Method: 6020
File ID: EL.052405.115703 Analyst: JYH Units: ug/L
Workgroup (AAB#): WG189691 Cal ID: ELAN-I - 24-MAY-05

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Antimony	0.200	0.400	.158	1	U
Selenium	0.200	0.400	.0314	1	U
Thallium	0.0400	0.0800	.012	1	U

U = Result is less than MDL
F = Result is between MDL and RL

KEMRON FORMS - Modified 04/04/2005
Version 1.5 PDF File ID: 243172
Report generated 05/24/2005 19:48

KEMRON Environmental Services

CONTINUING CALIBRATION BLANK REPORT

Login Number: L0505399 Run Date: 05/24/2005 Sample ID: WG189724-13
Instrument ID: ELAN-ICP Run Time: 13:06 Method: 6020
File ID: EL.052405.130609 Analyst: JYH Units: ug/L
Workgroup (AAB#): WG189691 Cal ID: ELAN-I - 24-MAY-05

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Antimony	0.200	0.400	.162	1	U
Selenium	0.200	0.400	.375	1	F
Thallium	0.0400	0.0800	.0307	1	U

U = Result is less than MDL
F = Result is between MDL and RL

KEMRON FORMS - Modified 04/04/2005
Version 1.5 PDF File ID: 243172
Report generated 05/24/2005 19:48

KEMRON Environmental Services

CONTINUING CALIBRATION BLANK REPORT

Login Number: L0505399 Run Date: 05/24/2005 Sample ID: WG189724-17
Instrument ID: ELAN-ICP Run Time: 13:55 Method: 6020
File ID: EL.052405.135518 Analyst: JYH Units: ug/L
Workgroup (AAB#): WG189691 Cal ID: ELAN-I - 24-MAY-05

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Antimony	0.200	0.400	.16	1	U
Selenium	0.200	0.400	.0136	1	U
Thallium	0.0400	0.0800	.0189	1	U

U = Result is less than MDL
F = Result is between MDL and RL

KEMRON FORMS - Modified 04/04/2005
Version 1.5 PDF File ID: 243172
Report generated 05/24/2005 19:48

KEMRON Environmental Services

CONTINUING CALIBRATION BLANK REPORT

Login Number: L0505399 Run Date: 05/24/2005 Sample ID: WG189724-19
Instrument ID: ELAN-ICP Run Time: 14:44 Method: 6020
File ID: EL.052405.144414 Analyst: JYH Units: ug/L
Workgroup (AAB#): WG189691 Cal ID: ELAN-I - 24-MAY-05

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Antimony	0.200	0.400	.149	1	U
Selenium	0.200	0.400	.195	1	U
Thallium	0.0400	0.0800	.0128	1	U

U = Result is less than MDL
F = Result is between MDL and RL

KEMRON FORMS - Modified 04/04/2005
Version 1.5 PDF File ID: 243172
Report generated 05/24/2005 19:48

KEMRON Environmental Services

INITIAL CALIBRATION REPORT

Login Number: L0505399 Run Date: 05/24/2005 Sample ID: WG189724-05
Instrument ID: ELAN-ICP Run Time: 11:23 Method: 6020
File ID: EL.052405.112338 Analyst: JYH Units: ug/L
Workgroup (AAB#): WG189691 Cal ID: ELAN-I - 24-MAY-05

Analyte		Expected	Found	%REC	LIMITS	Q
Antimony		50	53.0	106	90 - 110	
Selenium		50	51.9	104	90 - 110	
Thallium		50	50.8	102	90 - 110	

* Exceeds LIMITS Limit

KEMRON FORMS - Modified 03/31/2005
Version 1.3 PDF File ID: 243168
Report generated 05/24/2005 19:48

KEMRON Environmental Services

CONTINUING CALIBRATION REPORT

Login Number: L0505399 Run Date: 05/24/2005 Sample ID: WG189724-10
Instrument ID: ELAN-ICP Run Time: 11:51 Method: 6020
File ID: EL.052405.115130 Analyst: JYH
Workgroup (AAB#): WG189691 Cal ID: ELAN-I - 24-MAY-05

Analyte		Expected	Found	%REC	LIMITS	UNITS	Q
Antimony		50	48.6	97.3	90 - 110	ug/L	
Selenium		50	48.1	96.2	90 - 110	ug/L	
Thallium		50	48.8	97.6	90 - 110	ug/L	

* Exceeds LIMITS Limit

KEMRON FORMS - Modified 03/21/2005
Version 1.3 PDF File ID: 243171
Report generated 05/24/2005 19:48

KEMRON Environmental Services

CONTINUING CALIBRATION REPORT

Login Number: L0505399 Run Date: 05/24/2005 Sample ID: WG189724-12
Instrument ID: ELAN-ICP Run Time: 13:00 Method: 6020
File ID: EL.052405.130036 Analyst: JYH
Workgroup (AAB#): WG189691 Cal ID: ELAN-I - 24-MAY-05

Analyte		Expected	Found	%REC	LIMITS	UNITS	Q
Antimony		50	48.6	97.1	90 - 110	ug/L	
Selenium		50	49.1	98.2	90 - 110	ug/L	
Thallium		50	52.7	105	90 - 110	ug/L	

* Exceeds LIMITS Limit

KEMRON FORMS - Modified 03/21/2005
Version 1.3 PDF File ID: 243171
Report generated 05/24/2005 19:48

KEMRON Environmental Services

CONTINUING CALIBRATION REPORT

Login Number: L0505399 Run Date: 05/24/2005 Sample ID: WG189724-16
Instrument ID: ELAN-ICP Run Time: 13:49 Method: 6020
File ID: EL.052405.134946 Analyst: JYH
Workgroup (AAB#): WG189691 Cal ID: ELAN-I - 24-MAY-05

Analyte		Expected	Found	%REC	LIMITS	UNITS	Q
Antimony		50	48.6	97.1	90 - 110	ug/L	
Selenium		50	48.2	96.5	90 - 110	ug/L	
Thallium		50	54.4	109	90 - 110	ug/L	

* Exceeds LIMITS Limit

KEMRON FORMS - Modified 03/21/2005
Version 1.3 PDF File ID: 243171
Report generated 05/24/2005 19:48

KEMRON Environmental Services

CONTINUING CALIBRATION REPORT

Login Number: L0505399 Run Date: 05/24/2005 Sample ID: WG189724-18
Instrument ID: ELAN-ICP Run Time: 14:38 Method: 6020
File ID: EL.052405.143841 Analyst: JYH
Workgroup (AAB#): WG189691 Cal ID: ELAN-I - 24-MAY-05

Analyte		Expected	Found	%REC	LIMITS	UNITS	Q
Antimony		50	48.8	97.6	90 - 110	ug/L	
Selenium		50	48.0	96.0	90 - 110	ug/L	
Thallium		50	49.5	98.9	90 - 110	ug/L	

* Exceeds LIMITS Limit

KEMRON FORMS - Modified 03/21/2005
Version 1.3 PDF File ID: 243171
Report generated 05/24/2005 19:48

KEMRON ENVIRONMENTAL SERVICES
INTERFERENCE CHECK SAMPLES

Login number: L0505399 **Workgroup (AAB#):** WG189691
Instrument ID: ELAN-ICP **Method:** 6020
Sol. A : WG189724-08 **File ID:** EL.052405.114020 **Units:** ug/L
Sol. AB : WG189724-09 **File ID:** EL.052405.114555

	Sol. A			Sol. AB			
ANALYTE	True	Found	%Recovery	True	Found	%Recovery	Q
Antimony	NS	0.0570	NS	100	97.2	97.2	
Selenium	NS	0.00590	NS	100	91.8	91.8	
Thallium	NS	0.00900	NS	100	92.8	92.8	

NS = Not spiked
*** = Recovery of spiked element is outside acceptance limit of 80% - 120% of true value.**
 # = Result for unspiked element is outside the acceptance limits of (+/-) 2x the project reporting limit (RL).

KEMRON ENVIRONMENTAL SERVICES
INTERFERENCE CHECK SAMPLES

Login number: L0505399 **Workgroup (AAB#):** WG189691
Instrument ID: ELAN-ICP **Method:** 6020
Sol. A : WG189724-14 **File ID:** EL.052405.133836 **Units:** ug/L
Sol. AB : WG189724-15 **File ID:** EL.052405.134411

	Sol. A			Sol. AB			
ANALYTE	True	Found	%Recovery	True	Found	%Recovery	Q
Antimony	NS	0.00840	NS	100	97.3	97.3	
Selenium	NS	0.00670	NS	100	91.4	91.4	
Thallium	NS	0.0153	NS	100	103	103	

NS = Not spiked
*** = Recovery of spiked element is outside acceptance limit of 80% - 120% of true value.**
 # = Result for unspiked element is outside the acceptance limits of (+/-) 2x the project reporting limit (RL).

KEMRON Environmental Services

LINEAR RANGE (QUARTERLY)

Login Number: L0505399 **Date:** 03/07/2005

Insturment ID: ELAN-ICP **Method:** 6020

Analyte	Integration Time (Sec.)	Concentration (ug/L)
Antimony	1.00	100.0
Arsenic	1.00	100.0
Lead	1.00	100.0
Selenium	1.00	100.0
Silver	1.00	100.0
Thallium	1.00	100.0

Comments:

KEMRON Environmental Services
Data Checklist

Date:	May 23, 2005
Analyst:	CARLA R. COCHRAN
Method:	7470A
Instrument:	HYDRA
Curve Workgroup:	189676
Analytical Workgroups:	189622,189624

Run Log ID:	5102
Calibration/Linearity	✓
ICV/CCV	✓
ICB/CCB	✓
ICSA/ICSAB	
CRI	
Blank/LCS	✓
MS/MSD	✓
Post Spike/Serial Dilution	✓
Upload Results	✓
Data Qualifiers	
Generate PDF Instrument Data	✓
Sign/Annotate PDF Data	✓
Upload Curve Data	
Workgroup Forms	✓
Case Narrative	05-382,399
Client Forms	✓
Level X	
Level 3	05-399
Level 4	
Check for compliance with method and project specific requirements	✓
Check the completeness of reported information	✓
Check the information for the report narrative	✓
Primary Reviewer	CRC
Secondary Reviewer	LSB

KEMRON Environmental Services
HOLDING TIMES
EQUIVALENT TO AFCEE FORM 9

Analytical Method: 7470A **AAB#:** WG189622
Login Number: L0505399

Client ID	Date Collected	Date Received	Date Extracted	Max Hold Time Ext.	Time Held Ext.	Date Analyzed	Max Hold Time Anal	Time Held Anal.	Q
49WW01-MAY05	05/17/05	05/18/05	05/20/05	28	3.00	05/23/05	28	3.26	
49WW01-MAY05-MS	05/17/05	05/18/05	05/20/05	28	3.00	05/23/05	28	3.27	
49WW01-MAY05-MSD	05/17/05	05/18/05	05/20/05	28	3.00	05/23/05	28	3.27	
49WW02-MAY05	05/17/05	05/18/05	05/20/05	28	2.90	05/23/05	28	3.30	
49WW03-MAY05	05/17/05	05/18/05	05/20/05	28	3.07	05/23/05	28	3.31	
49WW03-MAY05	05/17/05	05/18/05	05/20/05	28	3.07	05/23/05	28	3.31	

*** EXT = SEE PROJECT QAPP REQUIREMENTS**
***ANAL = SEE PROJECT QAPP REQUIREMENTS**

KEMRON Environmental Services
HOLDING TIMES
EQUIVALENT TO AFCEE FORM 9

Analytical Method: 7470A **AAB#:** WG189622
Login Number: L0505399

Client ID	Date Collected	Date Received	Date Extracted	Max Hold Time Ext.	Time Held Ext.	Date Analyzed	Max Hold Time Anal	Time Held Anal.	Q
49WW01-MAY05	05/17/05	05/18/05	05/20/05	28	3.00	05/23/05	28	3.26	
49WW01-MAY05-MS	05/17/05	05/18/05	05/20/05	28	3.00	05/23/05	28	3.27	
49WW01-MAY05-MSD	05/17/05	05/18/05	05/20/05	28	3.00	05/23/05	28	3.30	
49WW02-MAY05	05/17/05	05/18/05	05/20/05	28	2.90	05/23/05	28	3.30	
49WW03-MAY05-D	05/17/05	05/18/05	05/20/05	28	3.07	05/23/05	28	3.31	
49WW03-MAY05-D	05/17/05	05/18/05	05/20/05	28	3.07	05/23/05	28	3.31	

*** EXT = SEE PROJECT QAPP REQUIREMENTS**
***ANAL = SEE PROJECT QAPP REQUIREMENTS**

KEMRON FORMS - Modified 11/05/2004
Version 1.5 PDF File ID: 244193
Report generated 05/25/2005 13:55

KEMRON Environmental Services
METHOD BLANK SUMMARY

Login Number: L0505399
Work Group: WG189622
Blank File ID: HY.052305.165133
Blank Sample ID: WG189489-05
Date Analyzed: 05/23/05
Instrument ID: HYDRA
Time Analyzed: 16:51
Method: 7470A
Analyst: CRC

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG189489-06	HY.052305.165402	05/23/05 16:54	01
49WW01-MAY05	L0505399-01	HY.052305.165950	05/23/05 16:59	01
49WW01-MAY05	L0505399-02	HY.052305.170450	05/23/05 17:04	01
49WW01-MAY05-MS	L0505399-03	HY.052305.170743	05/23/05 17:07	01
49WW01-MAY05-MS	L0505399-04	HY.052305.171020	05/23/05 17:10	01
49WW01-MAY05-MSD	L0505399-05	HY.052305.171354	05/23/05 17:13	01
49WW01-MAY05-MSD	L0505399-06	HY.052305.175909	05/23/05 17:59	01
49WW02-MAY05	L0505399-07	HY.052305.180047	05/23/05 18:00	01
49WW02-MAY05	L0505399-08	HY.052305.180315	05/23/05 18:03	01
49WW03-MAY05	L0505399-09	HY.052305.180454	05/23/05 18:04	01
49WW03-MAY05-D	L0505399-10	HY.052305.180731	05/23/05 18:07	01
49WW03-MAY05	L0505399-11	HY.052305.180931	05/23/05 18:09	01
DUP	WG189489-11	HY.052305.180931	05/23/05 18:09	01
49WW03-MAY05-D	L0505399-12	HY.052305.181118	05/23/05 18:11	01
DUP	WG189489-12	HY.052305.181118	05/23/05 18:11	02

KEMRON Environmental Services

METHOD BLANK REPORT

Login Number:	L0505399	Run Date:	05/23/2005	Sample ID:	WG189489-05
Instrument ID:	HYDRA	Run Time:	16:51	Prep Method:	METHOD
File ID:	HY.052305.165133	Analyst:	CRC	Method:	7470A
Workgroup (AAB#):	WG189622	Matrix:	Water	Units:	mg/L
Contract #:	DACA56-94-D-0020	Cal ID:	HYDRA-23-MAY-05		

Analytes	MDL	RL	Concentration	Dilution	Qualifier
Mercury	0.000100	0.000200	0.000100	1	U

KEMRON FORMS - Modified 05/17/2005
Version 1.5 PDF File ID: 242494
Report generated 05/24/2005 11:44

KEMRON Environmental Services

LABORATORY CONTROL SAMPLE

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189489-06
Instrument ID: HYDRA Run Time: 16:54 Prep Method: METHOD
File ID: HY.052305.165402 Analyst: CRC Method: 7470A
Workgroup (AAB#): WG189622 Matrix: Water Units: mg/L
Contract #: DACA56-94-D-0020 Cal ID: HYDRA-23-MAY-2005

Analytes	Expected	Found	% Rec	LCS Limits	Q
Mercury	0.00400	0.00389	97.3	80 - 120	

KEMRON FORMS - Modified 03/30/2005
Version 1.5 PDF File ID: 242495
Report generated 05/24/2005 11:44

KEMRON Environmental Services

MS/MSD REPORT

Loginnum:L0505399 Cal ID:HYDRA-23-MAY-05 Worknum:WG189622
Instrument ID:HYDRA Contract #:DACA56-94-D-0020 Prep Method:METHOD
Parent ID:L0505399-01 File ID:HY.052305.165950 Dil:1 Method:7470A
Sample ID:L0505399-03 MS File ID:HY.052305.170743 Dil:1 Matrix:Water
Sample ID:L0505399-05 MSD File ID:HY.052305.171354 Dil:1 Units:mg/L

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Mercury	ND	0.00444	0.00457	103	0.00444	0.00426	95.7	7.05	75 - 125	15	

* FAILS %REC LIMIT

FAILS RPD LIMIT

KEMRON FORMS - Modified 03/16/2005
Version 1.5 PDF File ID: 242496
Report generated 05/24/2005 11:44

KEMRON Environmental Services

MS/MSD REPORT

Loginnum:L0505399 Cal ID:HYDRA-23-MAY-05 Worknum:WG189622
Instrument ID:HYDRA Contract #:DACA56-94-D-0020 Prep Method:METHOD
Parent ID:L0505399-02 File ID:HY.052305.170450 Dil:1 Method:7470A
Sample ID:L0505399-04 MS File ID:HY.052305.171020 Dil:1 Matrix:Water
Sample ID:L0505399-06 MSD File ID:HY.052305.175909 Dil:1 Units:mg/L

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Mercury, Dissolved	ND	0.00444	0.00426	95.7	0.00444	0.00440	99.0	3.34	75 - 125	15	

* FAILS %REC LIMIT

FAILS RPD LIMIT

KEMRON FORMS - Modified 03/16/2005
Version 1.5 PDF File ID: 242503
Report generated 05/24/2005 11:46

KEMRON Environmental Services

DUPLICATE REPORT

Login Number: L0505399 Worknum: WG189622
Instrument ID: HYDRA Method: 7470A
Sample ID: L0505399-09 File ID: HY.052305.180454 Dil: 1 Matrix: Water
Duplicate ID: L0505399-11 File ID: HY.052305.180931 Dil: 1 Units: mg/L

Analyte	Sample	Duplicate	RPD	RPD Limit	Q
Mercury	ND	ND	0	15	

KEMRON FORMS - Modified 11/05/2004
Version 1.5 PDF File ID: 242504
Report generated 05/24/2005 11:46

KEMRON Environmental Services

DUPLICATE REPORT

Login Number: L0505399 Worknum: WG189622
Instrument ID: HYDRA Method: 7470A
Sample ID: L0505399-10 File ID: HY.052305.180731 Dil: 1 Matrix: Water
Duplicate ID: L0505399-12 File ID: HY.052305.181118 Dil: 1 Units: mg/L

Analyte	Sample	Duplicate	RPD	RPD Limit	Q
Mercury, Dissolved	ND	ND	0	15	

KEMRON FORMS - Modified 11/05/2004
Version 1.5 PDF File ID: 242504
Report generated 05/24/2005 11:46

KEMRON Environmental Services

MS/MSD REPORT

Loginnum:L0505399 Cal ID:HYDRA-23-MAY-2005 Worknum:WG189622
Instrument ID:HYDRA Contract #:DACA56-94-D-0020 Method:7470A
Parent ID:WG189489-01 File ID:HY.052305.165950 Dil:1 Matrix:WATER
Sample ID:WG189489-07 MS File ID:HY.052305.170743 Dil:1 Units:mg/L
Sample ID:WG189489-09 MSD File ID:HY.052305.171354 Dil:1

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Mercury	ND	0.00444	0.00457	103	0.00444	0.00426	95.7	7.05	75 - 125	15	

* FAILS %REC LIMIT

FAILS RPD LIMIT

KEMRON FORMS - Modified 03/21/2005
Version 1.5 PDF File ID: 242497
Report generated 05/24/2005 11:44

KEMRON Environmental Services

MS/MSD REPORT

Loginnum:L0505399 Cal ID:HYDRA-23-MAY-2005 Worknum:WG189622
Instrument ID:HYDRA Contract #:DACA56-94-D-0020 Method:7470A
Parent ID:WG189489-02 File ID:HY.052305.170450 Dil:1 Matrix:WATER
Sample ID:WG189489-08 MS File ID:HY.052305.171020 Dil:1 Units:mg/L
Sample ID:WG189489-10 MSD File ID:HY.052305.175909 Dil:1

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Mercury	ND	0.00444	0.00426	95.7	0.00444	0.00440	99.0	3.34	75 - 125	15	

* FAILS %REC LIMIT

FAILS RPD LIMIT

KEMRON FORMS - Modified 03/21/2005
Version 1.5 PDF File ID: 242497
Report generated 05/24/2005 11:44

KEMRON ENVIRONMENTAL SERVICES
POST SPIKE REPORT

Sample Login ID: L0505399 Worknum: WG189622
Instrument ID: HYDRA Method: 7470A
Post Spike ID: WG189622-02 File ID: HY.052305.173944 Dil: 1 Units: ug/L
Sample ID: L0505358-01 File ID: HY.052305.173802 Dil: 1 Matrix: Water

Analyte	Control Limit %R	Post Spike Result	C	Sample Result	C	Spike Added(SA)	% R	Q
Mercury	85 - 115	0.956		ND	U	1.0	95.6	

N = % Recoverv exceeds control limits of 85% - 115%
F = Result is between MDL and RL
U = Sample result is below MDL. A value of zero is used in the calculation.

KEMRON FORMS - Modified 05/11/2005
Version 1.3 PDF File ID: 242491
Report generated 05/24/2005 11:44

KEMRON ENVIRONMENTAL SERVICES
POST SPIKE REPORT

Sample Login ID: L0505399 Worknum: WG189622
Instrument ID: HYDRA Method: 7470A
Post Spike ID: WG189622-01 File ID: HY.052305.170159 Dil: 1 Units: ug/L
Sample ID: L0505399-01 File ID: HY.052305.165950 Dil: 1 Matrix: Water

Analyte	Control Limit %R	Post Spike Result	C	Sample Result	C	Spike Added(SA)	% R	Q
Mercury	85 - 115	0.856		ND	U	1.0	85.6	

N = % Recoverv exceeds control limits of 85% - 115%
F = Result is between MDL and RL
U = Sample result is below MDL. A value of zero is used in the calculation.

KEMRON FORMS - Modified 05/11/2005
Version 1.3 PDF File ID: 242491
Report generated 05/24/2005 11:44

KEMRON Environmental Services

INITIAL CALIBRATION

Login Number: L0505399 **Instrument ID:** HYDRA

Analytical Method: 7470A **Initial Calibration Date:** 05/23/2005 16:37

Analyte	WG189676-01		WG189676-02		WG189676-03		WG189676-04		WG189676-05		WG189676-06			
	STD	INT	STD	INT	STD	INT	STD	INT	STD	INT	STD	INT	R	Q
Mercury	0	11000	0.200	23364	1.00	72758	2.00	128219	5.00	324933	10.0	620241	0.9998	

INT = Instrument intensity
R = Coefficient of correlation
Q = Data Qualifier
*** = Out of Compliance; R < 0.995**

KEMRON FORMS - Modified 01/18/2005
Version 1.5 PDF File ID: 242498
Report generated 05/24/2005 11:44

KEMRON Environmental Services

INITIAL CALIBRATION

Login Number: L0505399 **Instrument ID:** HYDRA

Analytical Method: 7470A **Initial Calibration Date:** 05/23/2005 16:37

Analyte	WG189676-01		WG189676-02		WG189676-03		WG189676-04		WG189676-05		WG189676-06			
	STD	INT	STD	INT	STD	INT	STD	INT	STD	INT	STD	INT	R	Q
Mercury	0	11000	0.200	23364	1.00	72758	2.00	128219	5.00	324933	10.0	620241	0.9998	

INT = Instrument intensity
R = Coefficient of correlation
Q = Data Qualifier
*** = Out of Compliance; R < 0.995**

KEMRON FORMS - Modified 01/18/2005
Version 1.5 PDF File ID: 244194
Report generated 05/25/2005 13:56

KEMRON Environmental Services

INITIAL CALIBRATION BLANK REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189676-08
Instrument ID: HYDRA Run Time: 16:41 Method: 7470A
File ID: HY.052305.164158 Analyst: CRC Units: ug/L
Workgroup (AAB#): WG189622 Cal ID: HYDRA - 23-MAY-05

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Mercury	0.100	0.200	.01	1	U

U = Result is less than MDL
F = Result is between MDL and RL

KEMRON FORMS - Modified 04/04/2005
Version 1.5 PDF File ID: 242500
Report generated 05/24/2005 11:44

KEMRON Environmental Services

INITIAL CALIBRATION BLANK REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189676-08
Instrument ID: HYDRA Run Time: 16:41 Method: 7470A
File ID: HY.052305.164158 Analyst: CRC Units: ug/L
Workgroup (AAB#): WG189622 Cal ID: HYDRA - 23-MAY-05

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Mercury	0.100	0.200	.01	1	U

U = Result is less than MDL
F = Result is between MDL and RL

KEMRON FORMS - Modified 04/04/2005
Version 1.5 PDF File ID: 244196
Report generated 05/25/2005 13:56

KEMRON Environmental Services

CONTINUING CALIBRATION BLANK REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189676-11
Instrument ID: HYDRA Run Time: 16:48 Method: 7470A
File ID: HY.052305.164812 Analyst: CRC Units: ug/L
Workgroup (AAB#): WG189622 Cal ID: HYDRA - 23-MAY-05

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Mercury	0.100	0.200	-.107	1	F

U = Result is less than MDL
F = Result is between MDL and RL

KEMRON FORMS - Modified 04/04/2005
Version 1.5 PDF File ID: 242502
Report generated 05/24/2005 11:44

KEMRON Environmental Services

CONTINUING CALIBRATION BLANK REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189676-13
Instrument ID: HYDRA Run Time: 17:17 Method: 7470A
File ID: HY.052305.171752 Analyst: CRC Units: ug/L
Workgroup (AAB#): WG189622 Cal ID: HYDRA - 23-MAY-05

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Mercury	0.100	0.200	-.036	1	U

U = Result is less than MDL
F = Result is between MDL and RL

KEMRON FORMS - Modified 04/04/2005
Version 1.5 PDF File ID: 242502
Report generated 05/24/2005 11:44

KEMRON Environmental Services

CONTINUING CALIBRATION BLANK REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189676-15
Instrument ID: HYDRA Run Time: 17:44 Method: 7470A
File ID: HY.052305.174424 Analyst: CRC Units: ug/L
Workgroup (AAB#): WG189622 Cal ID: HYDRA - 23-MAY-05

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Mercury	0.100	0.200	-.352	1	

U = Result is less than MDL
F = Result is between MDL and RL

KEMRON FORMS - Modified 04/04/2005
Version 1.5 PDF File ID: 242502
Report generated 05/24/2005 11:44

KEMRON Environmental Services

CONTINUING CALIBRATION BLANK REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189676-17
Instrument ID: HYDRA Run Time: 17:57 Method: 7470A
File ID: HY.052305.175700 Analyst: CRC Units: ug/L
Workgroup (AAB#): WG189622 Cal ID: HYDRA - 23-MAY-05

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Mercury	0.100	0.200	-.045	1	U

U = Result is less than MDL
F = Result is between MDL and RL

KEMRON FORMS - Modified 04/04/2005
Version 1.5 PDF File ID: 242502
Report generated 05/24/2005 11:44

KEMRON Environmental Services

CONTINUING CALIBRATION BLANK REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189676-19
Instrument ID: HYDRA Run Time: 18:15 Method: 7470A
File ID: HY.052305.181540 Analyst: CRC Units: ug/L
Workgroup (AAB#): WG189622 Cal ID: HYDRA - 23-MAY-05

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Mercury	0.100	0.200	.056	1	U

U = Result is less than MDL
F = Result is between MDL and RL

KEMRON FORMS - Modified 04/04/2005
Version 1.5 PDF File ID: 242502
Report generated 05/24/2005 11:44

KEMRON Environmental Services

CONTINUING CALIBRATION BLANK REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189676-11
Instrument ID: HYDRA Run Time: 16:48 Method: 7470A
File ID: HY.052305.164812 Analyst: CRC Units: ug/L
Workgroup (AAB#): WG189622 Cal ID: HYDRA - 23-MAY-05

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Mercury	0.100	0.200	-.107	1	F

U = Result is less than MDL
F = Result is between MDL and RL

KEMRON FORMS - Modified 04/04/2005
Version 1.5 PDF File ID: 244241
Report generated 05/25/2005 13:59

KEMRON Environmental Services

CONTINUING CALIBRATION BLANK REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189676-13
Instrument ID: HYDRA Run Time: 17:17 Method: 7470A
File ID: HY.052305.171752 Analyst: CRC Units: ug/L
Workgroup (AAB#): WG189622 Cal ID: HYDRA - 23-MAY-05

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Mercury	0.100	0.200	-.036	1	U

U = Result is less than MDL
F = Result is between MDL and RL

KEMRON FORMS - Modified 04/04/2005
Version 1.5 PDF File ID: 244241
Report generated 05/25/2005 13:59

KEMRON Environmental Services

CONTINUING CALIBRATION BLANK REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189676-15
Instrument ID: HYDRA Run Time: 17:44 Method: 7470A
File ID: HY.052305.174424 Analyst: CRC Units: ug/L
Workgroup (AAB#): WG189622 Cal ID: HYDRA - 23-MAY-05

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Mercury	0.100	0.200	-.352	1	

U = Result is less than MDL
F = Result is between MDL and RL

KEMRON FORMS - Modified 04/04/2005
Version 1.5 PDF File ID: 244241
Report generated 05/25/2005 13:59

KEMRON Environmental Services

CONTINUING CALIBRATION BLANK REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189676-17
Instrument ID: HYDRA Run Time: 17:57 Method: 7470A
File ID: HY.052305.175700 Analyst: CRC Units: ug/L
Workgroup (AAB#): WG189622 Cal ID: HYDRA - 23-MAY-05

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Mercury	0.100	0.200	-.045	1	U

U = Result is less than MDL
F = Result is between MDL and RL

KEMRON FORMS - Modified 04/04/2005
Version 1.5 PDF File ID: 244241
Report generated 05/25/2005 13:59

KEMRON Environmental Services

CONTINUING CALIBRATION BLANK REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189676-19
Instrument ID: HYDRA Run Time: 18:15 Method: 7470A
File ID: HY.052305.181540 Analyst: CRC Units: ug/L
Workgroup (AAB#): WG189622 Cal ID: HYDRA - 23-MAY-05

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Mercury	0.100	0.200	.056	1	U

U = Result is less than MDL
F = Result is between MDL and RL

KEMRON FORMS - Modified 04/04/2005
Version 1.5 PDF File ID: 244241
Report generated 05/25/2005 13:59

KEMRON Environmental Services

INITIAL CALIBRATION REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189676-07
Instrument ID: HYDRA Run Time: 16:40 Method: 7470A
File ID: HY.052305.164012 Analyst: CRC Units: ug/L
Workgroup (AAB#): WG189622 Cal ID: HYDRA - 23-MAY-05

Analyte		Expected	Found	%REC	LIMITS	Q
Mercury		2	2.00	100	90 - 110	

* Exceeds LIMITS Limit

KEMRON FORMS - Modified 03/31/2005
Version 1.3 PDF File ID: 242499
Report generated 05/24/2005 11:44

KEMRON Environmental Services

INITIAL CALIBRATION REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189676-07
Instrument ID: HYDRA Run Time: 16:40 Method: 7470A
File ID: HY.052305.164012 Analyst: CRC Units: ug/L
Workgroup (AAB#): WG189622 Cal ID: HYDRA - 23-MAY-05

Analyte		Expected	Found	%REC	LIMITS	Q
Mercury		2	2.00	100	90 - 110	

* Exceeds LIMITS Limit

KEMRON FORMS - Modified 03/31/2005
Version 1.3 PDF File ID: 244195
Report generated 05/25/2005 13:56

KEMRON Environmental Services

CONTINUING CALIBRATION REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189676-09
Instrument ID: HYDRA Run Time: 16:43 Method: 7470A
File ID: HY.052305.164357 Analyst: CRC
Workgroup (AAB#): WG189622 Cal ID: HYDRA - 23-MAY-05

Analyte		Expected	Found	%REC	LIMITS	UNITS	Q
Mercury		2	2.07	104	80 - 120	ug/L	

* Exceeds LIMITS Limit

KEMRON FORMS - Modified 03/21/2005
Version 1.3 PDF File ID: 242501
Report generated 05/24/2005 11:44

KEMRON Environmental Services

CONTINUING CALIBRATION REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189676-12
Instrument ID: HYDRA Run Time: 17:16 Method: 7470A
File ID: HY.052305.171604 Analyst: CRC
Workgroup (AAB#): WG189622 Cal ID: HYDRA - 23-MAY-05

Analyte		Expected	Found	%REC	LIMITS	UNITS	Q
Mercury		2	1.80	90.0	80 - 120	ug/L	

* Exceeds LIMITS Limit

KEMRON FORMS - Modified 03/21/2005
Version 1.3 PDF File ID: 242501
Report generated 05/24/2005 11:44

KEMRON Environmental Services

CONTINUING CALIBRATION REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189676-14
Instrument ID: HYDRA Run Time: 17:41 Method: 7470A
File ID: HY.052305.174125 Analyst: CRC
Workgroup (AAB#): WG189622 Cal ID: HYDRA - 23-MAY-05

Analyte		Expected	Found	%REC	LIMITS	UNITS	Q
Mercury		2	2.04	102	80 - 120	ug/L	

* Exceeds LIMITS Limit

KEMRON FORMS - Modified 03/21/2005
Version 1.3 PDF File ID: 242501
Report generated 05/24/2005 11:44

KEMRON Environmental Services

CONTINUING CALIBRATION REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189676-16
Instrument ID: HYDRA Run Time: 17:54 Method: 7470A
File ID: HY.052305.175439 Analyst: CRC
Workgroup (AAB#): WG189622 Cal ID: HYDRA - 23-MAY-05

Analyte		Expected	Found	%REC	LIMITS	UNITS	Q
Mercury		2	2.00	100	80 - 120	ug/L	

* Exceeds LIMITS Limit

KEMRON FORMS - Modified 03/21/2005
Version 1.3 PDF File ID: 242501
Report generated 05/24/2005 11:44

KEMRON Environmental Services

CONTINUING CALIBRATION REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189676-18
Instrument ID: HYDRA Run Time: 18:13 Method: 7470A
File ID: HY.052305.181311 Analyst: CRC
Workgroup (AAB#): WG189622 Cal ID: HYDRA - 23-MAY-05

Analyte		Expected	Found	%REC	LIMITS	UNITS	Q
Mercury		2	2.01	101	80 - 120	ug/L	

* Exceeds LIMITS Limit

KEMRON FORMS - Modified 03/21/2005
Version 1.3 PDF File ID: 242501
Report generated 05/24/2005 11:44

KEMRON Environmental Services

CONTINUING CALIBRATION REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189676-09
Instrument ID: HYDRA Run Time: 16:43 Method: 7470A
File ID: HY.052305.164357 Analyst: CRC
Workgroup (AAB#): WG189622 Cal ID: HYDRA - 23-MAY-05

Analyte		Expected	Found	%REC	LIMITS	UNITS	Q
Mercury		2	2.07	104	80 - 120	ug/L	

* Exceeds LIMITS Limit

KEMRON FORMS - Modified 03/21/2005
Version 1.3 PDF File ID: 244197
Report generated 05/25/2005 13:56

KEMRON Environmental Services

CONTINUING CALIBRATION REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189676-12
Instrument ID: HYDRA Run Time: 17:16 Method: 7470A
File ID: HY.052305.171604 Analyst: CRC
Workgroup (AAB#): WG189622 Cal ID: HYDRA - 23-MAY-05

Analyte		Expected	Found	%REC	LIMITS	UNITS	Q
Mercury		2	1.80	90.0	80 - 120	ug/L	

* Exceeds LIMITS Limit

KEMRON FORMS - Modified 03/21/2005
Version 1.3 PDF File ID: 244197
Report generated 05/25/2005 13:56

KEMRON Environmental Services

CONTINUING CALIBRATION REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189676-14
Instrument ID: HYDRA Run Time: 17:41 Method: 7470A
File ID: HY.052305.174125 Analyst: CRC
Workgroup (AAB#): WG189622 Cal ID: HYDRA - 23-MAY-05

Analyte		Expected	Found	%REC	LIMITS	UNITS	Q
Mercury		2	2.04	102	80 - 120	ug/L	

* Exceeds LIMITS Limit

KEMRON FORMS - Modified 03/21/2005
Version 1.3 PDF File ID: 244197
Report generated 05/25/2005 13:56

KEMRON Environmental Services

CONTINUING CALIBRATION REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189676-16
Instrument ID: HYDRA Run Time: 17:54 Method: 7470A
File ID: HY.052305.175439 Analyst: CRC
Workgroup (AAB#): WG189622 Cal ID: HYDRA - 23-MAY-05

Analyte		Expected	Found	%REC	LIMITS	UNITS	Q
Mercury		2	2.00	100	80 - 120	ug/L	

* Exceeds LIMITS Limit

KEMRON FORMS - Modified 03/21/2005
Version 1.3 PDF File ID: 244197
Report generated 05/25/2005 13:56

KEMRON Environmental Services

CONTINUING CALIBRATION REPORT

Login Number: L0505399 Run Date: 05/23/2005 Sample ID: WG189676-18
Instrument ID: HYDRA Run Time: 18:13 Method: 7470A
File ID: HY.052305.181311 Analyst: CRC
Workgroup (AAB#): WG189622 Cal ID: HYDRA - 23-MAY-05

Analyte		Expected	Found	%REC	LIMITS	UNITS	Q
Mercury		2	2.01	101	80 - 120	ug/L	

* Exceeds LIMITS Limit

KEMRON FORMS - Modified 03/21/2005
Version 1.3 PDF File ID: 244197
Report generated 05/25/2005 13:56

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Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

Reference Document No: LHAAP-031
Page 1 of 2

Project Number: 845714
Project Name: Longhorn Army Ammunition Plant
Sample Coordinator: Phil Conley
Turnaround Time:

Samples Shipment Date: 17 MAY 2005
Lab Destination: Kemron Lab
Lab Contact: Stephanie Mossburg
Project Contact: Diane Meyer
Carrier/Waybill No.: UPS/J180 010 401 7

Bill To: Diane Meyer
3010 Briarpark Drive
Houston TX 77042

Report To: Diane Meyer
3010 Briarpark Drive
Houston TX 77042

Special Instructions:

Possible Hazard Indentification: Radiological ☐
Non-hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐

Sample Disposal:
Return to Client ☐ Disposal by Lab ☐ Archive (mos.)

1. Relinquished By (Signature/Affiliation)	Date: 5/17/05 Time:	1. Received By (Signature/Affiliation) Kemron	Date: 5/18/05 Time: 0950
2. Relinquished By (Signature/Affiliation)	Date: Time:	2. Received By (Signature/Affiliation)	Date: Time:
3. Relinquished By (Signature/Affiliation)	Date: Time:	3. Received By (Signature/Affiliation)	Date: Time:

Comments:
dc sealed
Sh intact
Cooler amb
bly

Sample No	Sample Name	Sample Date	Sample Time	Container	Ctr Qty	Preservative	Requested Testing Program	Sample Vol	Units	Fil	CID	Condition On Receipt
49WW01-MAY0	49WW01-GW-49WW01-MAY05-REG	17 MAY 2005	10:45	1000 mL HDPE	1	HNO3<pH 2	TAL METALS by 6010b, 6020, 7471A			N	KL397	
49WW01-MAY0	49WW01-GW-49WW01-MAY05-REG	17 MAY 2005	10:45	1000 mL HDPE	1	None except cool to 4 C	TAL METALS by 6010B, 6020, 7471A, DISSOLVED			N	KL397	
49WW01-MAY0	49WW01-GW-49WW01-MAY05-MS-MS	17 MAY 2005	10:45	1000 mL HDPE	1	HNO3<pH 2	TAL METALS by 6010b, 6020, 7471A			N	KL397	
49WW01-MAY0	49WW01-GW-49WW01-MAY05-MS-MS	17 MAY 2005	10:45	1000 mL HDPE	1	None except cool to 4 C	TAL METALS by 6010B, 6020, 7471A, DISSOLVED			N	KL397	
49WW01-MAY0	49WW01-GW-49WW01-MAY05-MSD-MS	17 MAY 2005	10:45	1000 mL HDPE	1	HNO3<pH 2	TAL METALS by 6010b, 6020, 7471A			N	KL164	
49WW01-MAY0	49WW01-GW-49WW01-MAY05-MSD-MS	17 MAY 2005	10:45	1000 mL HDPE	1	None except cool to 4 C	TAL METALS by 6010B, 6020, 7471A, DISSOLVED			N	KL397	
49WW02-MAY0	49WW02-GW-49WW02-MAY05-REG	17 MAY 2005	13:10	1000 mL HDPE	1	HNO3<pH 2	TAL METALS by 6010b, 6020, 7471A			N	KL397	

Shaw™
Shaw E & I, Inc.

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

Reference Document No: LHAAP-031
Page 2 of 2

Sample No	Sample Name	Sample Date	Sample Time	Container		Preservative	Requested Testing Program	Sample Vol	Units	Fil	CID	Condition On Receipt
49WW02-MAY05	49WW02-GW-49WW02-MAY05-REG	17 MAY 2005	13:10	1000 mL HDPE	1	None except cool to 4 C	TAL METALS by 6010B, 6020, 7471A, DISSOLVED			N	KL397	
49WW03-MAY05	49WW03-GW-49WW03-MAY05-REG	17 MAY 2005	09:00	1000 mL HDPE	1	HNO3<pH 2	TAL METALS by 6010b, 6020, 7471A			N	KL397	
49WW03-MAY05	49WW03-GW-49WW03-MAY05-REG	17 MAY 2005	09:00	1000 mL HDPE	1	None except cool to 4 C	TAL METALS by 6010B, 6020, 7471A, DISSOLVED			N	KL397	
49WW03-MAY05	49WW03-GW-49WW03-MAY05-D-FD	17 MAY 2005	09:00	1000 mL HDPE	1	HNO3<pH 2	TAL METALS by 6010b, 6020, 7471A			N	KL164	
49WW03-MAY05	49WW03-GW-49WW03-MAY05-D-FD	17 MAY 2005	09:00	1000 mL HDPE	1	None except cool to 4 C	TAL METALS by 6010B, 6020, 7471A, DISSOLVED			N	KL397	

KEMRON Environmental Services
Internal Chain of Custody Report
Login: L0505399
Account: SHAW-ALLIANCE-798
Project: 798-LONGHORN
Samples: 12
Due Date: 25-MAY-2005

Samplenum	Container ID	Products
L0505399-01	133954	DIG-MW PB-AX SB-MS SE-MS TL-MS V ZN AG AL AS-A

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish
1	LOGIN			18-MAY-2005 14:54	BRG	
2	PREP	W1	DIG	19-MAY-2005 17:04	REK	JKT
3	STORE	DIG	A1	20-MAY-2005 14:42	BRG	VC

Samplenum	Container ID	Products
L0505399-02	133955	DIG-MW NI-D PB-AX-D SB-MS-D SE-MS-D TL-MS-D V-

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish
1	LOGIN			18-MAY-2005 14:54	BRG	
2	PREP	W1	DIG	19-MAY-2005 17:04	REK	JKT
3	STORE	DIG	A1	20-MAY-2005 14:42	BRG	VC

Samplenum	Container ID	Products
L0505399-03	133956	AG AL AS-AX BA BE CA CD CO CR CU DIG-ICP DIG-M

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish
1	LOGIN			18-MAY-2005 14:54	BRG	
2	PREP	W1	DIG	19-MAY-2005 17:04	REK	JKT
3	STORE	DIG	A1	20-MAY-2005 14:42	BRG	VC

Samplenum	Container ID	Products
L0505399-04	133957	AG-D AL-D AS-AX-D BA-D BE-D CA-D CD-D CO-D CR-

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish
1	LOGIN			18-MAY-2005 14:54	BRG	
2	PREP	W1	DIG	19-MAY-2005 17:04	REK	JKT
3	STORE	DIG	A1	20-MAY-2005 14:41	BRG	VC

Samplenum	Container ID	Products
L0505399-05	133958	AG AL AS-AX BA BE CA CD CO CR CU DIG-ICP DIG-M

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish
1	LOGIN			18-MAY-2005 14:54	BRG	
2	PREP	W1	DIG	19-MAY-2005 17:04	REK	JKT
3	STORE	DIG	A1	20-MAY-2005 14:42	BRG	VC

KEMRON Environmental Services
Internal Chain of Custody Report
Login: L0505399
Account: SHAW-ALLIANCE-798
Project: 798-LONGHORN
Samples: 12
Due Date: 25-MAY-2005

Samplenum	Container ID	Products
L0505399-06	133959	AG-D AL-D AS-AX-D BA-D BE-D CA-D CD-D CO-D CR-

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish
1	LOGIN			18-MAY-2005 14:54	BRG	
2	PREP	W1	DIG	19-MAY-2005 17:04	REK	JKT
3	STORE	DIG	A1	20-MAY-2005 14:43	BRG	VC

Samplenum	Container ID	Products
L0505399-07	133960	AG AL AS-AX BA BE CA CD CO CR CU DIG-ICP DIG-M

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish
1	LOGIN			18-MAY-2005 14:54	BRG	
2	PREP	W1	DIG	19-MAY-2005 17:04	REK	JKT
3	STORE	DIG	A1	20-MAY-2005 14:43	BRG	VC

Samplenum	Container ID	Products
L0505399-08	133961	AG-D AL-D AS-AX-D BA-D BE-D CA-D CD-D CO-D CR-

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish
1	LOGIN			18-MAY-2005 14:54	BRG	
2	PREP	W1	DIG	19-MAY-2005 17:04	REK	JKT
3	STORE	DIG	A1	20-MAY-2005 14:43	BRG	VC

Samplenum	Container ID	Products
L0505399-09	133962	AG AL AS-AX BA BE CA CD CO CR CU DIG-ICP DIG-M

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish
1	LOGIN			18-MAY-2005 14:54	BRG	
2	PREP	W1	DIG	19-MAY-2005 17:04	REK	JKT
3	STORE	DIG	A1	20-MAY-2005 14:42	BRG	VC

Samplenum	Container ID	Products
L0505399-10	133963	AG-D AL-D AS-AX-D BA-D BE-D CA-D CD-D CO-D CR-

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish
1	LOGIN			18-MAY-2005 14:54	BRG	
2	PREP	W1	DIG	19-MAY-2005 17:04	REK	JKT
3	STORE	DIG	A1	20-MAY-2005 14:42	BRG	VC

KEMRON Environmental Services
Internal Chain of Custody Report
Login: L0505399
Account: SHAW-ALLIANCE-798
Project: 798-LONGHORN
Samples: 12
Due Date: 25-MAY-2005

Samplenum	Container ID	Products
L0505399-11	133964	AG AL AS-AX BA BE CA CD CO CR CU DIG-MW FE HG

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish
1	LOGIN			18-MAY-2005 14:54	BRG	
2	PREP	W1	DIG	19-MAY-2005 17:04	REK	JKT
3	STORE	DIG	A1	20-MAY-2005 14:42	BRG	VC

Samplenum	Container ID	Products
L0505399-12	133965	AG-D AL-D AS-AX-D BA-D BE-D CA-D CD-D CO-D CR-

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish
1	LOGIN			18-MAY-2005 14:54	BRG	
2	PREP	W1	DIG	19-MAY-2005 17:04	REK	JKT
3	STORE	DIG	A1	20-MAY-2005 14:42	BRG	VC

00074452

SAMPLE RECEIPT FORM

950

Date: 5/18/05 Client: Shaw

156 STARLITE DRIVE
MARIETTA, OH
45750
(740) 373-4071

Shipped By: ( ) Fed-Ex (✓) UPS ( )DHL ( ) KEMRON ( ) Client ( ) Other

Opened By: BLG

Logged By: BLG Login # L05 05399

IR Temp Gun: (✓) C ( ) F

COOLER INFORMATION

Number	Cooler ID	Temp °C	Airbill#	COC#	Other
1	KL397	1	J180 010 401 7	031	
2	KL1321	4	1788255371	028	
3	KL1644	0	J180 010 402 6	030	
4	KL494	4	J178 825 538 0	029	
5					
6					

Were all coolers sealed?	(Y)	N	N/A
Were custody seals used on all coolers?	(Y)	N	N/A
Were custody seals intact?	(Y)	N	N/A
Was visible ice present?	(Y)	N	N/A
Were all coolers in the temperature range of 2-6C? (>6C*)	Y	(N)	N/A
Were the samples frozen?*	Y	(N)	N/A
Were COC papers provided?	(Y)	N	N/A
Were all sample containers intact?*	(Y)	N	N/A
Were all sample labels intact?	(Y)	N	N/A
Were all sample labels legible?*	(Y)	N	N/A
Did all sample labels match the COC?*	(Y)	N	N/A
Was the label information complete?*	(Y)	N	N/A
Were the correct containers used?*	(Y)	N	N/A
Were the correct preservatives added to water samples?*	(Y)	N	N/A
Was the pH tested on preserved water samples?	(Y)	N	N/A
Were pH ranges acceptable?*	(Y)	N	N/A
Was sufficient amount of sample provided?*	(Y)	N	N/A
Were bubbles present in VOA samples?*	Y	N	(N/A)
Were COC's signed and dated?	(Y)	N	N/A
Did samples arrive before hold time expired?*	(Y)	N	N/A
Are discrepancy forms attached?	Y	N	(N/A)

** Requires a discrepancy form*

CRF #1
Revised 8/22/03

Comments:_____

156 Starlite Drive, Marietta, OH 45750 • TEL 740-373-4071 • FAX 740-373-4835 • http://www.kemron.com

Laboratory Report Number: L0710648

Please find enclosed the analytical results for the samples you submitted to KEMRON Environmental Services.

Review and compilation of your report was completed by KEMRON's Sales and Service Team. If you have questions, comments or require further assistance regarding this report, please contact your team member noted in the reviewed box bleow at 800-373-4071. Team member e-mail addresses also appear here for your convenience.

Debra Elliott - Team Leader
delliott@kemron-lab.com

Amanda Fickiesen - Client Services Specialist
afickiesen@kemron-lab.com

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Jacqueline Parsons - Team Assistant
jparsons@kemron-lab.com

This report was reviewed on November 05, 2007.

Stephanie Mossburg

STEPHANIE MOSSBURG - Team Chemist/Data Specialist

I certify that all test results meet all of the requirements of the NELAP standards and other applicable contract terms and conditions. All results for soil samples are reported on a 'dry-weight' basis unless specified otherwise. Analytical results for water and wastes are reported on a 'as received' basis unless specified otherwise. A statement of uncertainty for each analysis is available upon request. This laboratory report shall not be reproduced, except in full, without the written approval of KEMRON Environmental Services.

This report was certified on November 05, 2007.

David E. Vandenberg

David Vandenberg - Vice President

FL DOH NELAP ID: E8755
This report contains a total of 282 pages.

Protecting Our Environmental Future

KEMRON REPORT L0710648
PREPARED FOR Shaw E I, Inc.
WORK ID: LONGHORN AAP KARNACK TX

1.0 Introduction

KEMRON ENVIRONMENTAL SERVICES
REPORT NARRATIVE

KEMRON Login No.: L0710648

CHAIN OF CUSTODY: The chain of custody number was 10723.

SHIPMENT CONDITIONS: The chain of custody forms were received sealed in a cooler. The cooler temperature was 1 degree C.

SAMPLE MANAGEMENT: All samples received were intact.

I certify that this data package is in compliance with the terms and conditions agreed to by the client and KEMRON Environmental Services, both technically and for completeness, except for the conditions noted above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designated person, as verified by the following signature.

Approved: 26-OCT-07
Stephanie Mossburg

Laboratory Data Package Cover Page

00074457

This data Package consists of:

This signature page, the laboratory review checklists, and the following reportable data:

R1 Field chain-of-custody documentation;

R2 sample identification cross-reference;

R3 Test reports (analytical data sheets) for each enviornmental sample that includes:

a) Items consistant with NELAC 5.13 or ISO/IEC 17025 Section 5.10

b) dilution factors,

c) preparation methods,

d) Cleanup methods, and

e) If required for the project, tentatively identified compounds (TICs)

R4 Surrogate recovery data including:

a) Calculated recovery (%R) for each analyte, and

b) The laboratory's surrogate QC limits.

R5 Test reports/summary forms for blank samples;

R6 Test reports/summary forms FOR laboratory control samples (LCSs) including:

a) LCS spiking amount,

b) Calculated %R for each analyte, and

c) The laboratory"s LCS QC limits.

R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:

a) Samples associated with the MS/MSD clearly identified,

b) MS/MSD spiking amounts,

c) Concentration of each MS/MSD analyte measured in the parent and spiked samples,

d) Calculated %R and relative percent differences (RPDs), and

e) The laboratory's MS/MSD QC limits

R8 Laboratory analytical duplicate (if applicable) revocery and precision:

a) the amount of analyte measured in the duplicate,

b) the calculated RPD, and

c) the laboratory's QC limits for anlytical duplicates.

R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix;

R10 Other problems or anomalies.

The exception Report for every "No" or "Not Reviewed (NR)" item in laboratory review checklist.

Release statement: I am responsible for the release of this laboratory data package. This data package has been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exceptions reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratoy in the Laboratory Review Checklist, and no information or data have been knowingly withheld that would affect the quality of the data.

Check, If applicable: [] This laboratory is an in-house laboratory controlled by the person repsonding to rule. The official signing the cover page of the rule-required report (for example, the APAR) in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is trus.

SHERI L. PFALZGRAF	Sheri L. Pfalzgraf	Chemist II	November 2, 2007
Name (Printed)	Signature	Official Title (printed)	DATE

RG-366/TRRP-13 December 2002 A1

KEMRON Environmental Services
Laboratory Review Checklist

Laboratory Name:	KEMRON
Laboratory Log Number:	L0710648
Project Name:	798-LONGHORN
Method:	6020
Prep Batch Number(s):	WG253882
Reviewer Name:	SHERI L. PFALZGRAF
LRC Date:	November 02, 2007

Description	Yes	No	NA(1)	NR(2)	ER(3)
Chain-Of-Custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	✓				
Were all departures from standard conditions described in an exception report?	✓				
Sample and quality control (QC) identification					
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	✓				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	✓				
Test reports					
Were all samples prepared and analyzed within holding times?	✓				
Other than those results <MQL, were all other raw values bracketed by calibration standards?	✓				
Were calculations checked by a peer or supervisor?	✓				
Were all analyte identifications checked by a peer or supervisor?	✓				
Were sample quantitation limits reported for all analytes not detected?	✓				
Were all results for soil and sediment samples reported on a dry weight basis?	✓				
Were % moisture (or solids) reported for all soil and sediment samples?	✓				
If required for the project, TICs reported?			✓		
Surrogate recovery data					
Were surrogates added prior to extraction?			✓		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			✓		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	✓				
Were blanks analyzed at the appropriate frequency?	✓				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	✓				
Were blank concentrations <RL?	✓				
Laboratory control samples (LCS):					
Were all COCs included in the LCS?	✓				
Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	✓				
Were LCSs analyzed at the required frequency?	✓				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	✓				
Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?	✓				
Was the LCSD RPD within QC limits?			✓		
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?			✓		
Were MS/MSD analyzed at the appropriate frequency?			✓		
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?			✓		

Description	Yes	No	NA(1)	NR(2)	ER(3)
Were MS/MSD RPDs within laboratory QC limits?			✓		
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			✓		
Were analytical duplicates analyzed at the appropriate frequency?			✓		
Were RPDs or relative standard deviations within the laboratory QC limits?			✓		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	✓				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	✓				
Are unadjusted MQLs included in the laboratory data package?		✓			1
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	✓				
Were all necessary corrective actions performed for the reported data?	✓				
Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?	✓				
ICAL					
Were response factors and/or relative response factors for each analyte within QC limits?			✓		
Were percent RSDs or correlation coefficient criteria met?	✓				
Was the number of standards recommended in the method used for all analytes?	✓				
Were all points generated between the lowest and highest standard used to calculate the curve?	✓				
Are ICAL data available for all instruments used?	✓				
Has the initial calibration curve been verified using an appropriate second source standard?	✓				
Initial and continuing calibration verification (ICV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	✓				
Were percent differences for each analyte within the method-required QC limits?	✓				
Was the ICAL curve verified for each analyte?	✓				
Was the absolute value of the analyte concentration in the inorganic CCB <RL?	✓				
Mass spectral tuning:					
Was the appropriate compound for the method used for tuning?			✓		
Were ion abundance data within the method-required QC limits?			✓		
Internal standards (IS):					
Were IS area counts and retention times within the method-required QC limits?			✓		
Raw data (NELAC section 1 appendix A glossary, and section 5.12 or ISO/IEC 17025 section 4.12.2)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	✓				
Were data associated with manual integrations flagged on the raw data?			✓		
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			✓		
Tentatively identified compounds (TICs):					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			✓		
Interference Check Sample (ICS) results:					
Were percent recoveries within method QC limits?	✓				
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	✓				
Method detection limit (MDL) studies					
Was a MDL study performed for each reported analyte?	✓				
Is the MDL either adjusted or supported by the analysis of DCSs?	✓				
Proficiency test reports:					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	✓				

Description	Yes	No	NA(1)	NR(2)	EL(3)
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	✓				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	✓				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5C or ISO/IEC 4?	✓				
Is documentation of the analyst's competency up-to-date and on file?	✓				
Verification/validation documentation for methods (NELAC Chap 5 or ISO/IEC 17025 Section 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	✓				
Laboratory standard operating procedures (SOPs):					
Are laboratory SOPs current and on file for each method performed?	✓				

KEMRON Environmental Services
Laboratory Review Checklist

Laboratory Name:	KEMRON
Laboratory Log Number:	L0710648
Project Name:	798-LONGHORN
Method:	6020
Prep Batch Number(s):	WG253882
Reviewer Name:	SHERI L. PFALZGRAF
LRC Date:	November 02, 2007

EXCEPTIONS REPORT
ER1 - Due to high levels of nontarget analytes, client samples 01 through 04 were analyzed initially at dilutions. Upon initial analysis of client sample 02, the terbium internal standard yielded a recovery greater than 120%. The sample was reanalyzed for barium.
Footnotes:
(1) NA = Not applicable to method or project
(2) NR = Not reviewed
(3) ER# = Exception report number

Laboratory Data Package Cover Page

00074462

This data Package consists of:

This signature page, the laboratory review checklists, and the following reportable data:

R1 Field chain-of-custody documentation;

R2 sample identification cross-reference;

R3 Test reports (analytical data sheets) for each enviornmental sample that includes:

a) Items consistant with NELAC 5.13 or ISO/IEC 17025 Section 5.10

b) dilution factors,

c) preparation methods,

d) Cleanup methods, and

e) If required for the project, tentatively identified compounds (TICs)

R4 Surrogate recovery data including:

a) Calculated recovery (%R) for each analyte, and

b) The laboratory's surrogate QC limits.

✓R5 Test reports/summary forms for blank samples;

✓R6 Test reports/summary forms for laboratory control samples (LCSs) including:

a) LCS spiking amount,

b) Calculated %R for each analyte, and

c) The laboratory"s LCS QC limits.

R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:

a) Samples associated with the MS/MSD clearly identified,

b) MS/MSD spiking amounts,

c) Concentration of each MS/MSD analyte measured in the parent and spiked samples,

d) Calculated %R and relative percent differences (RPDs), and

e) The laboratory's MS/MSD QC limits

R8 Laboratory analytical duplicate (if applicable) revocery and precision:

a) the amount of analyte measured in the duplicate,

b) the calculated RPD, and

c) the laboratory's QC limits for anlytical duplicates.

R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix;

R10 Other problems or anomalies.

The exception Report for every "No" or "Not Reviewed (NR)" item in laboratory review checklist.

Release statement: I am responsible for the release of this laboratory data package. This data package has been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exceptions reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratoy in the Laboratory Review Checklist, and no information or data have been knowingly withheld that would affect the quality of the data.

Check, If applicable: [] This laboratory is an in-house laboratory controlled by the person repsonding to rule. The official signing the cover page of the rule-required report (for example, the APAR) in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is trus.

DEANNA I. HESSON	Deanna Hesson	Conventional Lab Supervisor	October 31, 2007
Name (Printed)	Signature	Official Title (printed)	DATE

RG-366/TRRP-13 December 2002 A1

KEMRON Environmental Services
Laboratory Review Checklist

Laboratory Name:	KEMRON
Laboratory Log Number:	L0710648
Project Name:	798-LONGHORN
Method:	NITRATE-NITRITE
Prep Batch Number(s):	WG254080
Reviewer Name:	DEANNA I. HESSON
LRC Date:	October 31, 2007

Description	Yes	No	NA(1)	NR(2)	ER(3)
Chain-Of-Custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	✓				
Were all departures from standard conditions described in an exception report?	✓				
Sample and quality control (QC) identification					
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	✓				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	✓				
Test reports					
Were all samples prepared and analyzed within holding times?	✓				
Other than those results <MQL, were all other raw values bracketed by calibration standards?	✓				
Were calculations checked by a peer or supervisor?	✓				
Were all analyte identifications checked by a peer or supervisor?	✓				
Were sample quantitation limits reported for all analytes not detected?	✓				
Were all results for soil and sediment samples reported on a dry weight basis?	✓				
Were % moisture (or solids) reported for all soil and sediment samples?	✓				
If required for the project, TICs reported?			✓		
Surrogate recovery data					
Were surrogates added prior to extraction?			✓		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			✓		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	✓				
Were blanks analyzed at the appropriate frequency?	✓				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	✓				
Were blank concentrations <MQL?	✓				
Laboratory control samples (LCS):					
Were all COCs included in the LCS?	✓				
Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	✓				
Were LCSs analyzed at the required frequency?	✓				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	✓				
Does the detectability data document the laboratorys capability to detect the COCs at the MDL used to calculate the SQLs?	✓				
Was the LCSD RPD within QC limits?	✓				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?	✓				
Were MS/MSD analyzed at the appropriate frequency?	✓				
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	✓				

Description	Yes	No	NA(1)	NR(2)	ED(3)
Were MS/MSD RPDs within laboratory QC limits?	✓				

Checklist ID: **22834**

KEMRON Environmental Services
Laboratory Review Checklist

Laboratory Name:	KEMRON
Laboratory Log Number:	L0710648
Project Name:	798-LONGHORN
Method:	NITRATE-NITRITE
Prep Batch Number(s):	WG254080
Reviewer Name:	DEANNA I. HESSON
LRC Date:	October 31, 2007

Description	Yes	No	NA(1)	NR(2)	ER(3)
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?	✓				
Were analytical duplicates analyzed at the appropriate frequency?	✓				
Were RPDs or relative standard deviations within the laboratory QC limits?	✓				
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	✓				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	✓				
Are unadjusted MQLs included in the laboratory data package?	✓				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	✓				
Were all necessary corrective actions performed for the reported data?	✓				
Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?	✓				
Were response factors and/or relative response factors for each analyte within QC limits?	✓				
Were percent RSDs or correlation coefficient criteria met?	✓				
Was the number of standards recommended in the method used for all analytes?	✓				
Were all points generated between the lowest and highest standard used to calculate the curve?	✓				
Are ICAL data available for all instruments used?	✓				
Has the initial calibration curve been verified using an appropriate second source standard?	✓				
Initial and continuing calibration verification (ICV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	✓				
Were percent differences for each analyte within the method-required QC limits?	✓				
Was the ICAL curve verified for each analyte?	✓				
Was the absolute value of the analyte concentration in the inorganic CCB <MDL?	✓				
Mass spectral tuning:					
Was the appropriate compound for the method used for tuning?			✓		
Were ion abundance data within the method-required QC limits?			✓		
Internal standards (IS):					
Were IS area counts and retention times within the method-required QC limits?			✓		
Raw data (NELAC section 1 appendix A glossary, and section 5.12 or ISO/IEC 17025 section 4.12.2)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	✓				
Were data associated with manual integrations flagged on the raw data?			✓		

Checklist ID: **22834**

KEMRON Environmental Services
Laboratory Review Checklist

Laboratory Name:	KEMRON
Laboratory Log Number:	L0710648
Project Name:	798-LONGHORN
Method:	NITRATE-NITRITE
Prep Batch Number(s):	WG254080
Reviewer Name:	DEANNA I. HESSON
LRC Date:	October 31, 2007

Description	Yes	No	NA(1)	NR(2)	ER(3)
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			✓		
Tentatively identified compounds (TICs):					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			✓		
Interference Check Sample (ICS) results:					
Were percent recoveries within method QC limits?			✓		
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			✓		
Method detection limit (MDL) studies					
Was a MDL study performed for each reported analyte?	✓				
Is the MDL either adjusted or supported by the analysis of DCSs?			✓		
Proficiency test reports:					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	✓				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	✓				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	✓				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5C or ISO/IEC 4?	✓				
Is documentation of the analyst's competency up-to-date and on file?	✓				
Verification/validation documentation for methods (NELAC Chap 5 or ISO/IEC 17025 Section 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	✓				
Laboratory standard operating procedures (SOPs):					
Are laboratory SOPs current and on file for each method performed?	✓				

KEMRON Environmental Services
Laboratory Review Checklist

Laboratory Name:	KEMRON
Laboratory Log Number:	L0710648
Project Name:	798-LONGHORN
Method:	NITRATE-NITRITE
Prep Batch Number(s):	WG254080
Reviewer Name:	DEANNA I. HESSON
LRC Date:	October 31, 2007

EXCEPTIONS REPORT
ER# - Description
Footnotes:
(1) NA = Not applicable to method or project
(2) NR = Not reviewed
(3) ER# = Exception report number

Laboratory Data Package Cover Page

00074468

This data Package consists of:

This signature page, the laboratory review checklists, and the following reportable data:

R1 Field chain-of-custody documentation;

R2 sample identification cross-reference;

R3 Test reports (analytical data sheets) for each enviornmental sample that includes:

a) Items consistant with NELAC 5.13 or ISO/IEC 17025 Section 5.10

b) dilution factors,

c) preparation methods,

d) Cleanup methods, and

e) If required for the project, tentatively identified compounds (TICs)

R4 Surrogate recovery data including:

a) Calculated recovery (%R) for each analyte, and

b) The laboratory's surrogate QC limits.

✓R5 Test reports/summary forms for blank samples;

✓R6 Test reports/summary forms for laboratory control samples (LCSs) including:

a) LCS spiking amount,

b) Calculated %R for each analyte, and

c) The laboratory"s LCS QC limits.

R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:

a) Samples associated with the MS/MSD clearly identified,

b) MS/MSD spiking amounts,

c) Concentration of each MS/MSD analyte measured in the parent and spiked samples,

d) Calculated %R and relative percent differences (RPDs), and

e) The laboratory's MS/MSD QC limits

R8 Laboratory analytical duplicate (if applicable) revocery and precision:

a) the amount of analyte measured in the duplicate,

b) the calculated RPD, and

c) the laboratory's QC limits for anlytical duplicates.

R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix;

R10 Other problems or anomalies.

The exception Report for every "No" or "Not Reviewed (NR)" item in laboratory review checklist.

Release statement: I am responsible for the release of this laboratory data package. This data package has been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exceptions reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratoy in the Laboratory Review Checklist, and no information or data have been knowingly withheld that would affect the quality of the data.

Check, If applicable: [] This laboratory is an in-house laboratory controlled by the person repsonding to rule. The official signing the cover page of the rule-required report (for example, the APAR) in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is trus.

DEANNA I. HESSON	Deanna Hesson	Conventional Lab Supervisor	October 31, 2007
Name (Printed)	Signature	Official Title (printed)	DATE

RG-366/TRRP-13 December 2002 A1

KEMRON Environmental Services
Laboratory Review Checklist

Laboratory Name:	KEMRON
Laboratory Log Number:	L0710648
Project Name:	798-LONGHORN
Method:	NITRITE
Prep Batch Number(s):	WG254356
Reviewer Name:	DEANNA I. HESSON
LRC Date:	October 31, 2007

Description	Yes	No	NA(1)	NR(2)	ER(3)
Chain-Of-Custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	✓				
Were all departures from standard conditions described in an exception report?	✓				
Sample and quality control (QC) identification					
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	✓				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	✓				
Test reports					
Were all samples prepared and analyzed within holding times?	✓				
Other than those results <MQL, were all other raw values bracketed by calibration standards?	✓				
Were calculations checked by a peer or supervisor?	✓				
Were all analyte identifications checked by a peer or supervisor?	✓				
Were sample quantitation limits reported for all analytes not detected?	✓				
Were all results for soil and sediment samples reported on a dry weight basis?	✓				
Were % moisture (or solids) reported for all soil and sediment samples?	✓				
If required for the project, TICs reported?	✓				
Surrogate recovery data					
Were surrogates added prior to extraction?			✓		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			✓		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	✓				
Were blanks analyzed at the appropriate frequency?	✓				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	✓				
Were blank concentrations <MQL?	✓				
Laboratory control samples (LCS):					
Were all COCs included in the LCS?	✓				
Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	✓				
Were LCSs analyzed at the required frequency?	✓				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	✓				
Does the detectability data document the laboratorys capability to detect the COCs at the MDL used to calculate the SQLs?	✓				
Was the LCSD RPD within QC limits?	✓				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?	✓				
Were MS/MSD analyzed at the appropriate frequency?	✓				
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	✓				

Description	Yes	No	NA(1)	NR(2)	ER(3)
Were MS/MSD RPDs within laboratory QC limits?	✓				
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?	✓				
Were analytical duplicates analyzed at the appropriate frequency?	✓				
Were RPDs or relative standard deviations within the laboratory QC limits?	✓				
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	✓				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	✓				
Are unadjusted MQLs included in the laboratory data package?	✓				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	✓				
Were all necessary corrective actions performed for the reported data?	✓				
Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?	✓				
Were response factors and/or relative response factors for each analyte within QC limits?	✓				
Were percent RSDs or correlation coefficient criteria met?	✓				
Was the number of standards recommended in the method used for all analytes?	✓				
Were all points generated between the lowest and highest standard used to calculate the curve?	✓				
Are ICAL data available for all instruments used?	✓				
Has the initial calibration curve been verified using an appropriate second source standard?	✓				
Initial and continuing calibration verification (ICV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	✓				
Were percent differences for each analyte within the method-required QC limits?	✓				
Was the ICAL curve verified for each analyte?	✓				
Was the absolute value of the analyte concentration in the inorganic CCB <MDL?	✓				
Mass spectral tuning:					
Was the appropriate compound for the method used for tuning?			✓		
Were ion abundance data within the method-required QC limits?			✓		
Internal standards (IS):					
Were IS area counts and retention times within the method-required QC limits?			✓		
Raw data (NELAC section 1 appendix A glossary, and section 5.12 or ISO/IEC 17025 section 4.12.2)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	✓				
Were data associated with manual integrations flagged on the raw data?			✓		
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			✓		
Tentatively identified compounds (TICs):					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			✓		
Interference Check Sample (ICS) results:					
Were percent recoveries within method QC limits?			✓		
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			✓		
Method detection limit (MDL) studies					
Was a MDL study performed for each reported analyte?	✓				
Is the MDL either adjusted or supported by the analysis of DCSs?	✓				
Proficiency test reports:					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	✓				

Description	Yes	No	NA(1)	NR(2)	ER(3)
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	✓				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	✓				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5C or ISO/IEC 4?	✓				
Is documentation of the analyst's competency up-to-date and on file?	✓				
Verification/validation documentation for methods (NELAC Chap 5 or ISO/IEC 17025 Section 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	✓				
Laboratory standard operating procedures (SOPs):					
Are laboratory SOPs current and on file for each method performed?	✓				

KEMRON Environmental Services
Laboratory Review Checklist

Laboratory Name:	KEMRON
Laboratory Log Number:	L0710648
Project Name:	798-LONGHORN
Method:	NITRITE
Prep Batch Number(s):	WG254356
Reviewer Name:	DEANNA I. HESSON
LRC Date:	October 31, 2007

EXCEPTIONS REPORT
ER# - Description
Footnotes:
(1) NA = Not applicable to method or project
(2) NR = Not reviewed
(3) ER# = Exception report number

Laboratory Data Package Cover Page

00074473

This data Package consists of:

This signature page, the laboratory review checklists, and the following reportable data:

R1 Field chain-of-custody documentation;

R2 sample identification cross-reference;

R3 Test reports (analytical data sheets) for each enviornmental sample that includes:

a) Items consistant with NELAC 5.13 or ISO/IEC 17025 Section 5.10

b) dilution factors,

c) preparation methods,

d) Cleanup methods, and

e) If required for the project, tentatively identified compounds (TICs)

R4 Surrogate recovery data including:

a) Calculated recovery (%R) for each analyte, and

b) The laboratory's surrogate QC limits.

R5 Test reports/summary forms for blank samples;

R6 Test reports/summary forms FOR laboratory control samples (LCSs) including:

a) LCS spiking amount,

b) Calculated %R for each analyte, and

c) The laboratory"s LCS QC limits.

R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:

a) Samples associated with the MS/MSD clearly identified,

b) MS/MSD spiking amounts,

c) Concentration of each MS/MSD analyte measured in the parent and spiked samples,

d) Calculated %R and relative percent differences (RPDs), and

e) The laboratory's MS/MSD QC limits

R8 Laboratory analytical duplicate (if applicable) revocery and precision:

a) the amount of analyte measured in the duplicate,

b) the calculated RPD, and

c) the laboratory's QC limits for anlytical duplicates.

R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix;

R10 Other problems or anomalies.

The exception Report for every "No" or "Not Reviewed (NR)" item in laboratory review checklist.

Release statement: I am responsible for the release of this laboratory data package. This data package has been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exceptions reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratoy in the Laboratory Review Checklist, and no information or data have been knowingly withheld that would affect the quality of the data.

Check, If applicable: [] This laboratory is an in-house laboratory controlled by the person repsonding to rule. The official signing the cover page of the rule-required report (for example, the APAR) in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is trus.

MAREN M. BEERY	Maren Beery	Metals Supervisor	November 1, 2007
Name (Printed)	Signature	Official Title (printed)	DATE

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KEMRON Environmental Services
Laboratory Review Checklist

Laboratory Name:	KEMRON
Laboratory Log Number:	L0710648
Project Name:	798-LONGHORN
Method:	6010
Prep Batch Number(s):	WG253902
Reviewer Name:	MAREN M. BEERY
LRC Date:	November 01, 2007

Description	Yes	No	NA(1)	NR(2)	ER(3)
Chain-Of-Custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	✓				
Were all departures from standard conditions described in an exception report?	✓				
Sample and quality control (QC) identification					
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	✓				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	✓				
Test reports					
Were all samples prepared and analyzed within holding times?	✓				
Other than those results <MQL, were all other raw values bracketed by calibration standards?			✓		ER1
Were calculations checked by a peer or supervisor?	✓				
Were all analyte identifications checked by a peer or supervisor?	✓				
Were sample quantitation limits reported for all analytes not detected?	✓				
Were all results for soil and sediment samples reported on a dry weight basis?	✓				
Were % moisture (or solids) reported for all soil and sediment samples?	✓				
If required for the project, TICs reported?			✓		
Surrogate recovery data					
Were surrogates added prior to extraction?			✓		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			✓		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	✓				
Were blanks analyzed at the appropriate frequency?	✓				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	✓				
Were blank concentrations <RL?	✓				
Laboratory control samples (LCS):					
Were all COCs included in the LCS?	✓				
Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	✓				
Were LCSs analyzed at the required frequency?	✓				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	✓				
Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?	✓				
Was the LCSD RPD within QC limits?			✓		
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?			✓		
Were MS/MSD analyzed at the appropriate frequency?			✓		
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?			✓		

Description	Yes	No	NA(1)	NR(2)	ER(3)
Were MS/MSD RPDs within laboratory QC limits?			✓		
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			✓		
Were analytical duplicates analyzed at the appropriate frequency?			✓		
Were RPDs or relative standard deviations within the laboratory QC limits?			✓		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	✓				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	✓				
Are unadjusted MQLs included in the laboratory data package?	✓				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	✓				
Were all necessary corrective actions performed for the reported data?	✓				
Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?	✓				ER2
ICAL					
Were response factors and/or relative response factors for each analyte within QC limits?			✓		
Were percent RSDs or correlation coefficient criteria met?	✓				
Was the number of standards recommended in the method used for all analytes?	✓				
Were all points generated between the lowest and highest standard used to calculate the curve?	✓				
Are ICAL data available for all instruments used?	✓				
Has the initial calibration curve been verified using an appropriate second source standard?	✓				
Initial and continuing calibration verification (ICV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	✓				
Were percent differences for each analyte within the method-required QC limits?	✓				
Was the ICAL curve verified for each analyte?	✓				
Was the absolute value of the analyte concentration in the inorganic CCB <RL?	✓				
Mass spectral tuning:					
Was the appropriate compound for the method used for tuning?			✓		
Were ion abundance data within the method-required QC limits?			✓		
Internal standards (IS):					
Were IS area counts and retention times within the method-required QC limits?			✓		
Raw data (NELAC section 1 appendix A glossary, and section 5.12 or ISO/IEC 17025 section 4.12.2)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	✓				
Were data associated with manual integrations flagged on the raw data?			✓		
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			✓		
Tentatively identified compounds (TICs):					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			✓		
Interference Check Sample (ICS) results:					
Were percent recoveries within method QC limits?	✓				
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	✓				
Method detection limit (MDL) studies					
Was a MDL study performed for each reported analyte?	✓				
Is the MDL either adjusted or supported by the analysis of DCSs?	✓				
Proficiency test reports:					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	✓				

Description	Yes	No	NA(1)	NR(2)	ER(3)
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	✓				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	✓				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5C or ISO/IEC 4?	✓				
Is documentation of the analyst's competency up-to-date and on file?	✓				
Verification/validation documentation for methods (NELAC Chap 5 or ISO/IEC 17025 Section 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	✓				
Laboratory standard operating procedures (SOPs):					
Are laboratory SOPs current and on file for each method performed?	✓				

KEMRON Environmental Services
Laboratory Review Checklist

Laboratory Name:	KEMRON
Laboratory Log Number:	L0710648
Project Name:	798-LONGHORN
Method:	6010
Prep Batch Number(s):	WG253902
Reviewer Name:	MAREN M. BEERY
LRC Date:	November 01, 2007

EXCEPTIONS REPORT
ER# 1- Due to results that exceeded the linear range on initial analysis, samples 02 and 04 (reference sample to the MS/MSD), the MS and the MSD were reported from dilution analyses for sodium. ER2 - Due to results that were noncompliant on the negative side on initial analysis, sample 02 was reported from a dilution analysis for vanadium, sample 04 (reference sample to the MS/MSD), the MS, and the MSD for aluminum and vanadium.
Footnotes:
(1) NA = Not applicable to method or project
(2) NR = Not reviewed
(3) ER# = Exception report number

Laboratory Data Package Cover Page

00074478

This data Package consists of:

This signature page, the laboratory review checklists, and the following reportable data:

R1 Field chain-of-custody documentation;

R2 sample identification cross-reference;

R3 Test reports (analytical data sheets) for each enviornmental sample that includes:

a) Items consistant with NELAC 5.13 or ISO/IEC 17025 Section 5.10

b) dilution factors,

c) preparation methods,

d) Cleanup methods, and

e) If required for the project, tentatively identified compounds (TICs)

R4 Surrogate recovery data including:

a) Calculated recovery (%R) for each analyte, and

b) The laboratory's surrogate QC limits.

R5 Test reports/summary forms for blank samples;

R6 Test reports/summary forms FOR laboratory control samples (LCSs) including:

a) LCS spiking amount,

b) Calculated %R for each analyte, and

c) The laboratory"s LCS QC limits.

R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:

a) Samples associated with the MS/MSD clearly identified,

b) MS/MSD spiking amounts,

c) Concentration of each MS/MSD analyte measured in the parent and spiked samples,

d) Calculated %R and relative percent differences (RPDs), and

e) The laboratory's MS/MSD QC limits

R8 Laboratory analytical duplicate (if applicable) revocery and precision:

a) the amount of analyte measured in the duplicate,

b) the calculated RPD, and

c) the laboratory's QC limits for anlytical duplicates.

R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix;

R10 Other problems or anomalies.

The exception Report for every "No" or "Not Reviewed (NR)" item in laboratory review checklist.

Release statement: I am responsible for the release of this laboratory data package. This data package has been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exceptions reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratoy in the Laboratory Review Checklist, and no information or data have been knowingly withheld that would affect the quality of the data.

Check, If applicable: [] This laboratory is an in-house laboratory controlled by the person repsonding to rule. The official signing the cover page of the rule-required report (for example, the APAR) in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is trus.

MAREN M. BEERY	Maren Beery	Metals Supervisor	November 1, 2007
Name (Printed)	Signature	Official Title (printed)	DATE

RG-366/TRRP-13 December 2002 A1

KEMRON Environmental Services
Laboratory Review Checklist

Laboratory Name:	KEMRON
Laboratory Log Number:	L0710648
Project Name:	798-LONGHORN
Method:	6010
Prep Batch Number(s):	WG253900
Reviewer Name:	MAREN M. BEERY
LRC Date:	October 30, 2007

Description	Yes	No	NA(1)	NR(2)	ER(3)
Chain-Of-Custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	✓				
Were all departures from standard conditions described in an exception report?	✓				
Sample and quality control (QC) identification					
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	✓				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	✓				
Test reports					
Were all samples prepared and analyzed within holding times?	✓				
Other than those results <MQL, were all other raw values bracketed by calibration standards?			✓		ER5
Were calculations checked by a peer or supervisor?	✓				
Were all analyte identifications checked by a peer or supervisor?	✓				
Were sample quantitation limits reported for all analytes not detected?	✓				
Were all results for soil and sediment samples reported on a dry weight basis?	✓				
Were % moisture (or solids) reported for all soil and sediment samples?	✓				
If required for the project, TICs reported?			✓		
Surrogate recovery data					
Were surrogates added prior to extraction?			✓		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			✓		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	✓				
Were blanks analyzed at the appropriate frequency?	✓				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	✓				
Were blank concentrations <RL?		✓			ER3
Laboratory control samples (LCS):					
Were all COCs included in the LCS?	✓				
Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	✓				
Were LCSs analyzed at the required frequency?	✓				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	✓				
Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?	✓				
Was the LCSD RPD within QC limits?			✓		
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?			✓		
Were MS/MSD analyzed at the appropriate frequency?			✓		
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?			✓		

Description	Yes	No	NA(1)	NR(2)	ER(3)
Were MS/MSD RPDs within laboratory QC limits?			✓		
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			✓		
Were analytical duplicates analyzed at the appropriate frequency?			✓		
Were RPDs or relative standard deviations within the laboratory QC limits?			✓		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	✓				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	✓				
Are unadjusted MQLs included in the laboratory data package?	✓				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	✓				
Were all necessary corrective actions performed for the reported data?	✓				
Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?	✓				ER4
ICAL					
Were response factors and/or relative response factors for each analyte within QC limits?			✓		
Were percent RSDs or correlation coefficient criteria met?	✓				
Was the number of standards recommended in the method used for all analytes?	✓				
Were all points generated between the lowest and highest standard used to calculate the curve?	✓				
Are ICAL data available for all instruments used?	✓				
Has the initial calibration curve been verified using an appropriate second source standard?	✓				
Initial and continuing calibration verification (ICV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	✓				
Were percent differences for each analyte within the method-required QC limits?		✓			ER2
Was the ICAL curve verified for each analyte?	✓				
Was the absolute value of the analyte concentration in the inorganic CCB <RL?	✓				
Mass spectral tuning:					
Was the appropriate compound for the method used for tuning?			✓		
Were ion abundance data within the method-required QC limits?			✓		
Internal standards (IS):					
Were IS area counts and retention times within the method-required QC limits?			✓		
Raw data (NELAC section 1 appendix A glossary, and section 5.12 or ISO/IEC 17025 section 4.12.2)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	✓				
Were data associated with manual integrations flagged on the raw data?			✓		
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			✓		
Tentatively identified compounds (TICs):					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			✓		
Interference Check Sample (ICS) results:					
Were percent recoveries within method QC limits?		✓			ER1
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?		✓			ER6
Method detection limit (MDL) studies					
Was a MDL study performed for each reported analyte?	✓				
Is the MDL either adjusted or supported by the analysis of DCSs?	✓				
Proficiency test reports:					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	✓				

Description	Yes	No	NA(1)	NR(2)	EQ(3)
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	✓				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	✓				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5C or ISO/IEC 4?	✓				
Is documentation of the analyst's competency up-to-date and on file?	✓				
Verification/validation documentation for methods (NELAC Chap 5 or ISO/IEC 17025 Section 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	✓				
Laboratory standard operating procedures (SOPs):					
Are laboratory SOPs current and on file for each method performed?	✓				

KEMRON Environmental Services
Laboratory Review Checklist

Laboratory Name:	KEMRON
Laboratory Log Number:	L0710648
Project Name:	798-LONGHORN
Method:	6010
Prep Batch Number(s):	WG253900
Reviewer Name:	MAREN M. BEERY
LRC Date:	October 30, 2007

EXCEPTIONS REPORT
ER#1 - Due to ICSAB failure for potassium on 29-OCT-2007 at 12:14, all batch QA/QC and client samples 01 and 03 were reanalyzed on a different calibration that was compliant for potassium.
ER2 - Due to continuing calibration verification failure for zinc on 29-OCT-2007 at 22:43, client samples 01 and 03 were reanalyzed on a later calibration which was compliant for zinc. ER3 - On initial analysis the method blank associated with this batch yielded noncompliant results on the negative side for aluminum and calcium, therefore all batch QA/QC and client samples 01 and 03 were reanalyzed on a different calibration where the method blank was compliant. ER4 - Due to a result that was noncompliant on the negative side, client sample 01 was reported from a dilution analysis for vanadium. ER5 - Due to results that exceeded the linear range of the instrument, client samples 01 and 03 were reported from dilution analyses for sodium. ER6 - Potassium for client sample 01 was reported from the twenty fold dilution where the post digestion spike was compliant.
Footnotes:
(1) NA = Not applicable to method or project
(2) NR = Not reviewed
(3) ER# = Exception report number

Laboratory Data Package Cover Page

00074483

This data Package consists of:

This signature page, the laboratory review checklists, and the following reportable data:

R1 Field chain-of-custody documentation;

R2 sample identification cross-reference;

R3 Test reports (analytical data sheets) for each enviornmental sample that includes:

a) Items consistant with NELAC 5.13 or ISO/IEC 17025 Section 5.10

b) dilution factors,

c) preparation methods,

d) Cleanup methods, and

e) If required for the project, tentatively identified compounds (TICs)

R4 Surrogate recovery data including:

a) Calculated recovery (%R) for each analyte, and

b) The laboratory's surrogate QC limits.

R5 Test reports/summary forms for blank samples;

R6 Test reports/summary forms FOR laboratory control samples (LCSs) including:

a) LCS spiking amount,

b) Calculated %R for each analyte, and

c) The laboratory"s LCS QC limits.

R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:

a) Samples associated with the MS/MSD clearly identified,

b) MS/MSD spiking amounts,

c) Concentration of each MS/MSD analyte measured in the parent and spiked samples,

d) Calculated %R and relative percent differences (RPDs), and

e) The laboratory's MS/MSD QC limits

R8 Laboratory analytical duplicate (if applicable) revocery and precision:

a) the amount of analyte measured in the duplicate,

b) the calculated RPD, and

c) the laboratory's QC limits for anlytical duplicates.

R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix;

R10 Other problems or anomalies.

The exception Report for every "No" or "Not Reviewed (NR)" item in laboratory review checklist.

Release statement: I am responsible for the release of this laboratory data package. This data package has been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exceptions reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratoy in the Laboratory Review Checklist, and no information or data have been knowingly withheld that would affect the quality of the data.

Check, If applicable: [] This laboratory is an in-house laboratory controlled by the person repsonding to rule. The official signing the cover page of the rule-required report (for example, the APAR) in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is trus.

MAREN M. BEERY	Maren Beery	Metals Supervisor	October 31, 2007
Name (Printed)	Signature	Official Title (printed)	DATE

RG-366/TRRP-13 December 2002 A1

KEMRON Environmental Services
Laboratory Review Checklist

Laboratory Name:	KEMRON
Laboratory Log Number:	L0710648
Project Name:	798-LONGHORN
Method:	7471
Prep Batch Number(s):	WG253806
Reviewer Name:	MAREN M. BEERY
LRC Date:	October 31, 2007

Description	Yes	No	NA(1)	NR(2)	ER(3)
Chain-Of-Custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	✓				
Were all departures from standard conditions described in an exception report?	✓				
Sample and quality control (QC) identification					
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	✓				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	✓				
Test reports					
Were all samples prepared and analyzed within holding times?	✓				
Other than those results <MQL, were all other raw values bracketed by calibration standards?	✓				
Were calculations checked by a peer or supervisor?	✓				
Were all analyte identifications checked by a peer or supervisor?	✓				
Were sample quantitation limits reported for all analytes not detected?	✓				
Were all results for soil and sediment samples reported on a dry weight basis?	✓				
Were % moisture (or solids) reported for all soil and sediment samples?	✓				
If required for the project, TICs reported?			✓		
Surrogate recovery data					
Were surrogates added prior to extraction?			✓		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			✓		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	✓				
Were blanks analyzed at the appropriate frequency?	✓				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	✓				
Were blank concentrations <RL?	✓				
Laboratory control samples (LCS):					
Were all COCs included in the LCS?	✓				
Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	✓				
Were LCSs analyzed at the required frequency?	✓				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	✓				
Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?	✓				
Was the LCSD RPD within QC limits?			✓		
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?			✓		
Were MS/MSD analyzed at the appropriate frequency?			✓		
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?			✓		

Description	Yes	No	NA(1)	NR(2)	ER(3)
Were MS/MSD RPDs within laboratory QC limits?			✓		
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			✓		
Were analytical duplicates analyzed at the appropriate frequency?			✓		
Were RPDs or relative standard deviations within the laboratory QC limits?			✓		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	✓				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	✓				
Are unadjusted MQLs included in the laboratory data package?	✓				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	✓				
Were all necessary corrective actions performed for the reported data?	✓				
Was applicable and available technology used to lower the SQL minimize the matrix interference affects on the sample results?	✓				
ICAL					
Were response factors and/or relative response factors for each analyte within QC limits?			✓		
Were percent RSDs or correlation coefficient criteria met?	✓				
Was the number of standards recommended in the method used for all analytes?	✓				
Were all points generated between the lowest and highest standard used to calculate the curve?	✓				
Are ICAL data available for all instruments used?	✓				
Has the initial calibration curve been verified using an appropriate second source standard?	✓				
Initial and continuing calibration verification (ICV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	✓				
Were percent differences for each analyte within the method-required QC limits?	✓				
Was the ICAL curve verified for each analyte?	✓				
Was the absolute value of the analyte concentration in the inorganic CCB <RL?	✓				
Mass spectral tuning:					
Was the appropriate compound for the method used for tuning?			✓		
Were ion abundance data within the method-required QC limits?			✓		
Internal standards (IS):					
Were IS area counts and retention times within the method-required QC limits?			✓		
Raw data (NELAC section 1 appendix A glossary, and section 5.12 or ISO/IEC 17025 section 4.12.2)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	✓				
Were data associated with manual integrations flagged on the raw data?			✓		
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			✓		
Tentatively identified compounds (TICs):					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			✓		
Interference Check Sample (ICS) results:					
Were percent recoveries within method QC limits?			✓		
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	✓				
Method detection limit (MDL) studies					
Was a MDL study performed for each reported analyte?	✓				
Is the MDL either adjusted or supported by the analysis of DCSs?	✓				
Proficiency test reports:					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	✓				

Description	Yes	No	NA(1)	NR(2)	EQ(3)
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	✓				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	✓				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5C or ISO/IEC 4?	✓				
Is documentation of the analyst's competency up-to-date and on file?	✓				
Verification/validation documentation for methods (NELAC Chap 5 or ISO/IEC 17025 Section 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	✓				
Laboratory standard operating procedures (SOPs):					
Are laboratory SOPs current and on file for each method performed?	✓				

KEMRON Environmental Services
Laboratory Review Checklist

Laboratory Name:	KEMRON
Laboratory Log Number:	L0710648
Project Name:	798-LONGHORN
Method:	7471
Prep Batch Number(s):	WG253806
Reviewer Name:	MAREN M. BEERY
LRC Date:	October 31, 2007

EXCEPTIONS REPORT
ER# - Description
Footnotes:
(1) NA = Not applicable to method or project
(2) NR = Not reviewed
(3) ER# = Exception report number

2.1 Metals Data

2.1.1 Metals I C P Data

2.1.1.1 Summary Data

LABORATORY REPORT

00074491

L0710648

11/05/07 07:58

Submitted By

KEMRON Environmental Services
156 Starlite Drive
Marietta , OH 45750
(740) 373 - 4071

For

Account Name: Shaw E & I, Inc.
ABB Lummus Biulding
3010 Briarpark Drive Suite 4N
Houston, TX 77042
Attention: Larry Duty

Account Number: 2773
Work ID: LHAAP

P.O. Number: 322255 OP

Sample Analysis Summary

Client ID	Lab ID	Method	Dilution	Date Received
49WW01-102307	L0710648-01	6010B	1	24-OCT-07
49WW01-102307	L0710648-01	6010B	1	24-OCT-07
49WW01-102307	L0710648-01	6010B	20	24-OCT-07
49WW01-102307	L0710648-02	6010B	1	24-OCT-07
49WW01-102307	L0710648-02	6010B	10	24-OCT-07
49WW03-102307	L0710648-03	6010B	1	24-OCT-07
49WW03-102307	L0710648-03	6010B	1	24-OCT-07
49WW03-102307	L0710648-03	6010B	20	24-OCT-07
49WW03-102307	L0710648-04	6010B	1	24-OCT-07
49WW03-102307	L0710648-04	6010B	10	24-OCT-07

Report Number: **L0710648**
Report Date : **November 5, 2007**

00074492

Sample Number: **L0710648-01**
Client ID: **49WW01-102307**
Matrix: **Water**
Workgroup Number: **WG254045**
Collect Date: **10/23/2007 12:55**
Sample Tag: **01**

PrePrep Method: **NONE**
Prep Method: **3005A**
Analytical Method: **6010B**
Analyst: **KRV**
Dilution: **1**
Units: **mg/L**

Instrument: **PE-ICP2**
Prep Date: **10/26/2007 05:20**
Cal Date: **10/29/2007 11:51**
Run Date: **10/29/2007 21:58**
File ID: **P2.102907.215837**

Analyte	CAS. Number	Result	Qual	PQL	SDL
Beryllium, Total	**7440-41-7**		**U**	**0.00200**	**0.000500**
Cobalt, Total	**7440-48-4**		**U**	**0.00500**	**0.00250**
Iron, Total	**7439-89-6**	**0.109**		**0.100**	**0.0250**
Magnesium, Total	**7439-95-4**	**180**		**0.500**	**0.250**

U Not detected at or above adjusted sample detection limit

Sample Number: **L0710648-01**
Client ID: **49WW01-102307**
Matrix: **Water**
Workgroup Number: **WG254045**
Collect Date: **10/23/2007 12:55**
Sample Tag: **02**

PrePrep Method: **NONE**
Prep Method: **3005A**
Analytical Method: **6010B**
Analyst: **KRV**
Dilution: **1**
Units: **mg/L**

Instrument: **PE-ICP2**
Prep Date: **10/26/2007 05:20**
Cal Date: **11/01/2007 08:36**
Run Date: **11/01/2007 11:49**
File ID: **P2.110107.114933**

Analyte	CAS. Number	Result	Qual	PQL	SDL
Aluminum, Total	**7429-90-5**		**U**	**0.100**	**0.0500**
Calcium, Total	**7440-70-2**	**229**		**0.200**	**0.100**
Zinc, Total	**7440-66-6**	**0.00935**	**J**	**0.0200**	**0.00500**

U Not detected at or above adjusted sample detection limit
J The analyte was positively identified, but the quantitation was below the RL

Report Number: **L0710648**
Report Date : **November 5, 2007**

00074494

Sample Number: **L0710648-01**
Client ID: **49WW01-102307**
Matrix: **Water**
Workgroup Number: **WG254045**
Collect Date: **10/23/2007 12:55**
Sample Tag: **DL01**

PrePrep Method: **NONE**
Prep Method: **3005A**
Analytical Method: **6010B**
Analyst: **KRV**
Dilution: **20**
Units: **mg/L**

Instrument: **PE-ICP2**
Prep Date: **10/26/2007 05:20**
Cal Date: **11/01/2007 08:36**
Run Date: **11/01/2007 12:21**
File ID: **P2.110107.122130**

Analyte	CAS. Number	Result	Qual	PQL	SDL
Potassium, Total	**7440-09-7**		**U**	**20.0**	**5.00**
Sodium, Total	**7440-23-5**	**381**		**10.0**	**5.00**
Vanadium, Total	**7440-62-2**		**U**	**0.200**	**0.100**

U Not detected at or above adjusted sample detection limit

Report Number: **L0710648**
Report Date : **November 5, 2007**

00074495

Sample Number: **L0710648-02**
Client ID: **49WW01-102307**
Matrix: **Water**
Workgroup Number: **WG254046**
Collect Date: **10/23/2007 12:55**
Sample Tag: **01**

PrePrep Method: **NONE**
Prep Method: **3005A**
Analytical Method: **6010B**
Analyst: **KHR**
Dilution: **1**
Units: **mg/L**

Instrument: **PE-ICP2**
Prep Date: **10/26/2007 05:30**
Cal Date: **10/31/2007 09:29**
Run Date: **10/31/2007 17:51**
File ID: **P2.103107.175112**

Analyte	CAS. Number	Result	Qual	PQL	SDL
Aluminum, Dissolved	7429-90-5		U	0.100	0.0500
Beryllium, Dissolved	7440-41-7		U	0.00200	0.000500
Calcium, Dissolved	7440-70-2	214		0.200	0.100
Cobalt, Dissolved	7440-48-4		U	0.00500	0.00250
Iron, Dissolved	7439-89-6		U	0.100	0.0250
Potassium, Dissolved	7440-09-7	5.12		1.00	0.250
Magnesium, Dissolved	7439-95-4	164		0.500	0.250
Zinc, Dissolved	7440-66-6	0.00730	J	0.0200	0.00500

U Not detected at or above adjusted sample detection limit
J The analyte was positively identified, but the quantitation was below the RL

Report Number: **L0710648**
Report Date : **November 5, 2007**

00074496

Sample Number: **L0710648-02**
Client ID: **49WW01-102307**
Matrix: **Water**
Workgroup Number: **WG254046**
Collect Date: **10/23/2007 12:55**
Sample Tag: **DL01**

PrePrep Method: **NONE**
Prep Method: **3005A**
Analytical Method: **6010B**
Analyst: **KRV**
Dilution: **10**
Units: **mg/L**

Instrument: **PE-ICP2**
Prep Date: **10/26/2007 05:30**
Cal Date: **11/01/2007 08:36**
Run Date: **11/01/2007 10:11**
File ID: **P2.110107.101111**

Analyte	CAS. Number	Result	Qual	PQL	SDL
Sodium, Dissolved	7440-23-5	415		5.00	2.50
Vanadium, Dissolved	7440-62-2		U	0.100	0.0500

U Not detected at or above adjusted sample detection limit

Report Number: **L0710648**
Report Date : **November 5, 2007**

00074497

Sample Number: **L0710648-03**
Client ID: **49WW03-102307**
Matrix: **Water**
Workgroup Number: **WG254045**
Collect Date: **10/23/2007 11:10**
Sample Tag: **01**

PrePrep Method: **NONE**
Prep Method: **3005A**
Analytical Method: **6010B**
Analyst: **KRV**
Dilution: **1**
Units: **mg/L**

Instrument: **PE-ICP2**
Prep Date: **10/26/2007 05:20**
Cal Date: **10/29/2007 11:51**
Run Date: **10/29/2007 22:05**
File ID: **P2.102907.220504**

Analyte	CAS. Number	Result	Qual	PQL	SDL
Beryllium, Total	**7440-41-7**		**U**	**0.00200**	**0.000500**
Cobalt, Total	**7440-48-4**		**U**	**0.00500**	**0.00250**
Iron, Total	**7439-89-6**	**0.134**		**0.100**	**0.0250**
Magnesium, Total	**7439-95-4**	**316**		**0.500**	**0.250**

U Not detected at or above adjusted sample detection limit

Sample Number: **L0710648-03**
Client ID: **49WW03-102307**
Matrix: **Water**
Workgroup Number: **WG254045**
Collect Date: **10/23/2007 11:10**
Sample Tag: **02**

PrePrep Method: **NONE**
Prep Method: **3005A**
Analytical Method: **6010B**
Analyst: **KRV**
Dilution: **1**
Units: **mg/L**

Instrument: **PE-ICP2**
Prep Date: **10/26/2007 05:20**
Cal Date: **11/01/2007 08:36**
Run Date: **11/01/2007 11:43**
File ID: **P2.110107.114304**

Analyte	CAS. Number	Result	Qual	PQL	SDL
Aluminum, Total	**7429-90-5**		**U**	**0.100**	**0.0500**
Calcium, Total	**7440-70-2**	**381**		**0.200**	**0.100**
Potassium, Total	**7440-09-7**	**10.6**		**1.00**	**0.250**
Vanadium, Total	**7440-62-2**		**U**	**0.0100**	**0.00500**
Zinc, Total	**7440-66-6**	**0.0100**	**J**	**0.0200**	**0.00500**

U Not detected at or above adjusted sample detection limit
J The analyte was positively identified, but the quantitation was below the RL

Report Number: **L0710648**
Report Date : **November 5, 2007**

Sample Number: **L0710648-03**
Client ID: **49WW03-102307**
Matrix: **Water**
Workgroup Number: **WG254045**
Collect Date: **10/23/2007 11:10**
Sample Tag: **DL01**

PrePrep Method: **NONE**
Prep Method: **3005A**
Analytical Method: **6010B**
Analyst: **KRV**
Dilution: **20**
Units: **mg/L**

Instrument: **PE-ICP2**
Prep Date: **10/26/2007 05:20**
Cal Date: **11/01/2007 08:36**
Run Date: **11/01/2007 12:34**
File ID: **P2.110107.123408**

Analyte	CAS. Number	Result	Qual	PQL	SDL
Sodium, Total	**7440-23-5**	**538**		**10.0**	**5.00**

Sample Number: **L0710648-04**
Client ID: **49WW03-102307**
Matrix: **Water**
Workgroup Number: **WG254046**
Collect Date: **10/23/2007 11:10**
Sample Tag: **01**

PrePrep Method: **NONE**
Prep Method: **3005A**
Analytical Method: **6010B**
Analyst: **KHR**
Dilution: **1**
Units: **mg/L**

Instrument: **PE-ICP2**
Prep Date: **10/26/2007 05:30**
Cal Date: **10/31/2007 09:29**
Run Date: **10/31/2007 17:57**
File ID: **P2.103107.175734**

Analyte	CAS. Number	Result	Qual	PQL	SDL
Beryllium, Dissolved	**7440-41-7**		**U**	**0.00200**	**0.000500**
Calcium, Dissolved	**7440-70-2**	**346**		**0.200**	**0.100**
Cobalt, Dissolved	**7440-48-4**		**U**	**0.00500**	**0.00250**
Iron, Dissolved	**7439-89-6**		**U**	**0.100**	**0.0250**
Potassium, Dissolved	**7440-09-7**	**9.57**		**1.00**	**0.250**
Magnesium, Dissolved	**7439-95-4**	**282**		**0.500**	**0.250**
Zinc, Dissolved	**7440-66-6**	**0.00573**	**J**	**0.0200**	**0.00500**

U Not detected at or above adjusted sample detection limit
J The analyte was positively identified, but the quantitation was below the RL

Report Number: **L0710648**
Report Date : **November 5, 2007**

Sample Number: **L0710648-04**
Client ID: **49WW03-102307**
Matrix: **Water**
Workgroup Number: **WG254046**
Collect Date: **10/23/2007 11:10**
Sample Tag: **DL01**

PrePrep Method: **NONE**
Prep Method: **3005A**
Analytical Method: **6010B**
Analyst: **KRV**
Dilution: **10**
Units: **mg/L**

Instrument: **PE-ICP2**
Prep Date: **10/26/2007 05:30**
Cal Date: **11/01/2007 08:36**
Run Date: **11/01/2007 10:17**
File ID: **P2.110107.101730**

Analyte	CAS. Number	Result	Qual	PQL	SDL
Aluminum, Dissolved	7429-90-5		U	1.00	0.500
Sodium, Dissolved	7440-23-5	545		5.00	2.50
Vanadium, Dissolved	7440-62-2		U	0.100	0.0500

U Not detected at or above adjusted sample detection limit

2.1.1.2 QC Summary Data

Example 6010 Calculations
Perkin Elmer Optima 4300 DV

1.0 Initial Calibration (ICAL) Parameters
The system performs linear regression from data consisting of a blank and three standards.

2.0 Calculating the concentration (C) of an element in water using data from prep log, run log, and quantitation report (note:the data system performs this calculation automatically when correction factors have been entered):

$$Cx = Cs \times \frac{Vf}{Vi} \times D$$

Where:	**Example:**
Cs = Concentration computed by the data system in ug/mL (ppm)	0.1
Vf = Final volume (mL)	50
Vi = Initial volume (mL)	50
D = Dilution factor as a multiplier (10X = 10)	1
Cx = Concentration of element in ug/mL (mg/L)	0.1

3.0 Calculating the concentration (C) of an element in soil using data from prep log, run log, and quantitation report (note: the data system performs this calculation automatically when correction factors have been entered):

$$Cx = Cs \times \frac{Vf}{Vi} \times D$$

Where:	**Example:**
Cs = Concentration computed by the data system (mg/L) (ppm)	0.1
Vf = Final volume (mL)	50
Vi = Initial weight (g)	1
D = Dilution factor as a multiplier (10X = 10)	1
Cx = Concentration of element in ug/g (mg/kg)	5

4.0 Adjusting the concentration to dry weight:

$$Cdry = \frac{Cx \times 100}{Px}$$

Where:	**Example:**
Cx = Concentration calculated as received (wet basis)	5
Px = Percent solids of sample (%wt)	80
$Cdry$ = Concentration calculated as dry weight (mg/kg)	6.25

Example 6010 Calculations
Thermo Scientific IRIS Advantage

1.0 Initial Calibration (ICAL) Parameters
The system performs linear regression from data consisting of a blank and three standards.

2.0 Calculating the concentration (C) of an element in water using data from prep log, run log, and quantitation report (note:the data system performs this calculation automatically when correction factors have been entered):

$$Cx = Cs \times \frac{Vf}{Vi} \times D$$

Where:	**Example:**
Cs = Concentration computed by the data system in ug/mL (ppm)	0.1
Vf = Final volume (mL)	50
Vi = Initial volume (mL)	50
D = Dilution factor as a multiplier (10X = 10)	1
Cx = Concentration of element in ug/mL (mg/L)	0.1

3.0 Calculating the concentration (C) of an element in soil using data from prep log, run log, and quantitation report (note: the data system performs this calculation automatically when correction factors have been entered):

$$Cx = Cs \times \frac{Vf}{Vi} \times D$$

Where:	**Example:**
Cs = Concentration computed by the data system (mg/L) (ppm)	0.1
Vf = Final volume (mL)	50
Vi = Initial weight (g)	1
D = Dilution factor as a multiplier (10X = 10)	1
Cx = Concentration of element in ug/g (mg/kg)	5

4.0 Adjusting the concentration to dry weight:

$$Cdry = \frac{Cx \times 100}{Px}$$

Where:	**Example:**
Cx = Concentration calculated as received (wet basis)	5
Px = Percent solids of sample (%wt)	80
$Cdry$ = Concentration calculated as dry weight (mg/kg)	6.25

KEMRON ENVIRONMENTAL SERVICES

Metals Digest Log

Analyst(s): RBW
Date: 10/26/07
LCS: 5ml STD 22494
MS/MSD: 5ml STD 22494
Witness: NO
HNO_3 Lot #: COO 12617
1:1HNO_3: NP
HCl Lot #: COO 12527
H_2O_2 Lot #: NP
Earliest Sample Due Date: 10/29
Digest Tube Lot #: COO 12605
Hotblock #: 2
Hotblock Temp - Start: 95.0 @ 0520
Hotblock Temp - End: 95.1 @ 0920

Box: 81
Digestion Work Group: WG 253900

General Digestion
ME401 Revision # 12 - Method 3005A-Water
ME403 Revision # _____ - Method 3050B-Soil

Furnace Digestion
ME402 Revision # _____ - Method 3020A-Water
ME403 Revision # _____ - Method 3050B-Soil

AS/SE Digestion
ME410 Revision # _____ - Method 7060/7740-Water

Relinquished By: [signature]
Digest Received By: Ed Date: 10-26-07

	KEMRON #	Initial WT/Vol	Final Volume	Comments	Due Date
1	MBW	50ml	50ml	-02	
2	LCSW			-03	
3	SPLP BLK 10/24			WG 253747 @ 1300	
4	10.657.01			1 Lab 14	10/29
5	10.602.01				11/2
6	10.621-02				11/2
7	-03				
8	-04				
9	-05				
10	-06				
11	10.648.01				10/31
12	-03				
13	10.728-02			Lab 14 DF 100	11/1
14	-03				
15	-04				
16	-06 RE			-01	
17	-07 MS			-04	
18	-08 MSD			-05	
19	-09				
20	-10				
21					
22					
23					
24					
25		10/26/07			
26					
27					
28					

Comments: _____

Primary Review: [signature] 10/26/07

Secondary Review: Vicki Collier 10/26/07

KEMRON ENVIRONMENTAL SERVICES

Metals Digest Log

Analyst(s): MM
Date: 10/26/07
LCS: 5ml STO 22494
MS/MSD: 5ml STO 22494
Witness: MD
HNO_3 Lot #: CON 12617
1:1HNO_3: N/A
HCl Lot #: CON 12634
H_2O_2 Lot #: N/A
Earliest Sample Due Date: 10/30/07
Digest Tube Lot #: CON 12609
Hotblock #: 6
Hotblock Temp - Start: 95.0°C 0530
Hotblock Temp - End: 99.4°C 0930

Box: 09
Digestion Work Group: WG 253902

General Digestion
ME401 Revision # 12 - Method 3005A-Water
ME403 Revision # _____ - Method 3050B-Soil

Furnace Digestion
ME402 Revision # _____ - Method 3020A-Water
ME403 Revision # _____ - Method 3050B-Soil

AS/SE Digestion
ME410 Revision # _____ - Method 7060/7740-Water

Relinquished By: MM
Digest Received By: SD Date: 10-26-07

	KEMRON #	Initial WT/Vol	Final Volume	Comments	Due Date
1	MBW	50ml	50ml	100 FILT -02	
2	LCSW			-03	
3	10-5996-12				10/30
4	10/26 -14				
5	10-6480-02				10/31
6	-04			-01	
7	-04MS			-04	
8	-04MD			-05	
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21		10/26/07			
22		MM			
23					
24					
25					
26					
27					
28					

Comments: _____

Primary Review: MM 10/26/07

Secondary Review: Vicki Collins 10/26/07

KEMRON Environmental Services

Instrument Run Log

Instrument: PE-ICP2 Dataset: 102907H4R.CSV
Analyst1: KRV Analyst2: N/A
Method: 6010B SOP: ME600E Rev: 6
Maintenance Log ID: 21476

Calibration Std: STD22439 ICV/CCV Std: STD22609 Post Spike: STD22493
ICSA: STD22610 ICSAB: STD22567

Workgroups: 253161,253956,254112,254130,254045

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
1	P2.102907.112615	WG254152-01	Calibration Point		1		10/29/07 11:26
2	P2.102907.113226	WG254152-02	Calibration Point		1		10/29/07 11:32
3	P2.102907.113841	WG254152-03	Calibration Point		1		10/29/07 11:38
4	P2.102907.114455	WG254152-04	Calibration Point		1		10/29/07 11:44
5	P2.102907.115108	WG254152-05	Calibration Point		1		10/29/07 11:51
6	P2.102907.115635	WG254152-06	Initial Calibration Verification		1		10/29/07 11:56
7	P2.102907.120251	WG254152-07	Initial Calib Blank		1		10/29/07 12:02
8	P2.102907.120906	WG254152-08	Interference Check		1		10/29/07 12:09
9	P2.102907.121426	WG254152-09	Interference Check		1		10/29/07 12:14
10	P2.102907.121945	WG254152-10	CCV		1		10/29/07 12:19
11	P2.102907.122601	WG254152-11	CCB		1		10/29/07 12:26
12	P2.102907.123215	Sample038	Sample038		1		10/29/07 12:32
13	P2.102907.123934	WG254152-12	CCV		1		10/29/07 12:39
14	P2.102907.124550	WG254152-13	CCB		1		10/29/07 12:45
15	P2.102907.140416	L0710356-01	GP-OFFSITE-INF		5		10/29/07 14:04
16	P2.102907.141107	L0710356-01	GP-OFFSITE-INF	50/50	10		10/29/07 14:11
17	P2.102907.141720	L0710561-01	CS070035	5/5	2		10/29/07 14:17
18	P2.102907.142343	WG253956-01	Post Digestion Spike		2	L0710561-01	10/29/07 14:23
19	P2.102907.143006	WG254152-14	CCV		1		10/29/07 14:30
20	P2.102907.143622	WG254152-15	CCB		1		10/29/07 14:36
21	P2.102907.144237	WG253902-02	Method/Prep Blank		1		10/29/07 14:42
22	P2.102907.145522	WG254152-16	CCV		1		10/29/07 14:55
23	P2.102907.150138	WG254152-17	CCB		1		10/29/07 15:01
24	P2.102907.150950	WG254152-18	CCV		1		10/29/07 15:09
25	P2.102907.151622	WG254152-19	CCB		1		10/29/07 15:16
26	P2.102907.152513	WG254152-20	CCV		1		10/29/07 15:25
27	P2.102907.153139	WG254152-21	CCB		1		10/29/07 15:31
28	P2.102907.153754	WG254083-02	Method/Prep Blank	50/50	1		10/29/07 15:37
29	P2.102907.154417	WG254083-03	Laboratory Control S	50/50	1		10/29/07 15:44
30	P2.102907.155040	WG253901-01	Fluid Blank		1		10/29/07 15:50
31	P2.102907.155659	WG254083-01	Reference Sample		1	L0710671-01	10/29/07 15:56
32	P2.102907.160325	WG254083-04	Matrix Spike	5/50	1	L0710671-01	10/29/07 16:03
33	P2.102907.160946	WG254083-05	Matrix Spike Duplica	5/50	1	L0710671-01	10/29/07 16:09
34	P2.102907.161607	L0710671-02	ABRASIVE-E623	5/50	1		10/29/07 16:16
35	P2.102907.162233	WG254112-01	Post Digestion Spike		1	L0710671-02	10/29/07 16:22
36	P2.102907.162852	WG254112-02	Serial Dilution		5	L0710671-02	10/29/07 16:28
37	P2.102907.163513	WG254152-22	CCV		1		10/29/07 16:35

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Approved: October 30, 2007

Maren Berry

KEMRON Environmental Services

Instrument Run Log

Instrument: PE-ICP2 Dataset: 102907H4R.CSV
Analyst1: KRV Analyst2: N/A
Method: 6010B SOP: ME600E Rev: 6
Maintenance Log ID: 21476

Calibration Std: STD22439 ICV/CCV Std: STD22609 Post Spike: STD22493
ICSA: STD22610 ICSAB: STD22567

Workgroups: 253161,253956,254112,254130,254045

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
38	P2.102907.164142	WG254152-23	CCB		1		10/29/07 16:41
39	P2.102907.164800	WG253790-02	Method/Prep Blank	50/50	1		10/29/07 16:48
40	P2.102907.165413	WG253790-03	Laboratory Control S	50/50	1		10/29/07 16:54
41	P2.102907.170038	WG253790-01	Reference Sample		1	L0710616-03	10/29/07 17:00
42	P2.102907.170707	WG253790-04	Matrix Spike	50/50	1	L0710616-03	10/29/07 17:07
43	P2.102907.171333	WG253790-05	Matrix Spike Duplica	50/50	1	L0710616-03	10/29/07 17:13
44	P2.102907.172001	L0710616-04	326RIVEROAKS221007	50/50	1		10/29/07 17:20
45	P2.102907.172630	L0710616-05	102CHURCHHILL221007	50/50	1		10/29/07 17:26
46	P2.102907.173343	L0710616-02	303WINDHAM221007	50/50	1		10/29/07 17:33
47	P2.102907.174002	WG254130-01	Post Digestion Spike		1	L0710616-02	10/29/07 17:40
48	P2.102907.174707	WG254130-02	Serial Dilution		5	L0710616-02	10/29/07 17:47
49	P2.102907.175343	WG254152-24	CCV		1		10/29/07 17:53
50	P2.102907.180002	WG254152-25	CCB		1		10/29/07 18:00
51	P2.102907.180620	L0710616-06	106LIPAN221007	50/50	1	WG253926-03	10/29/07 18:06
52	P2.102907.181246	L0710623-09	13609-W0271	50/50	1		10/29/07 18:12
53	P2.102907.181859	L0710624-12	13616-W0263	50/50	1		10/29/07 18:18
54	P2.102907.182519	L0710625-19	13620-W0264	50/50	1		10/29/07 18:25
55	P2.102907.183140	L0710627-05	13625-W0265	50/50	1		10/29/07 18:31
56	P2.102907.183753	L0710628-02	13627-W0266	50/50	1		10/29/07 18:37
57	P2.102907.184413	L0710628-22	13629-W0267	50/50	1		10/29/07 18:44
58	P2.102907.185033	L0710629-20	13636-W0268	50/50	1		10/29/07 18:50
59	P2.102907.185646	L0710632-20	13639-W0269	50/50	1		10/29/07 18:56
60	P2.102907.190302	L0710633-14	13644-W0270	50/50	1		10/29/07 19:03
61	P2.102907.190922	WG254152-26	CCV		1		10/29/07 19:09
62	P2.102907.191542	WG254152-27	CCB		1		10/29/07 19:15
63	P2.102907.192158	L0710634-17	15329-W0276	50/50	1		10/29/07 19:21
64	P2.102907.192815	L0710635-23	15331-W0277	50/50	1		10/29/07 19:28
65	P2.102907.193428	L0710636-21	15341-W0278	50/50	1		10/29/07 19:34
66	P2.102907.194046	L0710637-05	15342-W0279	50/50	1		10/29/07 19:40
67	P2.102907.194706	L0710646-09	16069-W0287	50/50	1		10/29/07 19:47
68	P2.102907.195320	L0710646-22	16070-W0288	50/50	1		10/29/07 19:53
69	P2.102907.195937	WG253900-02	Method/Prep Blank	50/50	1		10/29/07 19:59
70	P2.102907.200558	WG253900-03	Laboratory Control S	50/50	1		10/29/07 20:05
71	P2.102907.201223	WG253747-01	Fluid Blank		1		10/29/07 20:12
72	P2.102907.201842	WG253900-01	Reference Sample		1	L0710728-06	10/29/07 20:18
73	P2.102907.202505	WG254152-28	CCV		1		10/29/07 20:25
74	P2.102907.203123	WG254152-29	CCB		1		10/29/07 20:31

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Approved: October 30, 2007

Maren Berry

KEMRON Environmental Services

Instrument Run Log

Instrument: PE-ICP2 Dataset: 102907H4R.CSV
Analyst1: KRV Analyst2: N/A
Method: 6010B SOP: ME600E Rev: 6
Maintenance Log ID: 21476

Calibration Std: STD22439 ICV/CCV Std: STD22609 Post Spike: STD22493
ICSA: STD22610 ICSAB: STD22567

Workgroups: 253161,253956,254112,254130,254045

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
75	P2.102907.203744	WG253900-04	Matrix Spike	50/50	1	L0710728-06	10/29/07 20:37
76	P2.102907.204418	WG253900-05	Matrix Spike Duplica	50/50	1	L0710728-06	10/29/07 20:44
77	P2.102907.205047	L0710602-01	ST14-MW04-102	50/50	1		10/29/07 20:50
78	P2.102907.205604	L0710657-01	AV-NCB-AS-UNK-91-1022	50/50	1	WG253850-01	10/29/07 20:56
79	P2.102907.210225	WG254045-01	Post Digestion Spike		1	L0710657-01	10/29/07 21:02
80	P2.102907.210849	WG254045-02	Serial Dilution		5	L0710657-01	10/29/07 21:08
81	P2.102907.211510	L0710621-02	MW21102307	50/50	1		10/29/07 21:15
82	P2.102907.212128	L0710621-03	MW37102307	50/50	1		10/29/07 21:21
83	P2.102907.212752	L0710621-04	MW45102307	50/50	1		10/29/07 21:27
84	P2.102907.213320	L0710621-05	MW44102307	50/50	1		10/29/07 21:33
85	P2.102907.213939	WG254152-30	CCV		1		10/29/07 21:39
86	P2.102907.214558	WG254152-31	CCB		1		10/29/07 21:45
87	P2.102907.215218	L0710621-06	EB102307	50/50	1		10/29/07 21:52
88	P2.102907.215837	L0710648-01	49WW01-102307	50/50	1	WG253806-01	10/29/07 21:58
89	P2.102907.220504	L0710648-03	49WW03-102307	50/50	1	WG254080-04	10/29/07 22:05
90	P2.102907.221130	L0710728-02	MW439241007	50/50	1		10/29/07 22:11
91	P2.102907.221749	L0710728-03	MW434241007	50/50	1		10/29/07 22:17
92	P2.102907.222413	L0710728-04	MW427241007	50/50	1		10/29/07 22:24
93	P2.102907.223043	L0710728-09	SS007MW012241007	50/50	1		10/29/07 22:30
94	P2.102907.223705	L0710728-10	SS007MW004241007	50/50	1		10/29/07 22:37
95	P2.102907.224333	WG254152-32	CCV		1		10/29/07 22:43
96	P2.102907.224952	WG254152-33	CCB		1		10/29/07 22:49

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Approved: October 30, 2007

Maren Berry

KEMRON Environmental Services

Instrument Run Log

Instrument: PE-ICP2 Dataset: 103007H2R.CSV
Analyst1: KRV Analyst2: N/A
Method: 6010B SOP: ME600E Rev: 6
Maintenance Log ID: 21499

Calibration Std: STD22439 ICV/CCV Std: STD22609 Post Spike: STD22493
ICSA: STD22610 ICSAB: STD22567

Workgroups: 254045,254130

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
1	P2.103007.080913	WG254229-01	Calibration Point		1		10/30/07 08:09
2	P2.103007.081523	WG254229-02	Calibration Point		1		10/30/07 08:15
3	P2.103007.082141	WG254229-03	Calibration Point		1		10/30/07 08:21
4	P2.103007.082800	WG254229-04	Calibration Point		1		10/30/07 08:28
5	P2.103007.083418	WG254229-05	Calibration Point		1		10/30/07 08:34
6	P2.103007.083945	WG254229-06	Initial Calibration Verification		1		10/30/07 08:39
7	P2.103007.084602	WG254229-07	Initial Calib Blank		1		10/30/07 08:46
8	P2.103007.085221	WG254229-08	Interference Check		1		10/30/07 08:52
9	P2.103007.085804	WG254229-09	Interference Check		1		10/30/07 08:58
10	P2.103007.090332	WG254229-10	CCV		1		10/30/07 09:03
11	P2.103007.090951	WG254229-11	CCB		1		10/30/07 09:09
12	P2.103007.095521	WG253900-01	Reference Sample		10	L0710728-06	10/30/07 09:55
13	P2.103007.100135	WG253900-04	Matrix Spike	50/50	10	L0710728-06	10/30/07 10:01
14	P2.103007.100754	WG253900-05	Matrix Spike Duplica	50/50	10	L0710728-06	10/30/07 10:07
15	P2.103007.101431	WG253790-01	Reference Sample		10	L0710616-03	10/30/07 10:14
16	P2.103007.102051	WG253790-04	Matrix Spike	50/50	10	L0710616-03	10/30/07 10:20
17	P2.103007.102751	WG253790-05	Matrix Spike Duplica	50/50	10	L0710616-03	10/30/07 10:27
18	P2.103007.103427	L0710616-02	303WINDHAM221007	50/50	10		10/30/07 10:34
19	P2.103007.104208	WG254130-01	Post Digestion Spike		10	L0710616-02	10/30/07 10:42
20	P2.103007.104848	L0710616-05	102CHURCHHILL221007	50/50	10		10/30/07 10:48
21	P2.103007.105520	WG254229-12	CCV		1		10/30/07 10:55
22	P2.103007.110145	WG254229-13	CCB		1		10/30/07 11:01

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Approved: October 31, 2007

Maren Berry

KEMRON Environmental Services

Instrument Run Log

Instrument: PE-ICP2 Dataset: 103107HR.CSV
Analyst1: KHR Analyst2: N/A
Method: 6010B SOP: ME600E Rev: 6
Maintenance Log ID: 21515

Calibration Std: STD22439 ICV/CCV Std: STD22609 Post Spike: STD22493
ICSA: STD22610 ICSAB: STD22567

Workgroups: 254205, 254206, 254046, 254208, 254193

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
1	P2.103107.090411	WG254405-01	Calibration Point		1		10/31/07 09:04
2	P2.103107.091028	WG254405-02	Calibration Point		1		10/31/07 09:10
3	P2.103107.091655	WG254405-03	Calibration Point		1		10/31/07 09:16
4	P2.103107.092320	WG254405-04	Calibration Point		1		10/31/07 09:23
5	P2.103107.092948	WG254405-05	Calibration Point		1		10/31/07 09:29
6	P2.103107.093521	WG254405-06	Initial Calibration Verification		1		10/31/07 09:35
7	P2.103107.094150	WG254405-07	Initial Calib Blank		1		10/31/07 09:41
8	P2.103107.094822	WG254405-08	Interference Check		1		10/31/07 09:48
9	P2.103107.095342	WG254405-09	Interference Check		1		10/31/07 09:53
10	P2.103107.101817	WG254405-10	CCV		1		10/31/07 10:18
11	P2.103107.102434	WG254405-11	CCB		1		10/31/07 10:24
12	P2.103107.103051	L0710200-04	BGA006	50/50	1		10/31/07 10:30
13	P2.103107.103715	L0710675-02	SS007MW010231007	50/50	1		10/31/07 10:37
14	P2.103107.104337	L0710675-03	SS007MW010231007DUP	50/50	1		10/31/07 10:43
15	P2.103107.105006	L0710675-04	MW4-35231007	50/50	1		10/31/07 10:50
16	P2.103107.105633	L0710675-05	SS007MW006231007	50/50	1		10/31/07 10:56
17	P2.103107.110255	L0710675-06	EB23100701	50/50	1		10/31/07 11:02
18	P2.103107.110913	L0710675-07	313WINDHAM231007	50/50	1		10/31/07 11:09
19	P2.103107.111542	WG254405-12	CCV		1		10/31/07 11:15
20	P2.103107.112201	WG254405-13	CCB		1		10/31/07 11:22
21	P2.103107.112817	L0710675-09	SS007MW009231007	50/50	1		10/31/07 11:28
22	P2.103107.113542	L0710675-10	SS007MW008231007	50/50	1		10/31/07 11:35
23	P2.103107.114159	L0710675-11	MW4-36231007	50/50	1		10/31/07 11:41
24	P2.103107.114819	L0710675-12	MW4-36231007DUP	50/50	1		10/31/07 11:48
25	P2.103107.115443	L0710675-13	EB23100702	50/50	1		10/31/07 11:54
26	P2.103107.120058	WG253477-02	Method/Prep Blank	50/50	1		10/31/07 12:00
27	P2.103107.120718	WG254405-14	CCV		1		10/31/07 12:07
28	P2.103107.121339	WG254405-15	CCB		1		10/31/07 12:13
29	P2.103107.121954	WG253477-03	Laboratory Control Sample	50/50	1		10/31/07 12:19
30	P2.103107.122612	WG253477-01	Reference Sample		1	L0710444-01	10/31/07 12:26
31	P2.103107.123231	WG253477-04	Matrix Spike	50/50	1		10/31/07 12:32
32	P2.103107.123854	WG253477-05	Matrix Spike Duplicate	50/50	1		10/31/07 12:38
33	P2.103107.124519	L0710444-02	MW-3	50/50	1		10/31/07 12:45
34	P2.103107.125143	L0710444-03	MW-7	50/50	1		10/31/07 12:51
35	P2.103107.125814	L0710496-04	MW-8A	50/50	1		10/31/07 12:58
36	P2.103107.130430	WG254206-01	Post Digestion Spike		1		10/31/07 13:04
37	P2.103107.131059	WG254206-02	Serial Dilution		5		10/31/07 13:10

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Approved: November 01, 2007

Maren Berry

KEMRON Environmental Services

Instrument Run Log

Instrument: PE-ICP2 Dataset: 103107HR.CSV
Analyst1: KHR Analyst2: N/A
Method: 6010B SOP: ME600E Rev: 6
Maintenance Log ID: 21515

Calibration Std: STD22439 ICV/CCV Std: STD22609 Post Spike: STD22493
ICSA: STD22610 ICSAB: STD22567

Workgroups: 254205, 254206, 254046, 254208, 254193

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
38	P2.103107.131725	WG254405-16	CCV		1		10/31/07 13:17
39	P2.103107.132343	WG254405-17	CCB		1		10/31/07 13:23
40	P2.103107.133004	L0710444-04	MW-1S	50/50	1		10/31/07 13:30
41	P2.103107.133628	L0710444-05	MW-2S	50/50	1		10/31/07 13:36
42	P2.103107.134246	L0710444-06	MW-3S	50/50	1		10/31/07 13:42
43	P2.103107.134904	L0710444-07	MW-7S	50/50	1		10/31/07 13:49
44	P2.103107.135527	L0710496-01	MW-2A	50/50	1		10/31/07 13:55
45	P2.103107.140044	L0710496-02	MW-2B	50/50	1		10/31/07 14:00
46	P2.103107.140705	L0710496-03	MW-2C	50/50	1		10/31/07 14:07
47	P2.103107.141325	L0710496-05	MW-8B	50/50	1		10/31/07 14:13
48	P2.103107.141947	L0710496-06	MW-7A	50/50	1		10/31/07 14:19
49	P2.103107.142504	WG254405-18	CCV		1		10/31/07 14:25
50	P2.103107.143125	WG254405-19	CCB		1		10/31/07 14:31
51	P2.103107.143743	L0710496-07	MW-7B	50/50	1		10/31/07 14:37
52	P2.103107.144405	L0710513-01	MW-1	50/50	1		10/31/07 14:44
53	P2.103107.145029	L0710513-02	MW-4	50/50	1		10/31/07 14:50
54	P2.103107.145646	L0710513-03	MW-6	50/50	1		10/31/07 14:56
55	P2.103107.150311	L0710513-04	MW-4S	50/50	1		10/31/07 15:03
56	P2.103107.150935	L0710513-05	MW-6S	50/50	1		10/31/07 15:09
57	P2.103107.151549	WG254405-20	CCV		1		10/31/07 15:15
58	P2.103107.152215	WG254405-21	CCB		1		10/31/07 15:22
59	P2.103107.152637	L0710675-04	MW4-35231007	50/50	10		10/31/07 15:26
60	P2.103107.153254	L0710675-12	MW4-36231007DUP	50/50	10		10/31/07 15:32
61	P2.103107.153916	WG253477-01	Reference Sample		5	L0710444-01	10/31/07 15:39
62	P2.103107.154540	WG253477-04	Matrix Spike	50/50	5		10/31/07 15:45
63	P2.103107.155157	WG253477-05	Matrix Spike Duplicate	50/50	5		10/31/07 15:51
64	P2.103107.155822	L0710444-02	MW-3	50/50	5		10/31/07 15:58
65	P2.103107.160447	L0710444-03	MW-7	50/50	5		10/31/07 16:04
66	P2.103107.161139	L0710444-04	MW-1S	50/50	5		10/31/07 16:11
67	P2.103107.161757	WG254405-22	CCV		1		10/31/07 16:17
68	P2.103107.162420	WG254405-23	CCB		1		10/31/07 16:24
69	P2.103107.163045	L0710444-05	MW-2S	50/50	5		10/31/07 16:30
70	P2.103107.163703	L0710444-06	MW-3S		5		10/31/07 16:37
71	P2.103107.164327	L0710444-07	MW-7S	50/50	5		10/31/07 16:43
72	P2.103107.164952	L0710513-01	MW-1	50/50	5		10/31/07 16:49
73	P2.103107.165610	L0710513-02	MW-4	50/50	5		10/31/07 16:56
74	P2.103107.170235	L0710513-03	MW-6	50/50	5		10/31/07 17:02

Approved: November 01, 2007

Maren Berry

KEMRON Environmental Services

Instrument Run Log

Instrument: PE-ICP2 Dataset: 103107HR.CSV
Analyst1: KHR Analyst2: N/A
Method: 6010B SOP: ME600E Rev: 6
Maintenance Log ID: 21515

Calibration Std: STD22439 ICV/CCV Std: STD22609 Post Spike: STD22493
ICSA: STD22610 ICSAB: STD22567

Workgroups: 254205, 254206, 254046, 254208, 254193

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
75	P2.103107.170900	L0710513-04	MW-4S	50/50	5		10/31/07 17:09
76	P2.103107.171518	L0710513-05	MW-6S	50/50	5		10/31/07 17:15
77	P2.103107.172139	WG254405-24	CCV		1		10/31/07 17:21
78	P2.103107.172757	WG254405-25	CCB		1		10/31/07 17:27
79	P2.103107.173830	WG253902-02	Method/Prep Blank	50/50	1		10/31/07 17:38
80	P2.103107.174444	WG253902-03	Laboratory Control Sample	50/50	1		10/31/07 17:44
81	P2.103107.175112	L0710648-02	49WW01-102307	50/50	1		10/31/07 17:51
82	P2.103107.175734	WG253902-01	Reference Sample		1	L0710648-04	10/31/07 17:57
83	P2.103107.180358	WG253902-04	Matrix Spike	50/50	1		10/31/07 18:03
84	P2.103107.181024	WG253902-05	Matrix Spike Duplicate	50/50	1		10/31/07 18:10
85	P2.103107.181650	L0710596-12	47WWZZ-101807	50/50	1		10/31/07 18:16
86	P2.103107.182219	L0710596-14	EQUIPMENT RINSE	50/50	1		10/31/07 18:22
87	P2.103107.182844	WG254046-01	Post Digestion Spike		1		10/31/07 18:28
88	P2.103107.183508	WG254046-02	Serial Dilution		5		10/31/07 18:35
89	P2.103107.184129	WG254405-26	CCV		1		10/31/07 18:41
90	P2.103107.184746	WG254405-27	CCB		1		10/31/07 18:47
91	P2.103107.185402	WG253791-02	Method/Prep Blank	50/50	1		10/31/07 18:54
92	P2.103107.190021	WG253791-03	Laboratory Control Sample	50/50	1		10/31/07 19:00
93	P2.103107.190643	L0710602-02	ST14-MW05-102	50/50	1		10/31/07 19:06
94	P2.103107.191304	WG253791-01	Reference Sample		1	L0710602-03	10/31/07 19:13
95	P2.103107.191919	WG253791-04	Matrix Spike	50/50	1		10/31/07 19:19
96	P2.103107.192543	WG253791-05	Matrix Spike Duplicate	50/50	1		10/31/07 19:25
97	P2.103107.193215	L0710657-02	AV-NCB-EB-1-102307	50/50	1		10/31/07 19:32
98	P2.103107.193829	L0710613-40	5248-W0001	50/50	1		10/31/07 19:38
99	P2.103107.194449	WG254208-01	Post Digestion Spike		1		10/31/07 19:44
100	P2.103107.195114	WG254208-02	Serial Dilution		5		10/31/07 19:51
101	P2.103107.195734	WG254405-28	CCV		1		10/31/07 19:57
102	P2.103107.200355	WG254405-29	CCB		1		10/31/07 20:03
103	P2.103107.201014	L0710575-01	WAR 01	50/50	5		10/31/07 20:10
104	P2.103107.201538	L0710575-03	WAR 02	50/50	5		10/31/07 20:15
105	P2.103107.202100	L0710575-05	WAR 03	50/50	5		10/31/07 20:21
106	P2.103107.202722	L0710613-41	5248-W0002	50/50	1		10/31/07 20:27
107	P2.103107.203337	L0710613-42	5248-W0004	50/50	1		10/31/07 20:33
108	P2.103107.203957	L0710602-04	ST14-MW23-102	50/50	1		10/31/07 20:39
109	P2.103107.204624	L0710602-05	ST14-MW19-103	50/50	1		10/31/07 20:46
110	P2.103107.205240	L0710602-06	ST14-MW12-102	50/50	1		10/31/07 20:52
111	P2.103107.205904	L0710599-22	5248-W0005	50/50	1		10/31/07 20:59

Approved: November 01, 2007

Maren Berry

KEMRON Environmental Services

Instrument Run Log

Instrument: PE-ICP2 Dataset: 103107HR.CSV
Analyst1: KHR Analyst2: N/A
Method: 6010B SOP: ME600E Rev: 6
Maintenance Log ID: 21515

Calibration Std: STD22439 ICV/CCV Std: STD22609 Post Spike: STD22493
ICSA: STD22610 ICSAB: STD22567

Workgroups: 254205, 254206, 254046, 254208, 254193

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
112	P2.103107.210525	WG254405-30	CCV		1		10/31/07 21:05
113	P2.103107.211143	WG254405-31	CCB		1		10/31/07 21:11
114	P2.103107.211759	L0710599-23	5248-W0009	50/50	1		10/31/07 21:17
115	P2.103107.212420	L0710611-02	WG-ST24-MW-19-040	50/50	1		10/31/07 21:24
116	P2.103107.212939	L0710611-04	WG-ST24-MW-20-040	50/50	1		10/31/07 21:29
117	P2.103107.213603	L0710611-06	WG-ST24-MW-4-040	50/50	1		10/31/07 21:36
118	P2.103107.214228	L0710611-08	WG-ST24-MW-16-040	50/50	1		10/31/07 21:42
119	P2.103107.214843	WG253903-02	Method/Prep Blank	50/50	1		10/31/07 21:48
120	P2.103107.215506	WG254405-32	CCV		1		10/31/07 21:55
121	P2.103107.220125	WG254405-33	CCB		1		10/31/07 22:01
122	P2.103107.220740	WG253903-03	Laboratory Control Sample	50/50	1		10/31/07 22:07
123	P2.103107.221404	WG253903-01	Reference Sample		1	L0710661-01	10/31/07 22:14
124	P2.103107.222030	WG253903-04	Matrix Spike	50/50	1		10/31/07 22:20
125	P2.103107.222656	WG253903-05	Matrix Spike Duplicate	50/50	1		10/31/07 22:26
126	P2.103107.223321	L0710661-02	SW07-BRR-2	50/50	1		10/31/07 22:33
127	P2.103107.223945	L0710655-01	SW07	50/50	1		10/31/07 22:39
128	P2.103107.224612	L0710677-04	OUTFALL 003/COMP	50/50	1		10/31/07 22:46
129	P2.103107.225231	L0710679-01	OUTFALL 002/COMP	50/50	1		10/31/07 22:52
130	P2.103107.225850	WG254193-01	Post Digestion Spike		1		10/31/07 22:58
131	P2.103107.230510	WG254193-02	Serial Dilution		5		10/31/07 23:05
132	P2.103107.231129	WG254405-34	CCV		1		10/31/07 23:11
133	P2.103107.231742	WG254405-35	CCB		1		10/31/07 23:17
134	P2.103107.232355	L0710667-01	72 FLUME	5/50	1		10/31/07 23:23
135	P2.103107.233013	L0710667-02	AFC EFFLUENT	5/50	1		10/31/07 23:30
136	P2.103107.233722	L0710667-03	AFC BLEED	5/50	1		10/31/07 23:37
137	P2.103107.234347	L0710677-06	OUTFALL 800/COMP	50/50	1		10/31/07 23:43
138	P2.103107.235006	L0710680-01	DRL-Z-OUTLET 006	50/50	1		10/31/07 23:50
139	P2.103107.235623	L0710681-01	DRL-Z-SS-1	50/50	1		10/31/07 23:56
140	P2.110107.000143	L0710681-02	DRL-Z-SS-2	50/50	1		11/01/07 00:01
141	P2.110107.000702	L0710684-01	SITE 1	50/50	1		11/01/07 00:07
142	P2.110107.001318	L0710684-02	SITE 2	50/50	1		11/01/07 00:13
143	P2.110107.001933	WG254405-36	CCV		1		11/01/07 00:19
144	P2.110107.002547	WG254405-37	CCB		1		11/01/07 00:25
145	P2.110107.003200	L0710691-02	OUTFALL 001/COMP	50/50	1		11/01/07 00:32
146	P2.110107.003816	L0710691-04	OUTFALL 002/COMP	50/50	1		11/01/07 00:38
147	P2.110107.004432	L0710696-01	001	50/50	1		11/01/07 00:44
148	P2.110107.005052	L0710716-01	VEMH-4012	50/50	1		11/01/07 00:50

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Approved: November 01, 2007

Maren Berry

KEMRON Environmental Services

Instrument Run Log

Instrument: PE-ICP2 Dataset: 103107HR.CSV
Analyst1: KHR Analyst2: N/A
Method: 6010B SOP: ME600E Rev: 6
Maintenance Log ID: 21515

Calibration Std: STD22439 ICV/CCV Std: STD22609 Post Spike: STD22493
ICSA: STD22610 ICSAB: STD22567

Workgroups: 254205, 254206, 254046, 254208, 254193

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
149	P2.110107.005612	L0710735-01	OHIO RIVER/Z07134	50/50	1		11/01/07 00:56
150	P2.110107.010232	L0710735-02	RANNEY WELL/Z07135	50/50	1		11/01/07 01:02
151	P2.110107.010849	WG254405-38	CCV		1		11/01/07 01:08
152	P2.110107.011502	WG254405-39	CCB		1		11/01/07 01:15

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Approved: November 01, 2007

Maren Berry

KEMRON Environmental Services

Instrument Run Log

Instrument: PE-ICP2 Dataset: 110107HR2.CSV
Analyst1: KRV Analyst2: N/A
Method: 6010B SOP: ME600E Rev: 6
Maintenance Log ID: 21525

Calibration Std: STD22439 ICV/CCV Std: STD22609 Post Spike: STD22493
ICSA: STD22610 ICSAB: STD22567

Workgroups: 254046,254045,253535,253858,254208,254444,254206,254445,2538

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
1	P2.110107.081107	WG254439-01	Calibration Point		1		11/01/07 08:11
2	P2.110107.081719	WG254439-02	Calibration Point		1		11/01/07 08:17
3	P2.110107.082332	WG254439-03	Calibration Point		1		11/01/07 08:23
4	P2.110107.082943	WG254439-04	Calibration Point		1		11/01/07 08:29
5	P2.110107.083602	WG254439-05	Calibration Point		1		11/01/07 08:36
6	P2.110107.084128	WG254439-06	Initial Calibration Verification		1		11/01/07 08:41
7	P2.110107.084744	WG254439-07	Initial Calib Blank		1		11/01/07 08:47
8	P2.110107.085358	WG254439-08	Interference Check		1		11/01/07 08:53
9	P2.110107.085917	WG254439-09	Interference Check		1		11/01/07 08:59
10	P2.110107.090441	WG254439-10	CCV		1		11/01/07 09:04
11	P2.110107.091105	WG254439-11	CCB		1		11/01/07 09:11
12	P2.110107.100455	L0710596-12	47WWZZ-101807	50/50	10		11/01/07 10:04
13	P2.110107.101111	L0710648-02	49WW01-102307	50/50	10		11/01/07 10:11
14	P2.110107.101730	WG253902-01	Reference Sample		10	L0710648-04	11/01/07 10:17
15	P2.110107.102354	WG253902-04	Matrix Spike	50/50	10	L0710648-04	11/01/07 10:23
16	P2.110107.103011	WG253902-05	Matrix Spike Duplica	50/50	10	L0710648-04	11/01/07 10:30
17	P2.110107.103640	WG254439-12	CCV		1		11/01/07 10:36
18	P2.110107.104257	WG254439-13	CCB		1		11/01/07 10:42
19	P2.110107.110448	WG253900-02	Method/Prep Blank	50/50	1		11/01/07 11:04
20	P2.110107.111059	WG253900-03	Laboratory Control S	50/50	1		11/01/07 11:10
21	P2.110107.111722	WG253900-01	Reference Sample		1	L0710728-06	11/01/07 11:17
22	P2.110107.112341	WG253900-04	Matrix Spike	50/50	1	L0710728-06	11/01/07 11:23
23	P2.110107.113006	WG253900-05	Matrix Spike Duplica	50/50	1	L0710728-06	11/01/07 11:30
24	P2.110107.113636	L0710728-02	MW439241007	50/50	20		11/01/07 11:36
25	P2.110107.114304	L0710648-03	49WW03-102307	50/50	1		11/01/07 11:43
26	P2.110107.114933	L0710648-01	49WW01-102307	50/50	1		11/01/07 11:49
27	P2.110107.115602	WG254045-03	Post Digestion Spike		1	L0710648-01	11/01/07 11:56
28	P2.110107.120237	WG254045-04	Serial Dilution		5	L0710648-01	11/01/07 12:02
29	P2.110107.120859	WG254439-14	CCV		1		11/01/07 12:08
30	P2.110107.121515	WG254439-15	CCB		1		11/01/07 12:15
31	P2.110107.122130	L0710648-01	49WW01-102307	50/50	20		11/01/07 12:21
32	P2.110107.122751	WG254045-03	Post Digestion Spike		20	L0710648-01	11/01/07 12:27
33	P2.110107.123408	L0710648-03	49WW03-102307	50/50	20		11/01/07 12:34
34	P2.110107.124035	L0710539-01	MIN-01	50/50	10		11/01/07 12:40
35	P2.110107.124700	L0710539-03	MIN-02	50/50	10		11/01/07 12:47
36	P2.110107.125325	L0710540-01	SWL-01	50/50	10		11/01/07 12:53
37	P2.110107.125937	L0710540-03	SWL-01D	50/50	10		11/01/07 12:59

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Approved: November 02, 2007

Maren Berry

KEMRON Environmental Services

Instrument Run Log

Instrument: PE-ICP2 Dataset: 110107HR2.CSV
Analyst1: KRV Analyst2: N/A
Method: 6010B SOP: ME600E Rev: 6
Maintenance Log ID: 21525

Calibration Std: STD22439 ICV/CCV Std: STD22609 Post Spike: STD22493
ICSA: STD22610 ICSAB: STD22567

Workgroups: 254046,254045,253535,253858,254208,254444,254206,254445,2538

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
38	P2.110107.130554	L0710541-01	MTE-01	50/50	10		11/01/07 13:05
39	P2.110107.131211	L0710542-01	STA-01	50/50	10		11/01/07 13:12
40	P2.110107.131824	L0710543-03	SUC-02	50/50	10		11/01/07 13:18
41	P2.110107.132444	WG254439-16	CCV		1		11/01/07 13:24
42	P2.110107.133101	WG254439-17	CCB		1		11/01/07 13:31
43	P2.110107.133715	L0710571-01	LCR-01	50/50	10		11/01/07 13:37
44	P2.110107.134333	L0710543-01	SUC-01	50/50	1		11/01/07 13:43
45	P2.110107.134950	L0710543-01	SUC-01	50/50	10		11/01/07 13:49
46	P2.110107.135612	L0710572-03	TWP-02	50/50	10		11/01/07 13:56
47	P2.110107.140231	L0710539-02	MIN-01	50/50	10		11/01/07 14:02
48	P2.110107.140854	L0710539-04	MIN-02	50/50	10		11/01/07 14:08
49	P2.110107.141510	L0710540-02	SWL-01	50/50	10		11/01/07 14:15
50	P2.110107.142443	L0710540-04	SWL-01D	50/50	10		11/01/07 14:24
51	P2.110107.143059	L0710541-02	MTE-01	50/50	10		11/01/07 14:30
52	P2.110107.143723	L0710542-02	STA-01	50/50	10		11/01/07 14:37
53	P2.110107.144348	WG254439-18	CCV		1		11/01/07 14:43
54	P2.110107.145014	WG254439-19	CCB		1		11/01/07 14:50
55	P2.110107.145641	L0710543-02	SUC-01	50/50	5		11/01/07 14:56
56	P2.110107.150316	L0710543-04	SUC-02	50/50	10		11/01/07 15:03
57	P2.110107.150932	L0710571-02	LCR-01	50/50	5		11/01/07 15:09
58	P2.110107.151615	WG253555-01	Reference Sample		5	L0710572-02	11/01/07 15:16
59	P2.110107.152255	WG253555-04	Matrix Spike	50/50	5	L0710572-02	11/01/07 15:22
60	P2.110107.152918	WG253555-05	Matrix Spike Duplica	50/50	5	L0710572-02	11/01/07 15:29
61	P2.110107.153546	L0710573-02	ELK-01	50/50	10		11/01/07 15:35
62	P2.110107.154211	L0710574-02	LAS-01	50/50	10		11/01/07 15:42
63	P2.110107.154828	L0710574-04	LAS-02	50/50	10		11/01/07 15:48
64	P2.110107.155449	L0710575-02	WAR 01	50/50	10		11/01/07 15:54
65	P2.110107.160113	WG254439-20	CCV		1		11/01/07 16:01
66	P2.110107.160731	WG254439-21	CCB		1		11/01/07 16:07
67	P2.110107.161357	L0710575-04	WAR 02	50/50	10		11/01/07 16:13
137	P2.110107.162021	L0710441-02	C-004-LAB FILTER	50/50	1		11/01/07 16:20
68	P2.110107.162638	WG253858-02	Serial Dilution		5	L0710441-02	11/01/07 16:26
69	P2.110107.163301	L0710575-06	WAR 03	50/50	10		11/01/07 16:33
70	P2.110107.163943	L0710576-02	ALS-01	50/50	10		11/01/07 16:39
71	P2.110107.164606	L0710572-04	TWP-02	50/50	5		11/01/07 16:46
72	P2.110107.165231	L0710575-01	WAR 01	50/50	20		11/01/07 16:52
73	P2.110107.165844	L0710575-05	WAR 03	50/50	20		11/01/07 16:58

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Approved: November 02, 2007

Maren Berry

KEMRON Environmental Services

Instrument Run Log

Instrument: PE-ICP2 Dataset: 110107HR2.CSV
Analyst1: KRV Analyst2: N/A
Method: 6010B SOP: ME600E Rev: 6
Maintenance Log ID: 21525

Calibration Std: STD22439 ICV/CCV Std: STD22609 Post Spike: STD22493
ICSA: STD22610 ICSAB: STD22567

Workgroups: 254046,254045,253535,253858,254208,254444,254206,254445,2538

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
74	P2.110107.170508	WG254439-22	CCV		1		11/01/07 17:05
75	P2.110107.171126	WG254439-23	CCB		1		11/01/07 17:11
76	P2.110107.171742	WG254378-02	Method/Prep Blank	50/50	1		11/01/07 17:17
77	P2.110107.172401	WG254378-03	Laboratory Control S	50/50	1		11/01/07 17:24
78	P2.110107.173027	WG254378-01	Reference Sample		1		11/01/07 17:30
79	P2.110107.173647	WG254378-04	Matrix Spike	50/50	1	L0710911-01	11/01/07 17:36
80	P2.110107.174309	WG254378-05	Matrix Spike Duplica	50/50	1	L0710911-01	11/01/07 17:43
81	P2.110107.174931	L0710900-04	OUTFALL 003/COMP	50/50	1	WG254337-04	11/01/07 17:49
82	P2.110107.175554	L0710900-06	OUTFALL 800/COMP	50/50	1		11/01/07 17:55
83	P2.110107.180212	L0710899-01	OUTFALL 002/COMP	50/50	1	WG254408-02	11/01/07 18:02
84	P2.110107.180840	WG254444-01	Post Digestion Spike		1	L0710899-01	11/01/07 18:08
85	P2.110107.181506	WG254444-02	Serial Dilution		5	L0710899-01	11/01/07 18:15
86	P2.110107.182129	WG254439-24	CCV		1		11/01/07 18:21
87	P2.110107.182753	WG254439-25	CCB		1		11/01/07 18:27
88	P2.110107.183418	L0710912-01	72 FLUME	5/50	1		11/01/07 18:34
89	P2.110107.184031	L0710912-02	AFC EFFLUENT	5/50	1		11/01/07 18:40
90	P2.110107.184656	L0710912-03	AFC BLEED	5/50	1		11/01/07 18:46
91	P2.110107.185322	L0710444-03	MW-7	50/50	10		11/01/07 18:53
92	P2.110107.185941	L0710444-06	MW-3S	50/50	10		11/01/07 18:59
93	P2.110107.190606	L0710444-07	MW-7S	50/50	10		11/01/07 19:06
94	P2.110107.191232	L0710513-03	MW-6	50/50	10		11/01/07 19:12
95	P2.110107.191851	L0710513-04	MW-4S	50/50	10		11/01/07 19:18
96	P2.110107.192513	L0710513-05	MW-6S	50/50	10		11/01/07 19:25
97	P2.110107.193139	WG254439-26	CCV		1		11/01/07 19:31
98	P2.110107.193759	WG254439-27	CCB		1		11/01/07 19:37
99	P2.110107.194414	WG254136-02	Method/Prep Blank	50/50	1		11/01/07 19:44
100	P2.110107.195125	WG254136-03	Laboratory Control S	50/50	1		11/01/07 19:51
101	P2.110107.195750	WG254136-01	Reference Sample		1	L0710155-01	11/01/07 19:57
102	P2.110107.200405	WG254136-04	Matrix Spike	50/50	1	L0710155-01	11/01/07 20:04
103	P2.110107.201036	WG254136-05	Matrix Spike Duplica	50/50	1	L0710155-01	11/01/07 20:10
104	P2.110107.201701	L0710743-19	15839-W0282	50/50	1		11/01/07 20:17
105	P2.110107.202315	L0710744-02	15843-W0283	50/50	1		11/01/07 20:23
106	P2.110107.202936	L0710155-02	BGA010	50/50	1		11/01/07 20:29
107	P2.110107.203600	WG254445-01	Post Digestion Spike		1	L0710155-02	11/01/07 20:36
108	P2.110107.204226	WG254445-02	Serial Dilution		5	L0710155-02	11/01/07 20:42
109	P2.110107.204846	WG254439-28	CCV		1		11/01/07 20:48
110	P2.110107.205506	WG254439-29	CCB		1		11/01/07 20:55

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Approved: November 02, 2007

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KEMRON Environmental Services

Instrument Run Log

Instrument: PE-ICP2 Dataset: 110107HR2.CSV
Analyst1: KRV Analyst2: N/A
Method: 6010B SOP: ME600E Rev: 6
Maintenance Log ID: 21525

Calibration Std: STD22439 ICV/CCV Std: STD22609 Post Spike: STD22493
ICSA: STD22610 ICSAB: STD22567

Workgroups: 254046,254045,253535,253858,254208,254444,254206,254445,2538

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
111	P2.110107.210121	L0710745-19	15848-W0284	50/50	1		11/01/07 21:01
112	P2.110107.210739	L0710746-20	15851-W0285	50/50	1		11/01/07 21:07
113	P2.110107.211535	L0710748-06	15854-W0280	50/50	1		11/01/07 21:15
114	P2.110107.212150	L0710749-07	15864-W0281	50/50	1		11/01/07 21:21
115	P2.110107.212812	L0710155-03	BGA011	50/50	1		11/01/07 21:28
116	P2.110107.213432	L0710155-04	BGA013	50/50	1		11/01/07 21:34
117	P2.110107.214047	L0710155-05	100307-ER	50/50	1		11/01/07 21:40
118	P2.110107.214708	L0710656-02	WG-ST24-MW-17-050	50/50	1		11/01/07 21:47
119	P2.110107.215329	L0710656-04	WG-ST24-MW-18-050	50/50	1		11/01/07 21:53
120	P2.110107.215952	L0710656-06	WG-ST24-MW-15A-050	50/50	1		11/01/07 21:59
121	P2.110107.220608	WG254439-30	CCV		1		11/01/07 22:06
122	P2.110107.221226	WG254439-31	CCB		1		11/01/07 22:12
123	P2.110107.221841	L0710656-08	WG-ST24-MW-15A-051	50/50	1		11/01/07 22:18
124	P2.110107.222506	L0710656-10	WG-ST24-MW-3-050	50/50	1		11/01/07 22:25
125	P2.110107.223131	L0710656-12	WG-ST24-MW-3-051	50/50	1		11/01/07 22:31
126	P2.110107.223805	L0710750-07	16033-W0286	50/50	1		11/01/07 22:38
127	P2.110107.224426	L0710751-11	16074-W0289	50/50	1		11/01/07 22:44
128	P2.110107.225046	L0710752-20	16082-W0290	50/50	1		11/01/07 22:50
129	P2.110107.225708	L0710573-01	ELK-01	50/50	10		11/01/07 22:57
130	P2.110107.230324	L0710574-01	LAS-01	50/50	10		11/01/07 23:03
131	P2.110107.230949	L0710574-03	LAS-02	50/50	10		11/01/07 23:09
132	P2.110107.231615	WG254439-32	CCV		1		11/01/07 23:16
133	P2.110107.232233	WG254439-33	CCB		1		11/01/07 23:22
134	P2.110107.232850	L0710576-01	ALS-01	50/50	10		11/01/07 23:28
135	P2.110107.233509	WG254439-34	CCV		1		11/01/07 23:35
136	P2.110107.234137	WG254439-35	CCB		1		11/01/07 23:41

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Approved: November 02, 2007

Maren Berry

KEMRON Environmental Services
Data Checklist

Date: 29-OCT-2007
Analyst: KRV
Analyst: NA
Method: 6010
Instrument: PE-ICP2
Curve Workgroup: WG254152
Runlog ID: 18997
Analytical Workgroups: 253161,253956,254112,254130,254045

Calibration/Linearity	X
ICV/CCV	X
ICB/CCB	X
ICSA/ICSAB	X
CRI	
Blank/LCS	X
MS/MSD	X
Post Spike/Serial Dilution	X
Upload Results	X
Data Qualifiers	
Generate PDF Instrument Data	X
Sign/Annotate PDF Data	X
Upload Curve Data	X
Workgroup Forms	X
Case Narrative	X
Client Forms	X
Level X	
Level 3	648
Level 4	356,602,616,621,623,624,625,627,628,629,632
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Primary Reviewer	KRV
Secondary Reviewer	MMB
Comments	

Primary Reviewer:
29-OCT-2007
Katie Vickers

Secondary Reviewer:
30-OCT-2007
Maren Beery

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KEMRON Environmental Services
Data Checklist

Date: 31-OCT-2007
Analyst: KHR
Analyst: NA
Method: 6010B
Instrument: PE-ICP2
Curve Workgroup: 254405
Runlog ID: 19043
Analytical Workgroups: 254205, 254206, 254046, 254208, 254193

Calibration/Linearity	X
ICV/CCV	X
ICB/CCB	X
ICSA/ICSAB	X
CRI	
Blank/LCS	X
MS/MSD	X
Post Spike/Serial Dilution	X
Upload Results	X
Data Qualifiers	
Generate PDF Instrument Data	X
Sign/Annotate PDF Data	X
Upload Curve Data	X
Workgroup Forms	X
Case Narrative	X
Client Forms	X
Level X	444, 513, 575
Level 3	596, 611, 648
Level 4	200, 496, 599, 602, 613, 657, 675
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Primary Reviewer	KHR
Secondary Reviewer	MMB
Comments	

Primary Reviewer:
01-NOV-2007
Kim H. Rhoden

Secondary Reviewer:
01-NOV-2007
Maren Berry

Generated: NOV-01-2007 15:08:33

KEMRON Environmental Services
Data Checklist

Date: 01-NOV-2007
Analyst: KRV
Analyst: NA
Method: 6010
Instrument: PE-ICP2
Curve Workgroup: WG254439
Runlog ID: 19056
Analytical Workgroups: 254046,254045,253535,253858,254208,254444,254206,254445,253859

Calibration/Linearity	X
ICV/CCV	X
ICB/CCB	X
ICSA/ICSAB	X
CRI	
Blank/LCS	X
MS/MSD	X
Post Spike/Serial Dilution	X
Upload Results	X
Data Qualifiers	
Generate PDF Instrument Data	X
Sign/Annotate PDF Data	X
Upload Curve Data	X
Workgroup Forms	X
Case Narrative	X
Client Forms	X
Level X	444,513,539,540,541,542,543,571,572,573,574
Level 3	596,648,656
Level 4	155,728,743,744,745,746,748,749,750,751,752
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Primary Reviewer	KRV
Secondary Reviewer	MMB
Comments	

Primary Reviewer:
01-NOV-2007
Katie Vickers

Secondary Reviewer:
02-NOV-2007
Maren Beery

Generated: NOV-02-2007 16:07:17

KEMRON Environmental Services
HOLDING TIMES
EQUIVALENT TO AFCEE FORM 9

Analytical Method: 6010B **AAB#:** WG254046
Login Number: L0710648

Client ID	Date Collected	Date Received	Date Extracted	Max Hold Time Ext.	Time Held Ext.	Date Analyzed	Max Hold Time Anal	Time Held Anal.	Q
49WW01-102307	10/23/07	10/24/07	10/26/07	180	2.69	11/01/07	180	6.20	
49WW01-102307	10/23/07	10/24/07	10/26/07	180	2.69	10/31/07	180	5.51	
49WW03-102307	10/23/07	10/24/07	10/26/07	180	2.76	10/31/07	180	5.52	
49WW03-102307	10/23/07	10/24/07	10/26/07	180	2.76	11/01/07	180	6.20	

*** EXT = SEE PROJECT QAPP REQUIREMENTS**
***ANAL = SEE PROJECT QAPP REQUIREMENTS**

KEMRON Environmental Services
HOLDING TIMES
EQUIVALENT TO AFCEE FORM 9

Analytical Method: 6010B **AAB#:** WG254045
Login Number: L0710648

Client ID	Date Collected	Date Received	Date Extracted	Max Hold Time Ext.	Time Held Ext.	Date Analyzed	Max Hold Time Anal	Time Held Anal.	Q
49WW01-102307	10/23/07	10/24/07	10/26/07	180	2.68	11/01/07	180	6.29	
49WW03-102307	10/23/07	10/24/07	10/26/07	180	2.76	10/29/07	180	3.70	
49WW03-102307	10/23/07	10/24/07	10/26/07	180	2.76	11/01/07	180	6.27	
49WW01-102307	10/23/07	10/24/07	10/26/07	180	2.68	10/29/07	180	3.69	
49WW01-102307	10/23/07	10/24/07	10/26/07	180	2.68	11/01/07	180	6.27	
49WW03-102307	10/23/07	10/24/07	10/26/07	180	2.76	11/01/07	180	6.30	

*** EXT = SEE PROJECT QAPP REQUIREMENTS**
***ANAL = SEE PROJECT QAPP REQUIREMENTS**

METHOD BLANK SUMMARY

Login Number: L0710648
Work Group: WG254045
Blank File ID: P2.102907.195937
Blank Sample ID: WG253900-02
Prep Date: 10/26/07 05:20
Instrument ID: PE-ICP2
Analyzed Date: 10/29/07 19:59
Method: 6010B
Analyst: KRV

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG253900-03	P2.102907.200558	10/29/07 20:05	01
49WW01-102307	L0710648-01	P2.102907.215837	10/29/07 21:58	01
49WW03-102307	L0710648-03	P2.102907.220504	10/29/07 22:05	01
LCS	WG253900-03	P2.110107.111059	11/01/07 11:10	02
49WW03-102307	L0710648-03	P2.110107.114304	11/01/07 11:43	02
49WW01-102307	L0710648-01	P2.110107.114933	11/01/07 11:49	02
49WW01-102307	L0710648-01	P2.110107.122130	11/01/07 12:21	DL01
49WW03-102307	L0710648-03	P2.110107.123408	11/01/07 12:34	DL01

METHOD BLANK SUMMARY

Login Number: L0710648
Work Group: WG254046
Blank File ID: P2.103107.173830
Blank Sample ID: WG253902-02
Prep Date: 10/26/07 05:30
Instrument ID: PE-ICP2
Analyzed Date: 10/31/07 17:38
Method: 6010B
Analyst: KHR

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG253902-03	P2.103107.174444	10/31/07 17:44	01
49WW01-102307	L0710648-02	P2.103107.175112	10/31/07 17:51	01
49WW03-102307	L0710648-04	P2.103107.175734	10/31/07 17:57	01
49WW01-102307	L0710648-02	P2.110107.101111	11/01/07 10:11	DL01
49WW03-102307	L0710648-04	P2.110107.101730	11/01/07 10:17	DL01

KEMRON FORMS - Modified 01/31/2007
Version 1.5 PDF File ID: 920317
Report generated 11/01/2007 14:45

METHOD BLANK SUMMARY

Login Number: L0710648
Work Group: WG254045
Blank File ID: P2.110107.110448
Blank Sample ID: WG253900-02
Prep Date: 10/26/07 05:20
Instrument ID: PE-ICP2
Analyzed Date: 11/01/07 11:04
Method: 6010B
Analyst: KRV

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG253900-03	P2.102907.200558	10/29/07 20:05	01
49WW01-102307	L0710648-01	P2.102907.215837	10/29/07 21:58	01
49WW03-102307	L0710648-03	P2.102907.220504	10/29/07 22:05	01
LCS	WG253900-03	P2.110107.111059	11/01/07 11:10	02
49WW03-102307	L0710648-03	P2.110107.114304	11/01/07 11:43	02
49WW01-102307	L0710648-01	P2.110107.114933	11/01/07 11:49	02
49WW01-102307	L0710648-01	P2.110107.122130	11/01/07 12:21	DL01
49WW03-102307	L0710648-03	P2.110107.123408	11/01/07 12:34	DL01

METHOD BLANK REPORT

Login Number: L0710648 Prep Date: 10/26/07 05:20 Sample ID: WG253900-02
Instrument ID: PE-ICP2 Run Date: 10/29/07 19:59 Prep Method: 3005A
File ID: P2.102907.195937 Analyst: KRV Method: 6010B
Workgroup (AAB#): WG254045 Matrix: Water Units: mg/L
Contract #: DACA56-94-D-0020 Cal ID: PE-ICP-29-OCT-07

Analytes	SDL	PQL	Concentration	Dilution	Qualifier
Beryllium, Total	0.000500	0.00200	0.000500	1	U
Cobalt, Total	0.00250	0.00500	0.00250	1	U
Iron, Total	0.0250	0.100	0.0250	1	U
Magnesium, Total	0.250	0.500	0.250	1	U
Sodium, Total	0.250	0.500	0.250	1	U
Vanadium, Total	0.00500	0.0100	0.00500	1	U
Zinc, Total	0.00500	0.0200	0.00500	1	U

SDL Method Detection Limit
PQL Reporting/Practical Quantitation Limit
ND Analyte Not detected at or above reporting limit
* Analyte concentration > RL

KEMRON FORMS - Modified 12/07/2006
Version 1.5 PDF File ID: 920318
Report generated 11/01/2007 14:45

Login Number: L0710648 Prep Date: 10/26/07 05:30 Sample ID: WG253902-02
Instrument ID: PE-ICP2 Run Date: 10/31/07 17:38 Prep Method: 3005A
File ID: P2.103107.173830 Analyst: KHR Method: 6010B
Workgroup (AAB#): WG254046 Matrix: Water Units: mg/L
Contract #: DACA56-94-D-0020 Cal ID: PE-ICP-31-OCT-07

Analytes	SDL	PQL	Concentration	Dilution	Qualifier
Aluminum, Dissolved	0.0500	0.100	0.0500	1	U
Beryllium, Dissolved	0.000500	0.00200	0.000500	1	U
Calcium, Dissolved	0.100	0.200	0.100	1	U
Cobalt, Dissolved	0.00250	0.00500	0.00250	1	U
Iron, Dissolved	0.0250	0.100	0.0250	1	U
Potassium, Dissolved	0.250	1.00	0.250	1	U
Magnesium, Dissolved	0.250	0.500	0.250	1	U
Sodium, Dissolved	0.250	0.500	0.250	1	U
Vanadium, Dissolved	0.00500	0.0100	0.00500	1	U
Zinc, Dissolved	0.00500	0.0200	0.00500	1	U

SDL Method Detection Limit
PQL Reporting/Practical Quantitation Limit
ND Analyte Not detected at or above reporting limit
* Analyte concentration > RL

KEMRON FORMS - Modified 12/07/2006
Version 1.5 PDF File ID: 920318
Report generated 11/01/2007 14:45

KEMRON Environmental Services

METHOD BLANK REPORT

00074530

Login Number: L0710648 Prep Date: 10/26/07 05:20 Sample ID: WG253900-02
Instrument ID: PE-ICP2 Run Date: 11/01/07 11:04 Prep Method: 3005A
File ID: P2.110107.110448 Analyst: KRV Method: 6010B
Workgroup (AAB#): WG254045 Matrix: Water Units: mg/L
Contract #: DACA56-94-D-0020 Cal ID: PE-ICP-01-NOV-07

Analytes	SDL	PQL	Concentration	Dilution	Qualifier
Aluminum, Total	0.0500	0.100	0.0500	1	U
Calcium, Total	0.100	0.200	0.100	1	U
Potassium, Total	0.250	1.00	0.250	1	U

SDL Method Detection Limit
PQL Reporting/Practical Quantitation Limit
ND Analyte Not detected at or above reporting limit
* Analyte concentration > RL

KEMRON FORMS - Modified 12/07/2006
Version 1.5 PDF File ID: 920318
Report generated 11/01/2007 14:45

KEMRON Environmental Services

LABORATORY CONTROL SAMPLE (LCS)

Login Number: L0710648 Run Date: 10/29/2007 Sample ID: WG253900-03
Instrument ID: PE-ICP2 Run Time: 20:05 Prep Method: 3005A
File ID: P2.102907.200558 Analyst: KRV Method: 6010B
Workgroup (AAB#): WG254045 Matrix: Water Units: mg/L
QC Key: STD Lot#: MI0058-81 Cal ID: PE-ICP-29-OCT-07

Analytes	Expected	Found	% Rec	LCS Limits	Q
Beryllium, Total	0.0250	0.0262	105	85 - 115	
Cobalt, Total	0.100	0.107	107	85 - 115	
Iron, Total	2.00	2.13	107	85 - 115	
Magnesium, Total	5.00	5.31	106	85 - 115	
Sodium, Total	25.0	25.7	103	85 - 115	
Vanadium, Total	0.500	0.518	104	85 - 115	
Zinc, Total	0.500	0.550	110	85 - 115	

KEMRON FORMS - Modified 09/06/2007
Version 1.5 PDF File ID: 920319
Report generated 11/01/2007 14:45

LABORATORY CONTROL SAMPLE (LCS)

Login Number: L0710648 Run Date: 10/31/2007 Sample ID: WG253902-03
Instrument ID: PE-ICP2 Run Time: 17:44 Prep Method: 3005A
File ID: P2.103107.174444 Analyst: KHR Method: 6010B
Workgroup (AAB#): WG254046 Matrix: Water Units: mg/L
QC Key: STD Lot#: MI0058-81 Cal ID: PE-ICP-31-OCT-07

Analytes	Expected	Found	% Rec	LCS Limits	Q
Aluminum, Dissolved	5.00	4.89	97.9	85 - 115	
Beryllium, Dissolved	0.0250	0.0238	95.0	85 - 115	
Calcium, Dissolved	5.00	4.88	97.7	85 - 115	
Cobalt, Dissolved	0.100	0.0959	95.9	85 - 115	
Iron, Dissolved	2.00	1.92	96.2	85 - 115	
Potassium, Dissolved	25.0	24.6	98.5	85 - 115	
Magnesium, Dissolved	5.00	4.80	95.9	85 - 115	
Sodium, Dissolved	25.0	24.4	97.6	85 - 115	
Vanadium, Dissolved	0.500	0.465	92.9	85 - 115	
Zinc, Dissolved	0.500	0.476	95.3	85 - 115	

KEMRON FORMS - Modified 09/06/2007
Version 1.5 PDF File ID: 920319
Report generated 11/01/2007 14:45

KEMRON Environmental Services

LABORATORY CONTROL SAMPLE (LCS)

Login Number: L0710648 Run Date: 11/01/2007 Sample ID: WG253900-03
Instrument ID: PE-ICP2 Run Time: 11:10 Prep Method: 3005A
File ID: P2.110107.111059 Analyst: KRV Method: 6010B
Workgroup (AAB#): WG254045 Matrix: Water Units: mg/L
QC Key: STD Lot#: MI0058-81 Cal ID: PE-ICP-01-NOV-07

Analytes	Expected	Found	% Rec	LCS Limits	Q
Aluminum, Total	5.00	5.33	107	85 - 115	
Calcium, Total	5.00	5.30	106	85 - 115	
Potassium, Total	25.0	27.0	108	85 - 115	

KEMRON FORMS - Modified 09/06/2007
Version 1.5 PDF File ID: 920319
Report generated 11/01/2007 14:45

KEMRON Environmental Services

MATRIX SPIKE AND MATRIX SPIKE DUP (MS/MSD)

Loginnum:L0710648 Cal ID: PE-ICP2- Worknum:WG254045
Instrument ID:PE-ICP2 Contract #:DACA56-94-D-0020 Method:6010B
Parent ID:WG253900-01 File ID:P2.102907.201842 Dil:1 Matrix:WATER
Sample ID:WG253900-04 MS File ID:P2.102907.203744 Dil:1 Units:mg/L
Sample ID:WG253900-05 MSD File ID:P2.102907.204418 Dil:1

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Beryllium	ND	0.0250	0.0259	104	0.0250	0.0254	102	1.90	80 - 120	20	
Cobalt	ND	0.100	0.101	101	0.100	0.0993	99.3	1.26	80 - 120	20	
Iron, Total	0.384	2.00	2.81	121	2.00	2.47	104	13.0	80 - 120	20	*
Magnesium	135	5.00	142	134	5.00	134	-10.6	5.23	80 - 120	20	*
Sodium, Total	88.7	25.0	109	79.4	25.0	109	83.3	0.886	80 - 120	20	*
Vanadium	0.0141	0.500	0.531	103	0.500	0.517	101	2.66	80 - 120	20	
Zinc	0.0202	0.500	0.522	100	0.500	0.516	99.1	1.17	80 - 120	20	

* FAILS %REC LIMIT

FAILS RPD LIMIT

NOTE: This is an internal quality control sample.

KEMRON FORMS - Modified 09/25/2007 (wg_ms_msd_drywt)

Version 1.5 PDF File ID: 920320
Report generated 11/01/2007 14:45

Loginnum:L0710648 Cal ID: PE-ICP2- Worknum:WG254045
Instrument ID:PE-ICP2 Contract #:DACA56-94-D-0020 Method:6010B
Parent ID:WG253900-01 File ID:P2.110107.111722 Dil:1 Matrix:WATER
Sample ID:WG253900-04 MS File ID:P2.110107.112341 Dil:1 Units:mg/L
Sample ID:WG253900-05 MSD File ID:P2.110107.113006 Dil:1

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Aluminum	0.0816	5.00	5.55	109	5.00	5.36	105	3.56	80 - 120	20	
Calcium	243	5.00	245	28.6	5.00	240	-55.3	1.73	80 - 120	20	*
Potassium	6.73	25.0	38.0	125	25.0	38.7	128	1.86	80 - 120	20	*

* FAILS %REC LIMIT

FAILS RPD LIMIT

NOTE: This is an internal quality control sample.

KEMRON FORMS - Modified 09/25/2007 (wg_ms_msd_drywt)

Version 1.5 PDF File ID: 920320
Report generated 11/01/2007 14:45

Loginnum:L0710648 Cal ID: PE-ICP2- Worknum:WG254046
Instrument ID:PE-ICP2 Contract #:DACA56-94-D-0020 Method:6010B
Parent ID:WG253902-01 File ID:P2.103107.175734 Dil:1 Matrix:WATER
Sample ID:WG253902-04 MS File ID:P2.103107.180358 Dil:1 Units:mg/L
Sample ID:WG253902-05 MSD File ID:P2.103107.181024 Dil:1

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Beryllium, Dissolved	ND	0.0250	0.0235	94.1	0.0250	0.0236	94.3	0.130	80 - 120	20	
Calcium, Dissolved	346	5.00	347	19.6	5.00	343	-64.0	1.21	80 - 120	20	*
Cobalt, Dissolved	ND	0.100	0.0898	89.8	0.100	0.0904	90.4	0.580	80 - 120	20	
Iron, Dissolved	ND	2.00	1.82	90.9	2.00	1.80	89.8	1.22	80 - 120	20	
Magnesium, Dissolved	282	5.00	289	146	5.00	285	59.5	1.51	80 - 120	20	*
Potassium, Dissolved	9.57	25.0	43.5	136	25.0	44.8	141	3.05	80 - 120	20	*
Zinc, Dissolved	0.00573	0.500	0.450	88.9	0.500	0.455	89.9	1.15	80 - 120	20	

* FAILS %REC LIMIT

FAILS RPD LIMIT

NOTE: This is an internal quality control sample.

KEMRON FORMS - Modified 09/25/2007 (wg_ms_msd_drywt)

Version 1.5 PDF File ID: 920320
Report generated 11/01/2007 14:45

Loginnum:L0710648 Cal ID: PE-ICP2- Worknum:WG254046
Instrument ID:PE-ICP2 Contract #:DACA56-94-D-0020 Method:6010B
Parent ID:WG253902-01 File ID:P2.110107.101730 Dil:10 Matrix:WATER
Sample ID:WG253902-04 MS File ID:P2.110107.102354 Dil:10 Units:mg/L
Sample ID:WG253902-05 MSD File ID:P2.110107.103011 Dil:10

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Aluminum, Dissolved	0.0506	5.00	5.33	106	5.00	5.26	104	1.28	80 - 120	20	
Sodium, Dissolved	545	25.0	573	111	25.0	562	68.3	1.90	80 - 120	20	*
Vanadium, Dissolved	ND	0.500	0.423	84.5	0.500	0.425	85.0	0.542	80 - 120	20	

* FAILS %REC LIMIT

FAILS RPD LIMIT

NOTE: This is an internal quality control sample.

KEMRON FORMS - Modified 09/25/2007 (wg_ms_msd_drywt)

Version 1.5 PDF File ID: 920320
Report generated 11/01/2007 14:45

KEMRON ENVIRONMENTAL SERVICES
SERIAL DILUTION REPORT

Sample Login ID:L0710648 Worknum:WG254045
Instrument ID:PE-ICP2 Method:6010B
Sample ID:L0710657-01 File ID:P2.102907.205604 Dil:1 Units:mg/L
Serial Dilution ID:WG254045-02 File ID:P2.102907.210849 Dil:5

Analyte	Sample	C	Serial Dilution	C	% Difference	Q
Aluminum	ND	U	ND	U		
Beryllium	ND	U	ND	U		
Calcium	19.2		19.1	X	0.521	
Cobalt	ND	U	ND	U		
Iron	0.0503	F	ND	U	100	
Magnesium	1.22	X	0	U	100	X
Potassium	0.285	F	0	U	100	
Sodium	27.6		28.0	X	1.45	
Vanadium	ND	U	ND	U		
Zinc	ND	U	ND	U		

U = Result is below MDL
F = Result is between MDL and RL
X = Result is greater than RL and less than 50 times the MDL
E = %D exceeds control limit of 10% and initial
sample result is greater than or equal to 50 times the MDL

KEMRON FORMS - Modified 02/14/2006
Version 1.3 PDF File ID: 920314
Report generated 11/01/2007 14:44

KEMRON ENVIRONMENTAL SERVICES
SERIAL DILUTION REPORT

Sample Login ID: L0710648 Worknum: WG254045
Instrument ID: PE-ICP2 Method: 6010B
Sample ID: L0710648-01 File ID: P2.102907.215837 Dil: 1 Units: mg/L
Serial Dilution ID: WG254045-04 File ID: P2.110107.120237 Dil: 5

Analyte	Sample	C	Serial Dilution	C	% Difference	Q
Aluminum	ND	U	0	U		
Beryllium	ND	U	0	U		
Calcium	228		225		1.32	
Cobalt	0	U	0	U		
Iron	0.109	X	0	U	100	X
Magnesium	180		180		0.00	
Potassium	4.63	X	3.83	F	17.3	X
Sodium	366		391		6.83	
Vanadium	ND	U	ND	U		
Zinc	ND	U	0	U		

U = Result is below MDL
F = Result is between MDL and RL
X = Result is greater than RL and less than 50 times the MDL
E = %D exceeds control limit of 10% and initial
sample result is greater than or equal to 50 times the MDL

KEMRON FORMS - Modified 02/14/2006
Version 1.3 PDF File ID: 920314
Report generated 11/01/2007 14:44

KEMRON ENVIRONMENTAL SERVICES
SERIAL DILUTION REPORT

Sample Login ID: L0710648 Worknum: WG254045
Instrument ID: PE-ICP2 Method: 6010B
Sample ID: L0710648-01 File ID: P2.110107.114933 Dil: 1 Units: mg/L
Serial Dilution ID: WG254045-04 File ID: P2.110107.120237 Dil: 5

Analyte	Sample	C	Serial Dilution	C	% Difference	Q
Aluminum	0	U	0	U		
Beryllium	0	U	0	U		
Calcium	229		225		1.75	
Cobalt	0	U	0	U		
Iron	0.118	X	0	U	100	X
Magnesium	177		180		1.69	
Potassium	4.80	X	3.83	F	20.2	X
Sodium	329		391		18.8	E
Vanadium	ND	U	ND	U		
Zinc	0.00935	F	0	U	100	

U = Result is below MDL
F = Result is between MDL and RL
X = Result is greater than RL and less than 50 times the MDL
E = %D exceeds control limit of 10% and initial
sample result is greater than or equal to 50 times the MDL

KEMRON FORMS - Modified 02/14/2006
Version 1.3 PDF File ID: 920314
Report generated 11/01/2007 14:44

KEMRON ENVIRONMENTAL SERVICES
SERIAL DILUTION REPORT

Sample Login ID: L0710648 Worknum: WG254046
Instrument ID: PE-ICP2 Method: 6010B
Sample ID: L0710596-14 File ID: P2.103107.182219 Dil: 1 Units: mg/L
Serial Dilution ID: WG254046-02 File ID: P2.103107.183508 Dil: 5

Analyte	Sample	C	Serial Dilution	C	% Difference	Q
Aluminum	ND	U	ND	U		
Beryllium	0	U	0	U		
Calcium	0.332	X	0.797	F	140	X
Cobalt	ND	U	ND	U		
Iron	ND	U	ND	U		
Magnesium	0	U	0	U		
Potassium	0	U	0	U		
Sodium	24.0		24.2	X	0.833	
Vanadium	ND	U	ND	U		
Zinc	0	U	0	U		

U = Result is below MDL
F = Result is between MDL and RL
X = Result is greater than RL and less than 50 times the MDL
E = %D exceeds control limit of 10% and initial
sample result is greater than or equal to 50 times the MDL

KEMRON FORMS - Modified 02/14/2006
Version 1.3 PDF File ID: 920314
Report generated 11/01/2007 14:44

KEMRON ENVIRONMENTAL SERVICES
POST SPIKE REPORT

Sample Login ID: L0710648 **Worknum:** WG254045
Instrument ID: PE-ICP2 **Method:** 6010B
Post Spike ID: WG254045-03 **File ID:** P2.110107.115602 **Dil:** 1 **Units:** mg/L
Sample ID: L0710648-01 **File ID:** P2.110107.114933 **Dil:** 1 **Matrix:** Water

Analyte	Post Spike Result	C	Sample Result	C	Spike Added(SA)	% R	Control Limit %R	Q
ALUMINUM	4.99		0	U	5	99.7	75 - 125	
BERYLLIUM	0.0254		0	U	.025	101.5	75 - 125	
CALCIUM	212		229		5	113.6	75 - 125	
COBALT	0.0992		0	U	.1	99.2	75 - 125	
IRON	2.12		0.118		2	100.8	75 - 125	
MAGNESIUM	165		177		5	102.7	75 - 125	
POTASSIUM	40.8		4.80		25	146.1	75 - 125	N
SODIUM	324		329		25	110.0	75 - 125	
VANADIUM	0.496		0	U	.5	99.1	75 - 125	
ZINC	0.509		0.00935	F	.5	100.2	75 - 125	

N = % Recovery exceeds control limits
F = Result is between MDL and RL
U = Sample result is below MDL. A value of zero is used in the calculation

KEMRON FORMS - Modified 04/20/2007 - POST_SPIKE
Version 2.0 PDF File ID: 920315
Report generated 11/01/2007 14:45

KEMRON ENVIRONMENTAL SERVICES
POST SPIKE REPORT

Sample Login ID: L0710648 **Worknum:** WG254045
Instrument ID: PE-ICP2 **Method:** 6010B
Post Spike ID: WG254045-01 **File ID:** P2.102907.210225 **Dil:** 1 **Units:** mg/L
Sample ID: L0710657-01 **File ID:** P2.102907.205604 **Dil:** 1 **Matrix:** Water

Analyte	Post Spike Result	C	Sample Result	C	Spike Added(SA)	% R	Control Limit %R	Q
ALUMINUM	4.97		0	U	5	99.4	75 - 125	
BERYLLIUM	0.0256		0	U	.025	102.5	75 - 125	
CALCIUM	23.1		19.2		5	115.9	75 - 125	
COBALT	0.102		0	U	.1	102.1	75 - 125	
IRON	2.15		0.0503	F	2	105.4	75 - 125	
MAGNESIUM	6.35		1.22		5	105.1	75 - 125	
POTASSIUM	25.9		0.285	F	25	102.6	75 - 125	
SODIUM	51.6		27.6		25	106.9	75 - 125	
VANADIUM	0.505		0	U	.5	101.0	75 - 125	
ZINC	0.530		0	U	.5	105.9	75 - 125	

N = % Recovery exceeds control limits
F = Result is between MDL and RL
U = Sample result is below MDL. A value of zero is used in the calculation

KEMRON FORMS - Modified 04/20/2007 - POST_SPIKE
Version 2.0 PDF File ID: 920315
Report generated 11/01/2007 14:45

KEMRON ENVIRONMENTAL SERVICES
POST SPIKE REPORT

Sample Login ID: L0710648 **Worknum:** WG254045
Instrument ID: PE-ICP2 **Method:** 6010B
Post Spike ID: WG254045-03 **File ID:** P2.110107.122751 **Dil:** 20 **Units:** mg/L
Sample ID: L0710648-01 **File ID:** P2.110107.122130 **Dil:** 20 **Matrix:** Water

Analyte	Post Spike Result	C	Sample Result	C	Spike Added(SA)	% R	Control Limit %R	Q
ALUMINUM	5.13		0	U	5	102.5	75 - 125	
BERYLLIUM	0.0257		0	U	.025	102.8	75 - 125	
CALCIUM	16.3		10.6		5	113.2	75 - 125	
COBALT	0.104		0	U	.1	103.8	75 - 125	
IRON	2.07		0	U	2	103.6	75 - 125	
MAGNESIUM	14.1		8.73		5	107.9	75 - 125	
POTASSIUM	27.8		0	U	25	111.1	75 - 125	
SODIUM	46.6		19.0		25	110.2	75 - 125	
VANADIUM	0.512		0	U	.5	102.5	75 - 125	
ZINC	0.526		0	U	.5	105.2	75 - 125	

N = % Recovery exceeds control limits
F = Result is between MDL and RL
U = Sample result is below MDL. A value of zero is used in the calculation

KEMRON FORMS - Modified 04/20/2007 - POST_SPIKE
Version 2.0 PDF File ID: 920315
Report generated 11/01/2007 14:45

KEMRON ENVIRONMENTAL SERVICES
POST SPIKE REPORT

Sample Login ID: L0710648 **Worknum:** WG254046
Instrument ID: PE-ICP2 **Method:** 6010B
Post Spike ID: WG254046-01 **File ID:** P2.103107.182844 **Dil:** 1 **Units:** mg/L
Sample ID: L0710596-14 **File ID:** P2.103107.182219 **Dil:** 1 **Matrix:** Water

Analyte	Post Spike Result	C	Sample Result	C	Spike Added(SA)	% R	Control Limit %R	Q
ALUMINUM	4.72		0	U	5	94.5	75 - 125	
BERYLLIUM	0.0239		0	U	.025	95.6	75 - 125	
CALCIUM	5.19		0.332		5	97.7	75 - 125	
COBALT	0.0954		0	U	.1	95.4	75 - 125	
IRON	1.80		0	U	2	90.2	75 - 125	
MAGNESIUM	4.63		0	U	5	92.7	75 - 125	
POTASSIUM	24.8		0	U	25	99.4	75 - 125	
SODIUM	45.5		24.0		25	95.8	75 - 125	
VANADIUM	0.476		0	U	.5	95.2	75 - 125	
ZINC	0.483		0	U	.5	96.5	75 - 125	

N = % Recovery exceeds control limits
F = Result is between MDL and RL
U = Sample result is below MDL. A value of zero is used in the calculation

KEMRON FORMS - Modified 04/20/2007 - POST_SPIKE
Version 2.0 PDF File ID: 920315
Report generated 11/01/2007 14:45

KEMRON Environmental Services

INITIAL CALIBRATION SUMMARY

Login Number: L0710648 **Workgroup (AAB#):** WG254045

Analytical Method: 6010B **Instrument ID:** PE-ICP2

ICAL Worknum: WG254152 **Initial Calibration Date:** 29-OCT-2007 11:51

Analyte	WG254152-01		WG254152-02		WG254152-03		WG254152-04		WG254152-05			
	STD	INT	STD	INT	STD	INT	STD	INT	STD	INT	R	Q
Aluminum	0	1233.250676	.1	788.9147005	.2	1656.015247	10	81801.52243	20	160261.6644	0.999949	
Beryllium	0	-700.630551	.0005	141.9790573	.001	316.1692736	.05	16608.36571	.1	32075.50986	0.999849	
Calcium	0	-12.5452056	.1	15.10164112	.2	28.36199876	10	1149.693132	20	2261.222109	0.999970	
Cobalt	0	-45.0989449	.002	39.25174971	.004	82.60316458	.1	4126.134622	.4	7962.878515	0.999845	
Iron	0	2.93453132	.04	23.94323507	.08	47.51197699	4	2410.533239	8	4708.393361	0.999933	
Magnesium	0	17.96566132	.1	58.55446281	.2	107.546162	10	5391.21396	20	10655.49891	0.999984	
Potassium	0	-547.364085	.5	2267.098114	1	4519.822364	50	287925.7871	100	604983.9871	0.999999	
Sodium	0	365.7494318	.5	4814.036379	1	9365.731729	50	496315.1068	100	994520.7153	1.00000	
Vanadium	0	3468.905444	.01	915.7051736	.02	1456.063478	1	72464.50563	2	140362.3649	0.999879	
Zinc	0	1.723709168	.01	112.7562011	.02	297.4487146	1	9417.194454	2	18184.76614	0.999855	

INT = Instrument intensity
R = Coefficient of correlation
Q = Data Qualifier
*** = Out of Compliance; R < 0.995**

KEMRON FORMS - Modified 03/08/2007
Version 1.5 PDF File ID: 920323
Report generated 11/01/2007 14:43

KEMRON Environmental Services

INITIAL CALIBRATION SUMMARY

Login Number: L0710648 **Workgroup (AAB#):** WG254046

Analytical Method: 6010B **Instrument ID:** PE-ICP2

ICAL Worknum: WG254405 **Initial Calibration Date:** 31-OCT-2007 09:29

Analyte	WG254405-01		WG254405-02		WG254405-03		WG254405-04		WG254405-05			
	STD	INT	STD	INT	STD	INT	STD	INT	STD	INT	R	Q
Aluminum	0	625.5001312	.1	905.2598355	.2	1705.212423	10	81147.55744	20	160061.4196	0.999978	
Beryllium	0	-767.551029	.0005	160.7462449	.001	352.0625377	.05	17896.7155	.1	36110.38222	0.999991	
Calcium	0	-35.0008123	.1	17.75105213	.2	19.21006838	10	1230.210192	20	2518.368668	0.999931	
Cobalt	0	-46.6942808	.002	37.48564352	.004	93.13731387	.1	4524.779821	.4	8949.21028	0.999984	
Iron	0	-.180230761	.04	28.24068599	.08	52.95571411	4	2440.903419	8	4825.771882	0.999985	
Magnesium	0	24.8648807	.1	59.21922232	.2	112.4104987	10	5604.210786	20	11160.53034	0.999998	
Potassium	0	-54.2371874	.5	2373.749357	1	4526.152084	50	302641.9815	100	653115.0405	0.999999	
Sodium	0	419.2909972	.5	5167.542095	1	9898.627452	50	528065.0704	100	1069683.303	1.00000	
Vanadium	0	3577.093024	.01	910.316234	.02	1528.366813	1	76846.35599	2	154249.6719	0.999998	
Zinc	0	.3724934012	.01	134.1543087	.02	211.0579649	1	10515.71254	2	21207.5188	0.999990	

INT = Instrument intensity
R = Coefficient of correlation
Q = Data Qualifier
*** = Out of Compliance; R < 0.995**

KEMRON FORMS - Modified 03/08/2007
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KEMRON Environmental Services

INITIAL CALIBRATION SUMMARY

Login Number: L0710648 **Workgroup (AAB#):** WG254045

Analytical Method: 6010B **Instrument ID:** PE-ICP2

ICAL Worknum: WG254439 **Initial Calibration Date:** 01-NOV-2007 08:36

Analyte	WG254439-01		WG254439-02		WG254439-03		WG254439-04		WG254439-05			
	STD	INT	STD	INT	STD	INT	STD	INT	STD	INT	R	Q
Aluminum	0	471.4750489	.1	763.0876076	.2	1485.677134	10	75609.34942	20	152114.4356	0.999996	
Beryllium	0	-761.806768	.0005	187.0849547	.001	353.5988314	.05	16952.69238	.1	34856.49787	0.999910	
Calcium	0	-39.4352849	.1	13.08955827	.2	20.12598308	10	1163.19205	20	2403.849664	0.999877	
Cobalt	0	-53.5925967	.002	49.37365729	.004	99.65836886	.1	4299.796783	.4	8580.308794	0.999999	
Iron	0	.1500506897	.04	20.53037645	.08	43.04205002	4	2069.379937	8	4125.701525	0.999999	
Magnesium	0	18.84600223	.1	52.11523527	.2	97.96557357	10	4945.144736	20	9899.605427	1.00000	
Potassium	0	-35.0182110	.5	2280.000383	1	4440.252232	50	286749.5832	100	617382.9618	1.00000	
Sodium	0	708.1935609	.5	4631.55991	1	9195.329489	50	497046.404	100	1022406.727	1.00000	
Vanadium	0	3805.383002	.01	580.6514282	.02	1467.41639	1	72429.12977	2	148595.1123	0.999927	
Zinc	0	6.979116265	.01	117.2644459	.02	211.3238193	1	9962.190919	2	20382.66521	0.999937	

INT = Instrument intensity
R = Coefficient of correlation
Q = Data Qualifier
*** = Out of Compliance; R < 0.995**

KEMRON FORMS - Modified 03/08/2007
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KEMRON Environmental Services

INITIAL CALIBRATION SUMMARY

Login Number: L0710648 **Workgroup (AAB#):** WG254046

Analytical Method: 6010B **Instrument ID:** PE-ICP2

ICAL Worknum: WG254439 **Initial Calibration Date:** 01-NOV-2007 08:36

Analyte	WG254439-01		WG254439-02		WG254439-03		WG254439-04		WG254439-05			
	STD	INT	STD	INT	STD	INT	STD	INT	STD	INT	R	Q
Aluminum	0	471.4750489	.1	763.0876076	.2	1485.677134	10	75609.34942	20	152114.4356	0.999996	
Beryllium	0	-761.806768	.0005	187.0849547	.001	353.5988314	.05	16952.69238	.1	34856.49787	0.999910	
Calcium	0	-39.4352849	.1	13.08955827	.2	20.12598308	10	1163.19205	20	2403.849664	0.999877	
Cobalt	0	-53.5925967	.002	49.37365729	.004	99.65836886	.1	4299.796783	.4	8580.308794	0.999999	
Iron	0	.1500506897	.04	20.53037645	.08	43.04205002	4	2069.379937	8	4125.701525	0.999999	
Magnesium	0	18.84600223	.1	52.11523527	.2	97.96557357	10	4945.144736	20	9899.605427	1.00000	
Potassium	0	-35.0182110	.5	2280.000383	1	4440.252232	50	286749.5832	100	617382.9618	1.00000	
Sodium	0	708.1935609	.5	4631.55991	1	9195.329489	50	497046.404	100	1022406.727	1.00000	
Vanadium	0	3805.383002	.01	580.6514282	.02	1467.41639	1	72429.12977	2	148595.1123	0.999927	
Zinc	0	6.979116265	.01	117.2644459	.02	211.3238193	1	9962.190919	2	20382.66521	0.999937	

INT = Instrument intensity
R = Coefficient of correlation
Q = Data Qualifier
*** = Out of Compliance; R < 0.995**

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KEMRON Environmental Services
INITIAL CALIBRATION BLANK (ICB)

Login Number: L0710648 Run Date: 10/29/2007 Sample ID: WG254152-07
Instrument ID: PE-ICP2 Run Time: 12:02 Method: 6010
File ID: P2.102907.120251 Analyst: KRV Units: mg/L
Workgroup (AAB#): WG254045 Cal ID: PE-ICP2 - 29-OCT-07
Matrix: WATER

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
ALUMINUM	.05	.1	-.0315	1	U
BERYLLIUM	.0005	.002	-.000156	1	U
CALCIUM	.1	.2	-.0318	1	U
COBALT	.0025	.005	-.000852	1	U
IRON	.025	.1	-.0109	1	U
MAGNESIUM	.25	.5	-.016	1	U
POTASSIUM	.25	1	.16	1	U
SODIUM	.25	.5	.0569	1	U
VANADIUM	.005	.01	-.005	1	U
ZINC	.005	.02	-.00915	1	U

KEMRON FORMS - Modified 10/02/2007
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KEMRON Environmental Services
INITIAL CALIBRATION BLANK (ICB)

Login Number: L0710648 Run Date: 10/30/2007 Sample ID: WG254229-07
Instrument ID: PE-ICP2 Run Time: 08:46 Method: 6010
File ID: P2.103007.084602 Analyst: KRV Units: mg/L
Workgroup (AAB#): WG254045 Cal ID: PE-ICP2 - 30-OCT-07
Matrix: WATER

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
ALUMINUM	.05	.1	-.0205	1	U
BERYLLIUM	.0005	.002	.000101	1	U
CALCIUM	.1	.2	.0397	1	U
COBALT	.0025	.005	.0000776	1	U
IRON	.025	.1	-.0106	1	U
MAGNESIUM	.25	.5	-.0248	1	U
POTASSIUM	.25	1	.12	1	U
SODIUM	.25	.5	.0424	1	U
VANADIUM	.005	.01	-.00135	1	U
ZINC	.005	.02	-.000328	1	U

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KEMRON Environmental Services
INITIAL CALIBRATION BLANK (ICB)

Login Number: L0710648 Run Date: 10/31/2007 Sample ID: WG254405-07
Instrument ID: PE-ICP2 Run Time: 09:41 Method: 6010
File ID: P2.103107.094150 Analyst: KHR Units: mg/L
Workgroup (AAB#): WG254046 Cal ID: PE-ICP2 - 31-OCT-07
Matrix: WATER

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
ALUMINUM	.05	.1	-.0204	1	U
BERYLLIUM	.0005	.002	.000164	1	U
CALCIUM	.1	.2	.0702	1	U
COBALT	.0025	.005	-.000227	1	U
IRON	.025	.1	-.007	1	U
MAGNESIUM	.25	.5	-.0172	1	U
POTASSIUM	.25	1	.103	1	U
SODIUM	.25	.5	.0361	1	U
VANADIUM	.005	.01	.000767	1	U
ZINC	.005	.02	.000519	1	U

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KEMRON Environmental Services
INITIAL CALIBRATION BLANK (ICB)

Login Number: L0710648 Run Date: 11/01/2007 Sample ID: WG254439-07
Instrument ID: PE-ICP2 Run Time: 08:47 Method: 6010
File ID: P2.110107.084744 Analyst: KRV Units: mg/L
Workgroup (AAB#): WG254045 Cal ID: PE-ICP2 - 01-NOV-07
Matrix: WATER

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
ALUMINUM	.05	.1	.0082	1	U
BERYLLIUM	.0005	.002	.000232	1	U
CALCIUM	.1	.2	.0145	1	U
COBALT	.0025	.005	.000147	1	U
IRON	.025	.1	-.00184	1	U
MAGNESIUM	.25	.5	-.0000589	1	U
POTASSIUM	.25	1	.098	1	U
SODIUM	.25	.5	.0367	1	U
VANADIUM	.005	.01	.00277	1	U
ZINC	.005	.02	.0021	1	U

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KEMRON Environmental Services
INITIAL CALIBRATION BLANK (ICB)

Login Number: L0710648 Run Date: 11/01/2007 Sample ID: WG254439-07
Instrument ID: PE-ICP2 Run Time: 08:47 Method: 6010
File ID: P2.110107.084744 Analyst: KRV Units: mg/L
Workgroup (AAB#): WG254046 Cal ID: PE-ICP2 - 01-NOV-07
Matrix: WATER

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
ALUMINUM	.05	.1	.0082	1	U
BERYLLIUM	.0005	.002	.000232	1	U
CALCIUM	.1	.2	.0145	1	U
COBALT	.0025	.005	.000147	1	U
IRON	.025	.1	-.00184	1	U
MAGNESIUM	.25	.5	-.0000589	1	U
POTASSIUM	.25	1	.098	1	U
SODIUM	.25	.5	.0367	1	U
VANADIUM	.005	.01	.00277	1	U
ZINC	.005	.02	.0021	1	U

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KEMRON Environmental Services

00074555

CONTINUING CALIBRATION BLANK (CCB)

Login Number: L0710648 Run Date: 10/29/2007 Sample ID: WG254152-11
Instrument ID: PE-ICP2 Run Time: 12:26 Method: 6010B
File ID: P2.102907.122601 Analyst: KRV Units: mg/L
Workgroup (AAB#): WG254045 Cal ID: PE-ICP - 29-OCT-07
Matrix: WATER

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Aluminum	0.0500	0.100	-0.0222	1	U
Beryllium	0.000500	0.00200	-0.000217	1	U
Calcium	0.100	0.200	0.00373	1	U
Cobalt	0.00250	0.00500	-0.000974	1	U
Iron	0.0250	0.100	-0.0115	1	U
Potassium	0.250	1.00	0.132	1	U
Magnesium	0.250	0.500	-0.00405	1	U
Sodium	0.250	0.500	0.0489	1	U
Vanadium	0.00500	0.0100	-0.00384	1	U
Zinc	0.00500	0.0200	-0.00897	1	F

U = Result is less than MDL
F = Result is between MDL and RL
* = Result is above RL

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KEMRON Environmental Services

00074556

CONTINUING CALIBRATION BLANK (CCB)

Login Number: L0710648 Run Date: 10/29/2007 Sample ID: WG254152-27
Instrument ID: PE-ICP2 Run Time: 19:15 Method: 6010B
File ID: P2.102907.191542 Analyst: KRV Units: mg/L
Workgroup (AAB#): WG254045 Cal ID: PE-ICP - 29-OCT-07
Matrix: WATER

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Aluminum	0.0500	0.100	-0.0297	1	U
Beryllium	0.000500	0.00200	-0.000131	1	U
Calcium	0.100	0.200	-0.0611	1	U
Cobalt	0.00250	0.00500	-0.000922	1	U
Iron	0.0250	0.100	-0.0137	1	U
Potassium	0.250	1.00	0.0898	1	U
Magnesium	0.250	0.500	-0.0134	1	U
Sodium	0.250	0.500	0.0580	1	U
Vanadium	0.00500	0.0100	-0.00663	1	F
Zinc	0.00500	0.0200	-0.00915	1	F

U = Result is less than MDL
F = Result is between MDL and RL
* = Result is above RL

KEMRON FORMS - Modified 09/27/2006
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KEMRON Environmental Services

00074557

CONTINUING CALIBRATION BLANK (CCB)

Login Number: L0710648 Run Date: 10/29/2007 Sample ID: WG254152-29
Instrument ID: PE-ICP2 Run Time: 20:31 Method: 6010B
File ID: P2.102907.203123 Analyst: KRV Units: mg/L
Workgroup (AAB#): WG254045 Cal ID: PE-ICP - 29-OCT-07
Matrix: WATER

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Aluminum	0.0500	0.100	-0.0322	1	U
Beryllium	0.000500	0.00200	-0.000117	1	U
Calcium	0.100	0.200	-0.0213	1	U
Cobalt	0.00250	0.00500	-0.000720	1	U
Iron	0.0250	0.100	-0.0158	1	U
Potassium	0.250	1.00	0.0836	1	U
Magnesium	0.250	0.500	-0.0115	1	U
Sodium	0.250	0.500	0.0590	1	U
Vanadium	0.00500	0.0100	-0.00644	1	F
Zinc	0.00500	0.0200	-0.00935	1	F

U = Result is less than MDL
F = Result is between MDL and RL
* = Result is above RL

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KEMRON Environmental Services

00074558

CONTINUING CALIBRATION BLANK (CCB)

Login Number: L0710648 Run Date: 10/29/2007 Sample ID: WG254152-31
Instrument ID: PE-ICP2 Run Time: 21:45 Method: 6010B
File ID: P2.102907.214558 Analyst: KRV Units: mg/L
Workgroup (AAB#): WG254045 Cal ID: PE-ICP - 29-OCT-07
Matrix: WATER

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Aluminum	0.0500	0.100	-0.0337	1	U
Beryllium	0.000500	0.00200	-0.000138	1	U
Calcium	0.100	0.200	-0.00414	1	U
Cobalt	0.00250	0.00500	-0.000818	1	U
Iron	0.0250	0.100	-0.0121	1	U
Potassium	0.250	1.00	0.0917	1	U
Magnesium	0.250	0.500	-0.0141	1	U
Sodium	0.250	0.500	0.0599	1	U
Vanadium	0.00500	0.0100	-0.00620	1	F
Zinc	0.00500	0.0200	-0.00906	1	F

U = Result is less than MDL
F = Result is between MDL and RL
* = Result is above RL

KEMRON FORMS - Modified 09/27/2006
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Report generated 11/01/2007 14:43

KEMRON Environmental Services

00074559

CONTINUING CALIBRATION BLANK (CCB)

Login Number: L0710648 Run Date: 10/29/2007 Sample ID: WG254152-33
Instrument ID: PE-ICP2 Run Time: 22:49 Method: 6010B
File ID: P2.102907.224952 Analyst: KRV Units: mg/L
Workgroup (AAB#): WG254045 Cal ID: PE-ICP - 29-OCT-07
Matrix: WATER

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Aluminum	0.0500	0.100	-0.0284	1	U
Beryllium	0.000500	0.00200	-0.000139	1	U
Calcium	0.100	0.200	-0.0865	1	U
Cobalt	0.00250	0.00500	-0.000783	1	U
Iron	0.0250	0.100	-0.0121	1	U
Potassium	0.250	1.00	0.0898	1	U
Magnesium	0.250	0.500	-0.0139	1	U
Sodium	0.250	0.500	0.127	1	U
Vanadium	0.00500	0.0100	-0.00583	1	F
Zinc	0.00500	0.0200	-0.00948	1	F

U = Result is less than MDL
F = Result is between MDL and RL
* = Result is above RL

KEMRON FORMS - Modified 09/27/2006
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Report generated 11/01/2007 14:43

KEMRON Environmental Services

00074560

CONTINUING CALIBRATION BLANK (CCB)

Login Number: L0710648 Run Date: 10/30/2007 Sample ID: WG254229-11
Instrument ID: PE-ICP2 Run Time: 09:09 Method: 6010B
File ID: P2.103007.090951 Analyst: KRV Units: mg/L
Workgroup (AAB#): WG254045 Cal ID: PE-ICP - 30-OCT-07
Matrix: WATER

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Aluminum	0.0500	0.100	-0.00666	1	U
Beryllium	0.000500	0.00200	0.000144	1	U
Calcium	0.100	0.200	0.0247	1	U
Cobalt	0.00250	0.00500	0.000137	1	U
Iron	0.0250	0.100	-0.0126	1	U
Potassium	0.250	1.00	0.108	1	U
Magnesium	0.250	0.500	-0.0145	1	U
Sodium	0.250	0.500	0.0301	1	U
Vanadium	0.00500	0.0100	-0.00272	1	U
Zinc	0.00500	0.0200	-0.000486	1	U

U = Result is less than MDL
F = Result is between MDL and RL
* = Result is above RL

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KEMRON Environmental Services

00074561

CONTINUING CALIBRATION BLANK (CCB)

Login Number: L0710648 Run Date: 10/30/2007 Sample ID: WG254229-13
Instrument ID: PE-ICP2 Run Time: 11:01 Method: 6010B
File ID: P2.103007.110145 Analyst: KRV Units: mg/L
Workgroup (AAB#): WG254045 Cal ID: PE-ICP - 30-OCT-07
Matrix: WATER

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Aluminum	0.0500	0.100	-0.0154	1	U
Beryllium	0.000500	0.00200	0.000161	1	U
Calcium	0.100	0.200	0.0415	1	U
Cobalt	0.00250	0.00500	0.000224	1	U
Iron	0.0250	0.100	-0.0121	1	U
Potassium	0.250	1.00	0.0974	1	U
Magnesium	0.250	0.500	-0.0119	1	U
Sodium	0.250	0.500	0.0323	1	U
Vanadium	0.00500	0.0100	-0.00163	1	U
Zinc	0.00500	0.0200	-0.000307	1	U

U = Result is less than MDL
F = Result is between MDL and RL
* = Result is above RL

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KEMRON Environmental Services

00074562

CONTINUING CALIBRATION BLANK (CCB)

Login Number: L0710648 Run Date: 11/01/2007 Sample ID: WG254439-11
Instrument ID: PE-ICP2 Run Time: 09:11 Method: 6010B
File ID: P2.110107.091105 Analyst: KRV Units: mg/L
Workgroup (AAB#): WG254045 Cal ID: PE-ICP - 01-NOV-07
Matrix: WATER

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Aluminum	0.0500	0.100	0.00345	1	U
Beryllium	0.000500	0.00200	0.000242	1	U
Calcium	0.100	0.200	0.0341	1	U
Cobalt	0.00250	0.00500	0.000202	1	U
Iron	0.0250	0.100	-0.00251	1	U
Potassium	0.250	1.00	0.102	1	U
Magnesium	0.250	0.500	-0.00505	1	U
Sodium	0.250	0.500	0.0230	1	U
Vanadium	0.00500	0.0100	0.00258	1	U
Zinc	0.00500	0.0200	0.00200	1	U

U = Result is less than MDL
F = Result is between MDL and RL
* = Result is above RL

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KEMRON Environmental Services

00074563

CONTINUING CALIBRATION BLANK (CCB)

Login Number: L0710648 Run Date: 11/01/2007 Sample ID: WG254439-13
Instrument ID: PE-ICP2 Run Time: 10:42 Method: 6010B
File ID: P2.110107.104257 Analyst: KRV Units: mg/L
Workgroup (AAB#): WG254045 Cal ID: PE-ICP - 01-NOV-07
Matrix: WATER

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Aluminum	0.0500	0.100	0.00822	1	U
Beryllium	0.000500	0.00200	0.000205	1	U
Calcium	0.100	0.200	0.0343	1	U
Cobalt	0.00250	0.00500	0.000160	1	U
Iron	0.0250	0.100	-0.00126	1	U
Potassium	0.250	1.00	0.0699	1	U
Magnesium	0.250	0.500	-0.00338	1	U
Sodium	0.250	0.500	0.0300	1	U
Vanadium	0.00500	0.0100	0.00261	1	U
Zinc	0.00500	0.0200	0.00215	1	U

U = Result is less than MDL
F = Result is between MDL and RL
* = Result is above RL

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KEMRON Environmental Services

00074564

CONTINUING CALIBRATION BLANK (CCB)

Login Number: L0710648 Run Date: 11/01/2007 Sample ID: WG254439-15
Instrument ID: PE-ICP2 Run Time: 12:15 Method: 6010B
File ID: P2.110107.121515 Analyst: KRV Units: mg/L
Workgroup (AAB#): WG254045 Cal ID: PE-ICP - 01-NOV-07
Matrix: WATER

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Aluminum	0.0500	0.100	0.00443	1	U
Beryllium	0.000500	0.00200	0.000290	1	U
Calcium	0.100	0.200	0.0938	1	U
Cobalt	0.00250	0.00500	0.000285	1	U
Iron	0.0250	0.100	-0.000693	1	U
Potassium	0.250	1.00	0.0769	1	U
Magnesium	0.250	0.500	-0.000757	1	U
Sodium	0.250	0.500	0.0706	1	U
Vanadium	0.00500	0.0100	0.00273	1	U
Zinc	0.00500	0.0200	0.00202	1	U

U = Result is less than MDL
F = Result is between MDL and RL
* = Result is above RL

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KEMRON Environmental Services

00074565

CONTINUING CALIBRATION BLANK (CCB)

Login Number: L0710648 Run Date: 11/01/2007 Sample ID: WG254439-17
Instrument ID: PE-ICP2 Run Time: 13:31 Method: 6010B
File ID: P2.110107.133101 Analyst: KRV Units: mg/L
Workgroup (AAB#): WG254045 Cal ID: PE-ICP - 01-NOV-07
Matrix: WATER

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Aluminum	0.0500	0.100	0.00261	1	U
Beryllium	0.000500	0.00200	0.000240	1	U
Calcium	0.100	0.200	0.104	1	F
Cobalt	0.00250	0.00500	-0.000157	1	U
Iron	0.0250	0.100	-0.00546	1	U
Potassium	0.250	1.00	0.0878	1	U
Magnesium	0.250	0.500	-0.000227	1	U
Sodium	0.250	0.500	0.0360	1	U
Vanadium	0.00500	0.0100	0.00306	1	U
Zinc	0.00500	0.0200	0.00222	1	U

U = Result is less than MDL
F = Result is between MDL and RL
* = Result is above RL

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KEMRON Environmental Services

00074566

CONTINUING CALIBRATION BLANK (CCB)

Login Number: L0710648 Run Date: 10/31/2007 Sample ID: WG254405-11
Instrument ID: PE-ICP2 Run Time: 10:24 Method: 6010B
File ID: P2.103107.102434 Analyst: KHR Units: mg/L
Workgroup (AAB#): WG254046 Cal ID: PE-ICP - 31-OCT-07
Matrix: WATER

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Aluminum	0.0500	0.100	-0.0145	1	U
Beryllium	0.000500	0.00200	0.000158	1	U
Calcium	0.100	0.200	0.0383	1	U
Cobalt	0.00250	0.00500	-0.000389	1	U
Iron	0.0250	0.100	-0.00820	1	U
Potassium	0.250	1.00	0.0908	1	U
Magnesium	0.250	0.500	-0.00861	1	U
Sodium	0.250	0.500	0.0344	1	U
Vanadium	0.00500	0.0100	-0.000171	1	U
Zinc	0.00500	0.0200	0.000413	1	U

U = Result is less than MDL
F = Result is between MDL and RL
* = Result is above RL

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KEMRON Environmental Services

00074567

CONTINUING CALIBRATION BLANK (CCB)

Login Number: L0710648 Run Date: 10/31/2007 Sample ID: WG254405-25
Instrument ID: PE-ICP2 Run Time: 17:27 Method: 6010B
File ID: P2.103107.172757 Analyst: KHR Units: mg/L
Workgroup (AAB#): WG254046 Cal ID: PE-ICP - 31-OCT-07
Matrix: WATER

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Aluminum	0.0500	0.100	-0.0315	1	U
Beryllium	0.000500	0.00200	0.000203	1	U
Calcium	0.100	0.200	0.103	1	F
Cobalt	0.00250	0.00500	-0.000466	1	U
Iron	0.0250	0.100	-0.00794	1	U
Potassium	0.250	1.00	0.0688	1	U
Magnesium	0.250	0.500	-0.0172	1	U
Sodium	0.250	0.500	0.0381	1	U
Vanadium	0.00500	0.0100	-0.00306	1	U
Zinc	0.00500	0.0200	0.000510	1	U

U = Result is less than MDL
F = Result is between MDL and RL
* = Result is above RL

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KEMRON Environmental Services

00074568

CONTINUING CALIBRATION BLANK (CCB)

Login Number: L0710648 Run Date: 10/31/2007 Sample ID: WG254405-27
Instrument ID: PE-ICP2 Run Time: 18:47 Method: 6010B
File ID: P2.103107.184746 Analyst: KHR Units: mg/L
Workgroup (AAB#): WG254046 Cal ID: PE-ICP - 31-OCT-07
Matrix: WATER

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Aluminum	0.0500	0.100	-0.0274	1	U
Beryllium	0.000500	0.00200	0.000243	1	U
Calcium	0.100	0.200	0.105	1	F
Cobalt	0.00250	0.00500	-0.000266	1	U
Iron	0.0250	0.100	-0.00878	1	U
Potassium	0.250	1.00	0.0795	1	U
Magnesium	0.250	0.500	-0.00629	1	U
Sodium	0.250	0.500	0.0743	1	U
Vanadium	0.00500	0.0100	-0.00329	1	U
Zinc	0.00500	0.0200	0.000681	1	U

U = Result is less than MDL
F = Result is between MDL and RL
* = Result is above RL

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KEMRON Environmental Services

00074569

CONTINUING CALIBRATION BLANK (CCB)

Login Number: L0710648 Run Date: 11/01/2007 Sample ID: WG254439-11
Instrument ID: PE-ICP2 Run Time: 09:11 Method: 6010B
File ID: P2.110107.091105 Analyst: KRV Units: mg/L
Workgroup (AAB#): WG254046 Cal ID: PE-ICP - 01-NOV-07
Matrix: WATER

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Aluminum	0.0500	0.100	0.00345	1	U
Beryllium	0.000500	0.00200	0.000242	1	U
Calcium	0.100	0.200	0.0341	1	U
Cobalt	0.00250	0.00500	0.000202	1	U
Iron	0.0250	0.100	-0.00251	1	U
Potassium	0.250	1.00	0.102	1	U
Magnesium	0.250	0.500	-0.00505	1	U
Sodium	0.250	0.500	0.0230	1	U
Vanadium	0.00500	0.0100	0.00258	1	U
Zinc	0.00500	0.0200	0.00200	1	U

U = Result is less than MDL
F = Result is between MDL and RL
* = Result is above RL

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KEMRON Environmental Services

00074570

CONTINUING CALIBRATION BLANK (CCB)

Login Number: L0710648 Run Date: 11/01/2007 Sample ID: WG254439-13
Instrument ID: PE-ICP2 Run Time: 10:42 Method: 6010B
File ID: P2.110107.104257 Analyst: KRV Units: mg/L
Workgroup (AAB#): WG254046 Cal ID: PE-ICP - 01-NOV-07
Matrix: WATER

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Aluminum	0.0500	0.100	0.00822	1	U
Beryllium	0.000500	0.00200	0.000205	1	U
Calcium	0.100	0.200	0.0343	1	U
Cobalt	0.00250	0.00500	0.000160	1	U
Iron	0.0250	0.100	-0.00126	1	U
Potassium	0.250	1.00	0.0699	1	U
Magnesium	0.250	0.500	-0.00338	1	U
Sodium	0.250	0.500	0.0300	1	U
Vanadium	0.00500	0.0100	0.00261	1	U
Zinc	0.00500	0.0200	0.00215	1	U

U = Result is less than MDL
F = Result is between MDL and RL
* = Result is above RL

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KEMRON Environmental Services

00074571

INITIAL CALIBRATION VERIFICATION (ICV)

Login Number: L0710648 Run Date: 10/30/2007 Sample ID: WG254229-06
Instrument ID: PE-ICP2 Run Time: 08:39 Method: 6010B
File ID: P2.103007.083945 Analyst: KRV Units: mg/L
Workgroup (AAB#): WG254045 Cal ID: PE-ICP - 30-OCT-07
QC Key: STD

Analyte		Expected	Found	%REC	LIMITS	Q
Aluminum		10	10.2	102	90 - 110	
Beryllium		.05	0.0502	100	90 - 110	
Calcium		10	10.5	105	90 - 110	
Cobalt		.2	0.201	101	90 - 110	
Iron		4	4.19	105	90 - 110	
Potassium		50	51.4	103	90 - 110	
Magnesium		10	10.3	103	90 - 110	
Sodium		50	49.9	99.8	90 - 110	
Vanadium		1	0.996	99.6	90 - 110	
Zinc		1	1.04	104	90 - 110	

* Exceeds LIMITS Limit

KEMRON FORMS - Modified 09/06/2007 (ICV)
Version 1.5 PDF File ID: 920324
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KEMRON Environmental Services

00074572

INITIAL CALIBRATION VERIFICATION (ICV)

Login Number: L0710648 Run Date: 10/29/2007 Sample ID: WG254152-06
Instrument ID: PE-ICP2 Run Time: 11:56 Method: 6010B
File ID: P2.102907.115635 Analyst: KRV Units: mg/L
Workgroup (AAB#): WG254045 Cal ID: PE-ICP - 29-OCT-07
QC Key: STD

Analyte		Expected	Found	%REC	LIMITS	Q
Aluminum		10	10.3	103	90 - 110	
Beryllium		.05	0.0505	101	90 - 110	
Calcium		10	10.4	104	90 - 110	
Cobalt		.2	0.204	102	90 - 110	
Iron		4	4.16	104	90 - 110	
Potassium		50	51.3	103	90 - 110	
Magnesium		10	10.2	102	90 - 110	
Sodium		50	50.4	101	90 - 110	
Vanadium		1	0.994	99.4	90 - 110	
Zinc		1	1.04	104	90 - 110	

* Exceeds LIMITS Limit

KEMRON FORMS - Modified 09/06/2007 (ICV)
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KEMRON Environmental Services

INITIAL CALIBRATION VERIFICATION (ICV)

00074573

Login Number: L0710648 Run Date: 11/01/2007 Sample ID: WG254439-06
Instrument ID: PE-ICP2 Run Time: 08:41 Method: 6010B
File ID: P2.110107.084128 Analyst: KRV Units: mg/L
Workgroup (AAB#): WG254045 Cal ID: PE-ICP - 01-NOV-07
QC Key: STD

Analyte		Expected	Found	%REC	LIMITS	Q
Aluminum		10	10.1	101	90 - 110	
Beryllium		.05	0.0497	99.4	90 - 110	
Calcium		10	10.4	104	90 - 110	
Cobalt		.2	0.203	101	90 - 110	
Iron		4	4.14	103	90 - 110	
Potassium		50	52.0	104	90 - 110	
Magnesium		10	10.1	101	90 - 110	
Sodium		50	50.5	101	90 - 110	
Vanadium		1	0.980	98.0	90 - 110	
Zinc		1	1.02	102	90 - 110	

* Exceeds LIMITS Limit

KEMRON FORMS - Modified 09/06/2007 (ICV)
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KEMRON Environmental Services

00074574

INITIAL CALIBRATION VERIFICATION (ICV)

Login Number: L0710648 Run Date: 10/31/2007 Sample ID: WG254405-06
Instrument ID: PE-ICP2 Run Time: 09:35 Method: 6010B
File ID: P2.103107.093521 Analyst: KHR Units: mg/L
Workgroup (AAB#): WG254046 Cal ID: PE-ICP - 31-OCT-07
QC Key: STD

Analyte		Expected	Found	%REC	LIMITS	Q
Aluminum		10	10.1	101	90 - 110	
Beryllium		.05	0.0507	101	90 - 110	
Calcium		10	10.4	104	90 - 110	
Cobalt		.2	0.201	100	90 - 110	
Iron		4	4.07	102	90 - 110	
Potassium		50	50.5	101	90 - 110	
Magnesium		10	9.95	99.5	90 - 110	
Sodium		50	49.4	98.8	90 - 110	
Vanadium		1	0.996	99.6	90 - 110	
Zinc		1	1.04	104	90 - 110	

* Exceeds LIMITS Limit

KEMRON FORMS - Modified 09/06/2007 (ICV)
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KEMRON Environmental Services

00074575

INITIAL CALIBRATION VERIFICATION (ICV)

Login Number: L0710648 Run Date: 11/01/2007 Sample ID: WG254439-06
Instrument ID: PE-ICP2 Run Time: 08:41 Method: 6010B
File ID: P2.110107.084128 Analyst: KRV Units: mg/L
Workgroup (AAB#): WG254046 Cal ID: PE-ICP - 01-NOV-07
QC Key: STD

Analyte		Expected	Found	%REC	LIMITS	Q
Aluminum		10	10.1	101	90 - 110	
Beryllium		.05	0.0497	99.4	90 - 110	
Calcium		10	10.4	104	90 - 110	
Cobalt		.2	0.203	101	90 - 110	
Iron		4	4.14	103	90 - 110	
Potassium		50	52.0	104	90 - 110	
Magnesium		10	10.1	101	90 - 110	
Sodium		50	50.5	101	90 - 110	
Vanadium		1	0.980	98.0	90 - 110	
Zinc		1	1.02	102	90 - 110	

* Exceeds LIMITS Limit

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KEMRON Environmental Services

00074576

CONTINUING CALIBRATION VERIFICATION (CCV)

Login Number: L0710648 Run Date: 10/29/2007 Sample ID: WG254152-10
Instrument ID: PE-ICP2 Run Time: 12:19 Method: 6010B
File ID: P2.102907.121945 Analyst: KRV QC Key: STD
Workgroup (AAB#): WG254045 Cal ID: PE-ICP - 29-OCT-07

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Aluminum		10.0	10.2	mg/L	102	90 - 110		
Beryllium		0.0500	0.0520	mg/L	104	90 - 110		
Calcium		10.0	10.4	mg/L	104	90 - 110		
Cobalt		0.200	0.209	mg/L	104	90 - 110		
Iron		4.00	4.18	mg/L	105	90 - 110		
Potassium		50.0	50.8	mg/L	102	90 - 110		
Magnesium		10.0	10.3	mg/L	103	90 - 110		
Sodium		50.0	49.6	mg/L	99.3	90 - 110		
Vanadium		1.00	1.01	mg/L	101	90 - 110		
Zinc		1.00	1.09	mg/L	109	90 - 110		

* Exceeds LIMITS Criteria

KEMRON FORMS - Modified 09/06/2007 - (CCV)
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KEMRON Environmental Services

00074577

CONTINUING CALIBRATION VERIFICATION (CCV)

Login Number: L0710648 Run Date: 10/29/2007 Sample ID: WG254152-26
Instrument ID: PE-ICP2 Run Time: 19:09 Method: 6010B
File ID: P2.102907.190922 Analyst: KRV QC Key: STD
Workgroup (AAB#): WG254045 Cal ID: PE-ICP - 29-OCT-07

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Aluminum		10.0	10.1	mg/L	101	90 - 110		
Beryllium		0.0500	0.0516	mg/L	103	90 - 110		
Calcium		10.0	10.4	mg/L	104	90 - 110		
Cobalt		0.200	0.207	mg/L	103	90 - 110		
Iron		4.00	4.17	mg/L	104	90 - 110		
Potassium		50.0	49.9	mg/L	99.7	90 - 110		
Magnesium		10.0	10.3	mg/L	103	90 - 110		
Sodium		50.0	49.8	mg/L	99.6	90 - 110		
Vanadium		1.00	1.00	mg/L	100	90 - 110		
Zinc		1.00	1.09	mg/L	109	90 - 110		

* Exceeds LIMITS Criteria

KEMRON FORMS - Modified 09/06/2007 - (CCV)
Version 1.5 PDF File ID: 920327
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KEMRON Environmental Services

00074578

CONTINUING CALIBRATION VERIFICATION (CCV)

Login Number: L0710648 Run Date: 10/29/2007 Sample ID: WG254152-28
Instrument ID: PE-ICP2 Run Time: 20:25 Method: 6010B
File ID: P2.102907.202505 Analyst: KRV QC Key: STD
Workgroup (AAB#): WG254045 Cal ID: PE-ICP - 29-OCT-07

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Aluminum		10.0	9.90	mg/L	99.0	90 - 110		
Beryllium		0.0500	0.0508	mg/L	102	90 - 110		
Calcium		10.0	10.1	mg/L	101	90 - 110		
Cobalt		0.200	0.202	mg/L	101	90 - 110		
Iron		4.00	4.24	mg/L	106	90 - 110		
Potassium		50.0	49.4	mg/L	98.9	90 - 110		
Magnesium		10.0	10.4	mg/L	104	90 - 110		
Sodium		50.0	49.2	mg/L	98.5	90 - 110		
Vanadium		1.00	0.985	mg/L	98.5	90 - 110		
Zinc		1.00	1.08	mg/L	108	90 - 110		

* Exceeds LIMITS Criteria

KEMRON FORMS - Modified 09/06/2007 - (CCV)
Version 1.5 PDF File ID: 920327
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KEMRON Environmental Services

00074579

CONTINUING CALIBRATION VERIFICATION (CCV)

Login Number: L0710648 Run Date: 10/29/2007 Sample ID: WG254152-30
Instrument ID: PE-ICP2 Run Time: 21:39 Method: 6010B
File ID: P2.102907.213939 Analyst: KRV QC Key: STD
Workgroup (AAB#): WG254045 Cal ID: PE-ICP - 29-OCT-07

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Aluminum		10.0	9.94	mg/L	99.4	90 - 110		
Beryllium		0.0500	0.0509	mg/L	102	90 - 110		
Calcium		10.0	10.1	mg/L	101	90 - 110		
Cobalt		0.200	0.204	mg/L	102	90 - 110		
Iron		4.00	4.25	mg/L	106	90 - 110		
Potassium		50.0	48.9	mg/L	97.9	90 - 110		
Magnesium		10.0	10.5	mg/L	105	90 - 110		
Sodium		50.0	49.5	mg/L	98.9	90 - 110		
Vanadium		1.00	0.984	mg/L	98.4	90 - 110		
Zinc		1.00	1.08	mg/L	108	90 - 110		

* Exceeds LIMITS Criteria

KEMRON FORMS - Modified 09/06/2007 - (CCV)
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KEMRON Environmental Services

CONTINUING CALIBRATION VERIFICATION (CCV)

00074580

Login Number: L0710648 Run Date: 10/29/2007 Sample ID: WG254152-32
Instrument ID: PE-ICP2 Run Time: 22:43 Method: 6010B
File ID: P2.102907.224333 Analyst: KRV QC Key: STD
Workgroup (AAB#): WG254045 Cal ID: PE-ICP - 29-OCT-07

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Aluminum		10.0	9.97	mg/L	99.7	90 - 110		
Beryllium		0.0500	0.0525	mg/L	105	90 - 110		
Calcium		10.0	10.4	mg/L	104	90 - 110		
Cobalt		0.200	0.211	mg/L	105	90 - 110		
Iron		4.00	4.12	mg/L	103	90 - 110		
Potassium		50.0	49.4	mg/L	98.9	90 - 110		
Magnesium		10.0	10.4	mg/L	104	90 - 110		
Sodium		50.0	50.0	mg/L	99.9	90 - 110		
Vanadium		1.00	1.02	mg/L	102	90 - 110		
Zinc		1.00	1.12	mg/L	112	90 - 110		*

* Exceeds LIMITS Criteria

KEMRON FORMS - Modified 09/06/2007 - (CCV)
Version 1.5 PDF File ID: 920327
Report generated 11/01/2007 14:43

KEMRON Environmental Services

00074581

CONTINUING CALIBRATION VERIFICATION (CCV)

Login Number: L0710648 Run Date: 10/31/2007 Sample ID: WG254405-10
Instrument ID: PE-ICP2 Run Time: 10:18 Method: 6010B
File ID: P2.103107.101817 Analyst: KHR QC Key: STD
Workgroup (AAB#): WG254046 Cal ID: PE-ICP - 31-OCT-07

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Aluminum		10.0	9.79	mg/L	97.9	90 - 110		
Beryllium		0.0500	0.0486	mg/L	97.2	90 - 110		
Calcium		10.0	10.0	mg/L	100	90 - 110		
Cobalt		0.200	0.194	mg/L	96.8	90 - 110		
Iron		4.00	3.98	mg/L	99.5	90 - 110		
Potassium		50.0	49.0	mg/L	98.0	90 - 110		
Magnesium		10.0	9.70	mg/L	97.0	90 - 110		
Sodium		50.0	48.0	mg/L	96.0	90 - 110		
Vanadium		1.00	0.949	mg/L	94.9	90 - 110		
Zinc		1.00	0.994	mg/L	99.4	90 - 110		

* Exceeds LIMITS Criteria

KEMRON FORMS - Modified 09/06/2007 - (CCV)
Version 1.5 PDF File ID: 920327
Report generated 11/01/2007 14:43

KEMRON Environmental Services

00074582

CONTINUING CALIBRATION VERIFICATION (CCV)

Login Number: L0710648 Run Date: 10/31/2007 Sample ID: WG254405-24
Instrument ID: PE-ICP2 Run Time: 17:21 Method: 6010B
File ID: P2.103107.172139 Analyst: KHR QC Key: STD
Workgroup (AAB#): WG254046 Cal ID: PE-ICP - 31-OCT-07

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Aluminum		10.0	9.63	mg/L	96.3	90 - 110		
Beryllium		0.0500	0.0475	mg/L	94.9	90 - 110		
Calcium		10.0	9.85	mg/L	98.5	90 - 110		
Cobalt		0.200	0.190	mg/L	94.8	90 - 110		
Iron		4.00	3.77	mg/L	94.3	90 - 110		
Potassium		50.0	49.3	mg/L	98.7	90 - 110		
Magnesium		10.0	9.26	mg/L	92.6	90 - 110		
Sodium		50.0	47.5	mg/L	95.0	90 - 110		
Vanadium		1.00	0.929	mg/L	92.9	90 - 110		
Zinc		1.00	0.970	mg/L	97.0	90 - 110		

* Exceeds LIMITS Criteria

KEMRON FORMS - Modified 09/06/2007 - (CCV)
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Report generated 11/01/2007 14:43

KEMRON Environmental Services

00074583

CONTINUING CALIBRATION VERIFICATION (CCV)

Login Number: L0710648 Run Date: 10/31/2007 Sample ID: WG254405-26
Instrument ID: PE-ICP2 Run Time: 18:41 Method: 6010B
File ID: P2.103107.184129 Analyst: KHR QC Key: STD
Workgroup (AAB#): WG254046 Cal ID: PE-ICP - 31-OCT-07

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Aluminum		10.0	9.59	mg/L	95.9	90 - 110		
Beryllium		0.0500	0.0472	mg/L	94.4	90 - 110		
Calcium		10.0	9.81	mg/L	98.1	90 - 110		
Cobalt		0.200	0.189	mg/L	94.4	90 - 110		
Iron		4.00	3.74	mg/L	93.5	90 - 110		
Potassium		50.0	48.0	mg/L	96.0	90 - 110		
Magnesium		10.0	9.33	mg/L	93.3	90 - 110		
Sodium		50.0	47.4	mg/L	94.9	90 - 110		
Vanadium		1.00	0.924	mg/L	92.4	90 - 110		
Zinc		1.00	0.960	mg/L	96.0	90 - 110		

* Exceeds LIMITS Criteria

KEMRON FORMS - Modified 09/06/2007 - (CCV)
Version 1.5 PDF File ID: 920327
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KEMRON Environmental Services

00074584

CONTINUING CALIBRATION VERIFICATION (CCV)

Login Number: L0710648 Run Date: 11/01/2007 Sample ID: WG254439-10
Instrument ID: PE-ICP2 Run Time: 09:04 Method: 6010B
File ID: P2.110107.090441 Analyst: KRV QC Key: STD
Workgroup (AAB#): WG254045 Cal ID: PE-ICP - 01-NOV-07

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Aluminum		10.0	10.2	mg/L	102	90 - 110		
Beryllium		0.0500	0.0505	mg/L	101	90 - 110		
Calcium		10.0	10.3	mg/L	103	90 - 110		
Cobalt		0.200	0.202	mg/L	101	90 - 110		
Iron		4.00	4.08	mg/L	102	90 - 110		
Potassium		50.0	52.1	mg/L	104	90 - 110		
Magnesium		10.0	9.95	mg/L	99.5	90 - 110		
Sodium		50.0	50.8	mg/L	102	90 - 110		
Vanadium		1.00	0.988	mg/L	98.8	90 - 110		
Zinc		1.00	1.04	mg/L	104	90 - 110		

* Exceeds LIMITS Criteria

KEMRON FORMS - Modified 09/06/2007 - (CCV)
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Report generated 11/01/2007 14:43

KEMRON Environmental Services

CONTINUING CALIBRATION VERIFICATION (CCV)

00074585

Login Number: L0710648 Run Date: 11/01/2007 Sample ID: WG254439-10
Instrument ID: PE-ICP2 Run Time: 09:04 Method: 6010B
File ID: P2.110107.090441 Analyst: KRV QC Key: STD
Workgroup (AAB#): WG254046 Cal ID: PE-ICP - 01-NOV-07

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Aluminum		10.0	10.2	mg/L	102	90 - 110		
Beryllium		0.0500	0.0505	mg/L	101	90 - 110		
Calcium		10.0	10.3	mg/L	103	90 - 110		
Cobalt		0.200	0.202	mg/L	101	90 - 110		
Iron		4.00	4.08	mg/L	102	90 - 110		
Potassium		50.0	52.1	mg/L	104	90 - 110		
Magnesium		10.0	9.95	mg/L	99.5	90 - 110		
Sodium		50.0	50.8	mg/L	102	90 - 110		
Vanadium		1.00	0.988	mg/L	98.8	90 - 110		
Zinc		1.00	1.04	mg/L	104	90 - 110		

* Exceeds LIMITS Criteria

KEMRON FORMS - Modified 09/06/2007 - (CCV)
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KEMRON Environmental Services

00074586

CONTINUING CALIBRATION VERIFICATION (CCV)

Login Number: L0710648 Run Date: 11/01/2007 Sample ID: WG254439-12
Instrument ID: PE-ICP2 Run Time: 10:36 Method: 6010B
File ID: P2.110107.103640 Analyst: KRV QC Key: STD
Workgroup (AAB#): WG254045 Cal ID: PE-ICP - 01-NOV-07

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Aluminum		10.0	10.3	mg/L	103	90 - 110		
Beryllium		0.0500	0.0512	mg/L	102	90 - 110		
Calcium		10.0	10.6	mg/L	106	90 - 110		
Cobalt		0.200	0.207	mg/L	103	90 - 110		
Iron		4.00	4.19	mg/L	105	90 - 110		
Potassium		50.0	51.7	mg/L	103	90 - 110		
Magnesium		10.0	10.2	mg/L	102	90 - 110		
Sodium		50.0	51.1	mg/L	102	90 - 110		
Vanadium		1.00	1.01	mg/L	101	90 - 110		
Zinc		1.00	1.06	mg/L	106	90 - 110		

* Exceeds LIMITS Criteria

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KEMRON Environmental Services

00074587

CONTINUING CALIBRATION VERIFICATION (CCV)

Login Number: L0710648 Run Date: 11/01/2007 Sample ID: WG254439-12
Instrument ID: PE-ICP2 Run Time: 10:36 Method: 6010B
File ID: P2.110107.103640 Analyst: KRV QC Key: STD
Workgroup (AAB#): WG254046 Cal ID: PE-ICP - 01-NOV-07

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Aluminum		10.0	10.3	mg/L	103	90 - 110		
Beryllium		0.0500	0.0512	mg/L	102	90 - 110		
Calcium		10.0	10.6	mg/L	106	90 - 110		
Cobalt		0.200	0.207	mg/L	103	90 - 110		
Iron		4.00	4.19	mg/L	105	90 - 110		
Potassium		50.0	51.7	mg/L	103	90 - 110		
Magnesium		10.0	10.2	mg/L	102	90 - 110		
Sodium		50.0	51.1	mg/L	102	90 - 110		
Vanadium		1.00	1.01	mg/L	101	90 - 110		
Zinc		1.00	1.06	mg/L	106	90 - 110		

* Exceeds LIMITS Criteria

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KEMRON Environmental Services

CONTINUING CALIBRATION VERIFICATION (CCV)

00074588

Login Number: L0710648 Run Date: 11/01/2007 Sample ID: WG254439-14
Instrument ID: PE-ICP2 Run Time: 12:08 Method: 6010B
File ID: P2.110107.120859 Analyst: KRV QC Key: STD
Workgroup (AAB#): WG254045 Cal ID: PE-ICP - 01-NOV-07

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Aluminum		10.0	10.1	mg/L	101	90 - 110		
Beryllium		0.0500	0.0501	mg/L	100	90 - 110		
Calcium		10.0	10.4	mg/L	104	90 - 110		
Cobalt		0.200	0.203	mg/L	101	90 - 110		
Iron		4.00	4.00	mg/L	99.9	90 - 110		
Potassium		50.0	53.3	mg/L	107	90 - 110		
Magnesium		10.0	9.88	mg/L	98.8	90 - 110		
Sodium		50.0	51.0	mg/L	102	90 - 110		
Vanadium		1.00	0.983	mg/L	98.3	90 - 110		
Zinc		1.00	1.04	mg/L	104	90 - 110		

* Exceeds LIMITS Criteria

KEMRON FORMS - Modified 09/06/2007 - (CCV)
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Report generated 11/01/2007 14:43

KEMRON Environmental Services

00074589

CONTINUING CALIBRATION VERIFICATION (CCV)

Login Number: L0710648 Run Date: 11/01/2007 Sample ID: WG254439-16
Instrument ID: PE-ICP2 Run Time: 13:24 Method: 6010B
File ID: P2.110107.132444 Analyst: KRV QC Key: STD
Workgroup (AAB#): WG254045 Cal ID: PE-ICP - 01-NOV-07

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Aluminum		10.0	10.3	mg/L	103	90 - 110		
Beryllium		0.0500	0.0507	mg/L	101	90 - 110		
Calcium		10.0	10.5	mg/L	105	90 - 110		
Cobalt		0.200	0.208	mg/L	104	90 - 110		
Iron		4.00	4.12	mg/L	103	90 - 110		
Potassium		50.0	53.6	mg/L	107	90 - 110		
Magnesium		10.0	10.2	mg/L	102	90 - 110		
Sodium		50.0	51.5	mg/L	103	90 - 110		
Vanadium		1.00	1.00	mg/L	100	90 - 110		
Zinc		1.00	1.07	mg/L	107	90 - 110		

* Exceeds LIMITS Criteria

KEMRON FORMS - Modified 09/06/2007 - (CCV)
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Report generated 11/01/2007 14:43

KEMRON ENVIRONMENTAL SERVICES
INTERFERENCE CHECK SAMPLES

Login number: L0710648 **Workgroup (AAB#):** WG254046
Instrument ID: PE-ICP2 **Method:** 6010B
Sol. A : WG254405-08 **File ID:** P2.103107.094822 **Units:** mg/L
Sol. AB : WG254405-09 **File ID:** P2.103107.095342

	Sol. A			Sol. AB			
ANALYTE	True	Found	%Recovery	True	Found	%Recovery	Q
Aluminum	250	247	98.8	250	247	98.8	
Beryllium	NS	0.000300	NS	0.250	0.247	98.8	
Calcium	250	255	102	250	261	104	
Cobalt	NS	0.000420	NS	0.250	0.235	94.0	
Iron	100	98.2	98.2	100	99.6	99.6	
Magnesium	250	254	102	250	258	103	
Potassium	NS	-0.411	NS	5.00	5.85	117	
Sodium	NS	0.0668	NS	5.00	5.36	107	
Vanadium	NS	0.00800	NS	0.250	0.252	101	
Zinc	NS	-0.00707	NS	0.500	0.466	93.2	

NS = Not spiked
*** = Recovery of spiked element is outside acceptance limit of 80% - 120% of true value.**
 # = Result for unspiked element is outside the acceptance limits of (+/-) the project reporting limit (RL).

KEMRON ENVIRONMENTAL SERVICES
INTERFERENCE CHECK SAMPLES

Login number: L0710648 **Workgroup (AAB#):** WG254046
Instrument ID: PE-ICP2 **Method:** 6010B
Sol. A : WG254439-08 **File ID:** P2.110107.085358 **Units:** mg/L
Sol. AB : WG254439-09 **File ID:** P2.110107.085917

	Sol. A			Sol. AB			
ANALYTE	True	Found	%Recovery	True	Found	%Recovery	Q
Aluminum	250	253	101	250	253	101	
Beryllium	NS	-0.000100	NS	0.250	0.250	100	
Calcium	250	258	103	250	267	107	
Cobalt	NS	0.000720	NS	0.250	0.241	96.4	
Iron	100	102	102	100	103	103	
Magnesium	250	264	106	250	265	106	
Potassium	NS	-0.493	NS	5.00	5.98	120	
Sodium	NS	0.0621	NS	5.00	5.65	113	
Vanadium	NS	0.00604	NS	0.250	0.257	103	
Zinc	NS	-0.00559	NS	0.500	0.479	95.8	

NS = Not spiked
*** = Recovery of spiked element is outside acceptance limit of 80% - 120% of true value.**
 # = Result for unspiked element is outside the acceptance limits of (+/-) the project reporting limit (RL).

KEMRON ENVIRONMENTAL SERVICES
INTERFERENCE CHECK SAMPLES

Login number: L0710648 **Workgroup (AAB#):** WG254045
Instrument ID: PE-ICP2 **Method:** 6010B
Sol. A : WG254152-08 **File ID:** P2.102907.120906 **Units:** mg/L
Sol. AB : WG254152-09 **File ID:** P2.102907.121426

	Sol. A			Sol. AB			
ANALYTE	True	Found	%Recovery	True	Found	%Recovery	Q
Aluminum	250	249	99.6	250	249	99.6	
Beryllium	NS	-0.000350	NS	0.250	0.254	102	
Calcium	250	262	105	250	273	109	
Cobalt	NS	-0.000570	NS	0.250	0.246	98.4	
Iron	100	101	101	100	103	103	
Magnesium	250	263	105	250	269	108	
Potassium	NS	0.112	NS	5.00	6.05	121	*
Sodium	NS	0.0575	NS	5.00	5.22	104	
Vanadium	NS	0.00154	NS	0.250	0.254	102	
Zinc	NS	0.0000500	NS	0.500	0.508	102	

NS = Not spiked
*** = Recovery of spiked element is outside acceptance limit of 80% - 120% of true value.**
 # = Result for unspiked element is outside the acceptance limits of (+/-) the project reporting limit (RL).

KEMRON ENVIRONMENTAL SERVICES
INTERFERENCE CHECK SAMPLES

Login number: L0710648 **Workgroup (AAB#):** WG254045
Instrument ID: PE-ICP2 **Method:** 6010B
Sol. A : WG254229-08 **File ID:** P2.103007.085221 **Units:** mg/L
Sol. AB : WG254229-09 **File ID:** P2.103007.085804

	Sol. A			Sol. AB			
ANALYTE	True	Found	%Recovery	True	Found	%Recovery	Q
Aluminum	250	252	101	250	252	101	
Beryllium	NS	0	NS	0.250	0.248	99.2	
Calcium	250	258	103	250	268	107	
Cobalt	NS	0.000950	NS	0.250	0.243	97.2	
Iron	100	102	102	100	107	107	
Magnesium	250	265	106	250	281	112	
Potassium	NS	0.00434	NS	5.00	5.85	117	
Sodium	NS	0.0491	NS	5.00	5.28	106	
Vanadium	NS	0.00410	NS	0.250	0.257	103	
Zinc	NS	0.00905	NS	0.500	0.498	99.6	

NS = Not spiked
*** = Recovery of spiked element is outside acceptance limit of 80% - 120% of true value.**
 # = Result for unspiked element is outside the acceptance limits of (+/-) the project reporting limit (RL).

KEMRON ENVIRONMENTAL SERVICES
INTERFERENCE CHECK SAMPLES

Login number: L0710648 **Workgroup (AAB#):** WG254045
Instrument ID: PE-ICP2 **Method:** 6010B
Sol. A : WG254439-08 **File ID:** P2.110107.085358 **Units:** mg/L
Sol. AB : WG254439-09 **File ID:** P2.110107.085917

	Sol. A			Sol. AB			
ANALYTE	True	Found	%Recovery	True	Found	%Recovery	Q
Aluminum	250	253	101	250	253	101	
Beryllium	NS	-0.000100	NS	0.250	0.250	100	
Calcium	250	258	103	250	267	107	
Cobalt	NS	0.000720	NS	0.250	0.241	96.4	
Iron	100	102	102	100	103	103	
Magnesium	250	264	106	250	265	106	
Potassium	NS	-0.493	NS	5.00	5.98	120	
Sodium	NS	0.0621	NS	5.00	5.65	113	
Vanadium	NS	0.00604	NS	0.250	0.257	103	
Zinc	NS	-0.00559	NS	0.500	0.479	95.8	

NS = Not spiked
*** = Recovery of spiked element is outside acceptance limit of 80% - 120% of true value.**
 # = Result for unspiked element is outside the acceptance limits of (+/-) the project reporting limit (RL).

Login Number: L0710648 **Date:** 01/08/2007
Insturment ID: PE-ICP2 **Method:** 6010B

Analyte	Wave Length	AG	AL	AS	B	BA
ALUMINUM	396.15	0	0	0.206	0	0
ANTIMONY	206.84	0	0	-0.740	0	0
ARSENIC	188.98	0	0.0237	0	0	0
BARIUM	233.53	0	0	0	0	0
BERYLLIUM	234.86	0	0	0	0	0
BORON	249.68	0	0	0	0	0
CADMIUM	228.80	0	-0.000453	1.00	0	0
CALCIUM	227.55	0	-0.370	0.0414	0	0
CHROMIUM	267.72	0	0	0	0	0
COBALT	228.62	0	0	0	0	-0.0647
COPPER	327.39	0	0	0	0	0
IRON	239.56	0	0	0	0	0
LEAD	220.35	0	-0.143	0	0	0
LITHIUM	670.78	0	0	0	0	0
MAGNESIUM	279.08	0	0	0	0	0
MANGANESE	257.61	-0.185	0	-0.231	-0.0949	-0.230
MOLYBDENUM	202.03	0	0	0	0	0
NICKEL	231.60	0	0	0	0	0
POTASSIUM	766.49	0	0	0	0	0
SELENIUM	196.03	0	0.0416	0	0	0
SILICON	251.61	0	0	0	0	0
SILVER	328.07	0	0	0	0	0
SODIUM	589.59	0	0	0	0	0
STRONTIUM	407.77	0	0	0	0	0
THALLIUM	190.80	0	0	0	0	0
TIN	189.93	0	0	0	0	0
TITANIUM	334.94	0	0	0	0	0
VANADIUM	290.88	0.504	0	0.200	0	-0.130
ZINC	206.20	0	0	0	0	0

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Login Number: L0710648 **Date:** 01/08/2007
Insturment ID: PE-ICP2 **Method:** 6010B

Analyte	Wave Length	BE	CA	CD	CO	CR
ALUMINUM	396.15	0	0.274	0	0	0
ANTIMONY	206.84	0	0	0	0	19.8
ARSENIC	188.98	0	-0.0104	-0.0875	0	-3.78
BARIUM	233.53	0	0	0	0	0
BERYLLIUM	234.86	0	0	0	0	-0.0105
BORON	249.68	0	0.0238	50.1	3.51	1.50
CADMIUM	228.80	0	0	0	-7.33	0
CALCIUM	227.55	0	0	0	174	-21.8
CHROMIUM	267.72	0	0	0	0	0
COBALT	228.62	0	0	0	0	0.436
COPPER	327.39	0	-0.0137	0	0.380	-0.0467
IRON	239.56	0	0.0227	0	1.91	0.331
LEAD	220.35	0	-0.0214	0	0.666	-0.100
LITHIUM	670.78	0	0	0	0	0
MAGNESIUM	279.08	0	0.638	0	0	0
MANGANESE	257.61	-1.04	-0.0173	-0.755	-0.0418	-0.110
MOLYBDENUM	202.03	0	0	0	0	0
NICKEL	231.60	0	0	0	0.948	0
POTASSIUM	766.49	0	0	0	0	0
SELENIUM	196.03	0	0.0228	0	-0.382	0
SILICON	251.61	0	0	0	0	0
SILVER	328.07	0	0	0	0	0
SODIUM	589.59	0	0	0	0	0
STRONTIUM	407.77	0	0	0	0	0
THALLIUM	190.80	0	0	0	2.97	0
TIN	189.93	0	0	0	0	0
TITANIUM	334.94	0	-0.0233	0	0	0.297
VANADIUM	290.88	0	0.00481	0	0	0
ZINC	206.20	0	0.00300	0	0	-6.39

KEMRON FORMS - Modified 02/14/2006
Version 1.5 PDF File ID: 920322
Report generated 11/01/2007 14:43

Login Number: L0710648 **Date:** 01/08/2007
Insturment ID: PE-ICP2 **Method:** 6010B

Analyte	Wave Length	CU	FE	K	LI	MG
ALUMINUM	396.15	0	0.108	0	0	0
ANTIMONY	206.84	0	0	0	0	0
ARSENIC	188.98	0	-0.115	0	0	0.0133
BARIUM	233.53	0	0.0217	0	0	0
BERYLLIUM	234.86	0	0.171	0	0	0
BORON	249.68	0	-4.09	0	0	0
CADMIUM	228.80	0	-0.00172	0	0	0
CALCIUM	227.55	-2.44	-8.15	0	0	0.104
CHROMIUM	267.72	0	-0.0115	0	0	0
COBALT	228.62	0	0	0	0	0
COPPER	327.39	0	-0.0550	0	0	0
IRON	239.56	0	0	0	0	0.0276
LEAD	220.35	0.341	0.0593	0	0	0
LITHIUM	670.78	0	0	0	0	0
MAGNESIUM	279.08	0	0.174	0	0	0
MANGANESE	257.61	-0.0457	-0.0659	-0.0181	-0.794	0.0147
MOLYBDENUM	202.03	0	-0.0342	0	11.9	0
NICKEL	231.60	0	0	0	0	0
POTASSIUM	766.49	0	0.831	0	0	0
SELENIUM	196.03	0	-0.444	0	0	0.00120
SILICON	251.61	0	0	0	0	0
SILVER	328.07	0.0717	-0.0541	0	0	0.00521
SODIUM	589.59	0	0	0	0	0
STRONTIUM	407.77	0	-16.4	0	0	0
THALLIUM	190.80	0	0	0	0	0
TIN	189.93	0	0	0	0	0
TITANIUM	334.94	0	0	0	0	0.0284
VANADIUM	290.88	0	-0.0723	0	0	-0.0542
ZINC	206.20	-0.309	0.00450	0	0	0

KEMRON FORMS - Modified 02/14/2006
Version 1.5 PDF File ID: 920322
Report generated 11/01/2007 14:43

Login Number: L0710648 **Date:** 01/08/2007
Insturment ID: PE-ICP2 **Method:** 6010B

Analyte	Wave Length	MN	MO	NA	NI	PB
ALUMINUM	396.15	0	51.0	0	0	0
ANTIMONY	206.84	0	-17.4	0	0	0
ARSENIC	188.98	0	3.15	0	0	0
BARIUM	233.53	0	-0.740	0	0	0
BERYLLIUM	234.86	-0.131	-0.545	0	-0.00974	0
BORON	249.68	0	-2.08	0	0	0
CADMIUM	228.80	0	0	0	-0.0660	0
CALCIUM	227.55	0	-25.0	0	-1100	0
CHROMIUM	267.72	0.554	-0.0135	0	0	0
COBALT	228.62	0	-0.668	0	0.129	0
COPPER	327.39	0	-0.519	0	-0.0905	-0.0630
IRON	239.56	-1.38	0	0	0	0
LEAD	220.35	0.232	-2.35	0	0	0
LITHIUM	670.78	0	0	0	0	0
MAGNESIUM	279.08	0	-5.58	0	0	0.0252
MANGANESE	257.61	0	-0.0482	-0.00916	-0.0340	-0.0413
MOLYBDENUM	202.03	-0.209	0	0	0.134	0
NICKEL	231.60	0	0	0	0	0
POTASSIUM	766.49	0	0	0.0278	0	0
SELENIUM	196.03	1.11	0.199	0	-0.202	0
SILICON	251.61	0	12.9	0	0	0
SILVER	328.07	0.130	0.0781	0	0	0
SODIUM	589.59	0	0	0.181	0	0
STRONTIUM	407.77	0	0	0	0	0
THALLIUM	190.80	-1.50	0.660	0	0	0
TIN	189.93	0	0	0	0	0
TITANIUM	334.94	0	0	0	0	0
VANADIUM	290.88	0	0.578	0	0	0
ZINC	206.20	0	0	0	-0.244	-0.330

Login Number: L0710648 **Date:** 01/08/2007
Insturment ID: PE-ICP2 **Method:** 6010B

Analyte	Wave Length	SB	SE	SI	SN	SR
ALUMINUM	396.15	0	0	0	0	0
ANTIMONY	206.84	0	0	0	-7.64	0
ARSENIC	188.98	0	0	0	0	0
BARIUM	233.53	0	0	0	0	0
BERYLLIUM	234.86	0	0	0	0	0
BORON	249.68	0	0	0	0	0
CADMIUM	228.80	0	0	0	0	0
CALCIUM	227.55	0	0	2.79	0	0
CHROMIUM	267.72	0	-0.0706	0	0	0
COBALT	228.62	0	0	0	0	0
COPPER	327.39	0	0	0	0	0
IRON	239.56	0	0	0	0	0
LEAD	220.35	-0.117	0	0	0	0
LITHIUM	670.78	0	0	0	0	0
MAGNESIUM	279.08	0	-0.0924	0	0	0
MANGANESE	257.61	-0.0505	-0.0281	-0.185	-0.0445	-0.625
MOLYBDENUM	202.03	0	0	0	0	0
NICKEL	231.60	-0.288	-0.262	0	0	0
POTASSIUM	766.49	0	0	0	0	0
SELENIUM	196.03	0	0	0	0	0
SILICON	251.61	0	0	0	0	0
SILVER	328.07	0	0	0	0	1.61
SODIUM	589.59	0	0	0	0	0
STRONTIUM	407.77	0	0	0	0	0
THALLIUM	190.80	0	0	0	0	0
TIN	189.93	0	0	0	0	0
TITANIUM	334.94	0	0	0	0	0
VANADIUM	290.88	0	0	0	0	0
ZINC	206.20	-0.420	0	0	0	0

KEMRON Environmental Services

INTERELEMENT CORRECTION FACTORS (ANNUALLY)

Login Number: L0710648 **Date:** 01/08/2007

Insturment ID: PE-ICP2 **Method:** 6010B

Analyte	Wave Length	TI	TL	V	ZN
ALUMINUM	396.15	0	0	0	0
ANTIMONY	206.84	0	0	-3.59	0
ARSENIC	188.98	0	0	0.0930	0
BARIUM	233.53	0	0	-2.27	0
BERYLLIUM	234.86	0	0	0	0
BORON	249.68	0	0	0	0
CADMIUM	228.80	0	0	0.0980	0
CALCIUM	227.55	0	0	11.3	0
CHROMIUM	267.72	0	0	-0.605	-0.0845
COBALT	228.62	2.07	0	0	0
COPPER	327.39	-1.79	0	-0.842	-0.0613
IRON	239.56	0	0	0	0
LEAD	220.35	-0.776	0	-0.153	0
LITHIUM	670.78	0	0	0	0
MAGNESIUM	279.08	0	0	-0.0280	0
MANGANESE	257.61	-0.227	-0.0414	-0.0601	-0.0553
MOLYBDENUM	202.03	0	0	-0.288	0
NICKEL	231.60	0	0.286	0	0
POTASSIUM	766.49	0	0	0	0
SELENIUM	196.03	0	0	0.593	0
SILICON	251.61	0	0	0	0
SILVER	328.07	0	0	-6.38	0
SODIUM	589.59	0	0	0	0
STRONTIUM	407.77	0	0	0	0
THALLIUM	190.80	-10.1	0	0	0
TIN	189.93	0	0	0	0
TITANIUM	334.94	0	0	0	0
VANADIUM	290.88	0	0	0	0
ZINC	206.20	0	0	-0.100	0

KEMRON FORMS - Modified 02/14/2006
Version 1.5 PDF File ID: 920322
Report generated 11/01/2007 14:43

Login Number: L0710648 **Date:** 09/11/2007
Insturment ID: PE-ICP2 **Method:** 6010B

Analyte	Integration Time (Sec.)	Concentration (mg/L)
Aluminum	10.00	450.0
Antimony	10.00	36.0
Arsenic	10.00	9.0
Barium	10.00	9.0
Beryllium	10.00	1.8
Boron	10.00	18.0
Cadmium	10.00	2.7
Calcium	10.00	450.0
Chromium	10.00	45.0
Cobalt	10.00	45.0
Copper	10.00	45.0
Iron	10.00	360.0
Lead	10.00	45.0
Lithium	10.00	1.8
Magnesium	10.00	450.0
Manganese	10.00	27.0
Molybdenum	10.00	45.0
Nickel	10.00	45.0
Potassium	10.00	90.0
Selenium	10.00	45.0
Silicon	10.00	9.0
Silver	10.00	9.0
Sodium	10.00	180.0
Strontium	10.00	2.7
Thallium	10.00	45.0
Tin	10.00	45.0
Titanium	10.00	9.0
Vanadium	10.00	45.0
Zinc	10.00	36.0

Comments:

2.1.2 Metals ICP-MS Data

2.1.2.1 Summary Data

LABORATORY REPORT

00074604

L0710648

11/05/07 07:58

Submitted By

KEMRON Environmental Services
156 Starlite Drive
Marietta , OH 45750
(740) 373 - 4071

For

Account Name: Shaw E & I, Inc.
ABB Lummus Biulding
3010 Briarpark Drive Suite 4N
Houston, TX 77042
Attention: Larry Duty

Account Number: 2773
Work ID: LHAAP

P.O. Number: 322255 OP

Sample Analysis Summary

Client ID	Lab ID	Method	Dilution	Date Received
49WW01-102307	L0710648-01	6020	10	24-OCT-07
49WW01-102307	L0710648-02	6020	10	24-OCT-07
49WW03-102307	L0710648-03	6020	10	24-OCT-07
49WW03-102307	L0710648-04	6020	10	24-OCT-07

Report Number: **L0710648**
Report Date : **November 5, 2007**

00074605

Sample Number: **L0710648-01**
Client ID: **49WW01-102307**
Matrix: **Water**
Workgroup Number: **WG254014**
Collect Date: **10/23/2007 12:55**
Sample Tag: **DL01**

PrePrep Method: **NONE**
Prep Method: **3015**
Analytical Method: **6020**
Analyst: **JYH**
Dilution: **10**
Units: **mg/L**

Instrument: **ELAN-ICP**
Prep Date: **10/25/2007 13:30**
Cal Date: **11/01/2007 10:36**
Run Date: **11/01/2007 12:08**
File ID: **EL.110107.120830**

Analyte	CAS. Number	Result	Qual	PQL	SDL
Silver, Total	7440-22-4		U	0.0100	0.00250
Arsenic, Total	7440-38-2	0.00745	J	0.0100	0.00250
Barium, Total	7440-39-3	0.0260	J	0.0300	0.00500
Cadmium, Total	7440-43-9		U	0.00500	0.00125
Chromium, Total	7440-47-3	0.0394		0.0200	0.00500
Copper, Total	7440-50-8		U	0.0200	0.00500
Lead, Total	7439-92-1		U	0.00500	0.00250
Manganese, Total	7439-96-5	0.166		0.0200	0.00500
Nickel, Total	7440-02-0	0.0349	J	0.0400	0.0100
Antimony, Total	7440-36-0		U	0.0100	0.00250
Selenium, Total	7782-49-2	0.0363		0.0100	0.00500
Thallium, Total	7440-28-0	0.00428		0.00200	0.000500

J The analyte was positively identified, but the quantitation was below the RL
U Not detected at or above adjusted sample detection limit

Report Number: **L0710648**
Report Date : **November 5, 2007**

00074606

Sample Number: **L0710648-02**
Client ID: **49WW01-102307**
Matrix: **Water**
Workgroup Number: **WG254014**
Collect Date: **10/23/2007 12:55**
Sample Tag: **DL01**

PrePrep Method: **NONE**
Prep Method: **3015**
Analytical Method: **6020**
Analyst: **JYH**
Dilution: **10**
Units: **mg/L**

Instrument: **ELAN-ICP**
Prep Date: **10/25/2007 13:30**
Cal Date: **11/01/2007 10:36**
Run Date: **11/01/2007 12:15**
File ID: **EL.110107.121502**

Analyte	CAS. Number	Result	Qual	PQL	SDL
Silver, Dissolved	7440-22-4		U	0.0100	0.00250
Arsenic, Dissolved	7440-38-2	0.00365	J	0.0100	0.00250
Barium, Dissolved	7440-39-3	0.0288	J	0.0300	0.00500
Cadmium, Dissolved	7440-43-9		U	0.00500	0.00125
Chromium, Dissolved	7440-47-3	0.00885	J	0.0200	0.00500
Copper, Dissolved	7440-50-8		U	0.0200	0.00500
Lead, Dissolved	7439-92-1		U	0.00500	0.00250
Manganese, Dissolved	7439-96-5	0.119		0.0200	0.00500
Nickel, Dissolved	7440-02-0	0.0512		0.0400	0.0100
Antimony, Dissolved	7440-36-0		U	0.0100	0.00250
Selenium, Dissolved	7782-49-2	0.0174		0.0100	0.00500
Thallium, Dissolved	7440-28-0	0.00332		0.00200	0.000500

J The analyte was positively identified, but the quantitation was below the RL
U Not detected at or above adjusted sample detection limit

Report Number: **L0710648**
Report Date : **November 5, 2007**

00074607

Sample Number: **L0710648-03**
Client ID: **49WW03-102307**
Matrix: **Water**
Workgroup Number: **WG254014**
Collect Date: **10/23/2007 11:10**
Sample Tag: **DL01**

PrePrep Method: **NONE**
Prep Method: **3015**
Analytical Method: **6020**
Analyst: **JYH**
Dilution: **10**
Units: **mg/L**

Instrument: **ELAN-ICP**
Prep Date: **10/25/2007 13:30**
Cal Date: **11/01/2007 10:36**
Run Date: **11/01/2007 12:49**
File ID: **EL.110107.124909**

Analyte	CAS. Number	Result	Qual	PQL	SDL
Silver, Total	7440-22-4		U	0.0100	0.00250
Arsenic, Total	7440-38-2	0.0131		0.0100	0.00250
Barium, Total	7440-39-3	0.0878		0.0300	0.00500
Cadmium, Total	7440-43-9		U	0.00500	0.00125
Chromium, Total	7440-47-3	0.0676		0.0200	0.00500
Copper, Total	7440-50-8		U	0.0200	0.00500
Lead, Total	7439-92-1	0.00913		0.00500	0.00250
Manganese, Total	7439-96-5	1.54		0.0200	0.00500
Nickel, Total	7440-02-0	0.896		0.0400	0.0100
Antimony, Total	7440-36-0		U	0.0100	0.00250
Selenium, Total	7782-49-2	0.0581		0.0100	0.00500
Thallium, Total	7440-28-0	0.00827		0.00200	0.000500

U Not detected at or above adjusted sample detection limit

Report Number: **L0710648**
Report Date : **November 5, 2007**

00074608

Sample Number: **L0710648-04**
Client ID: **49WW03-102307**
Matrix: **Water**
Workgroup Number: **WG254014**
Collect Date: **10/23/2007 11:10**
Sample Tag: **DL01**

PrePrep Method: **NONE**
Prep Method: **3015**
Analytical Method: **6020**
Analyst: **JYH**
Dilution: **10**
Units: **mg/L**

Instrument: **ELAN-ICP**
Prep Date: **10/25/2007 13:30**
Cal Date: **11/01/2007 10:36**
Run Date: **11/01/2007 12:55**
File ID: **EL.110107.125542**

Analyte	CAS. Number	Result	Qual	PQL	SDL
Silver, Dissolved	7440-22-4		U	0.0100	0.00250
Arsenic, Dissolved	7440-38-2	0.00714	J	0.0100	0.00250
Barium, Dissolved	7440-39-3	0.0859		0.0300	0.00500
Cadmium, Dissolved	7440-43-9		U	0.00500	0.00125
Chromium, Dissolved	7440-47-3	0.00740	J	0.0200	0.00500
Copper, Dissolved	7440-50-8		U	0.0200	0.00500
Lead, Dissolved	7439-92-1	0.00921		0.00500	0.00250
Manganese, Dissolved	7439-96-5	1.42		0.0200	0.00500
Nickel, Dissolved	7440-02-0	0.915		0.0400	0.0100
Antimony, Dissolved	7440-36-0		U	0.0100	0.00250
Selenium, Dissolved	7782-49-2	0.0291		0.0100	0.00500
Thallium, Dissolved	7440-28-0	0.00728		0.00200	0.000500

J The analyte was positively identified, but the quantitation was below the RL
U Not detected at or above adjusted sample detection limit

2.1.2.2 QC Summary Data

Example 6020 Calculations
Perkin Elmer ELAN 6100

1.0 Initial Calibration (ICAL) Parameters
The system performs linear regression from data consisting of a blank and three standards.

2.0 Calculating the concentration (C) of an element in water using data from prep log, run log, and quantitation report (note:the data system performs this calculation automatically when correction factors have been entered):

$$Cx = Cs \times \frac{Vf}{Vi} \times D$$

Where:	**Example:**
Cs = Concentration computed by the data system (ug/L)	0.1
Vf = Final volume	100
Vi = Initial volume	40
D = Dilution factor as a multiplier (10X = 10)	1
Cx = Concentration of element in (ug/L)	0.25

3.0 Calculating the concentration (C) of an element in soil using data from prep log, run log, and quantitation report (note: the data system performs this calculation automatically when correction factors have been entered):

$$Cx = Cs \times \frac{Vf}{Vi} \times D$$

Where:	**Example:**
Cs = Concentration computed by the data system (ug/L)	0.1
Vf = Final volume	200
Vi = Initial volume	0.5
D = Dilution factor as a multiplier (10X = 10)	1
Cx = Concentration of element in (ug/kg)	40

4.0 Adjusting the concentration to dry weight:

$$Cdry = \frac{Cx \times 100}{Px}$$

Where:	**Example:**
Cx = Concentration calculated as received (wet basis)	40
Px = Percent solids of sample (%wt)	80
$Cdry$ = Concentration calculated as dry weight (ug/kg)	50

50 ug/kg = 0.050 mg/kg

Perkin Elmer ELAN ICP/MS

STANDARDS KEY

QC Std 1 - ICV
QC Std 2 - ICB
QC Std 3 - CRI - Soil
QC Std 4 - CRI - Water
QC Std 5 - ICSA
QC Std 6 - ICSAB
QC Std 7 - CCV
QC Std 8 - CCB

Calibration Solutions

Analyte	Stock Conc. (mg/L)	S1 (mg/L)	S2 (mg/L)	S3 (mg/L)	S4 (mg/L)
Al	10	0	0.0004	0.05	0.1
Sb	10	0	0.0004	0.05	0.1
As	10	0	0.0004	0.05	0.1
Ba	10	0	0.0004	0.05	0.1
Be	10	0	0.0004	0.05	0.1
Ca	1000	0	0.04	5	10
Cd	10	0	0.0004	0.05	0.1
Cr	10	0	0.0004	0.05	0.1
Co	10	0	0.0004	0.05	0.1
Cu	10	0	0.0004	0.05	0.1
Fe	1000	0	0.04	5	10
Pb	10	0	0.0004	0.05	0.1
Mg	1000	0	0.04	5	10
Mn	10	0	0.0004	0.05	0.1
Ni	10	0	0.0004	0.05	0.1
K	1000	0	0.04	5	10
Se	10	0	0.0004	0.05	0.1
Ag	10	0	0.0004	0.05	0.1
Na	1000	0	0.04	5	10
Tl	10	0	0.0004	0.05	0.1
V	10	0	0.0004	0.05	0.1
Zn	10	0	0.0004	0.05	0.1

KEMRON ENVIRONMENTAL SERVICES

Microwave Digestion Log

Analyst(s): VC
Date: 10/25/07 13:30
LCS: 125 mL STD21717
MS/MSD: 125 mL STD21717
Witness: #
HNO_3 Lot #: Con 12417
HCl Lot #:
Digest Tube Lot #: Con D609
Earliest Sample Due Date: 10/31
Microwave # MW2

Box: 82 129512
Digestion Work Group: WG 253882

ME407 Revision # 8 Method 3015-Water
ME406 Revision # _____ Method 3051-Soil-Oil

Relinquished By: VC
Digest Received By: [signature] Date: 10/25/07

	KEMRON #	Initial Wt/Vol	Final Volume	Initial Weight	Final Weight	Comments	Due Date
1	PBW 27	45 mL	100 mL	20602	20595		
2	LCS			20646	20645		
3	10-572-01			26752	26738		11/2
4	02			26581	26572	Lab Filtered	
5	02 MS			20283	20277		
6	02 MSD			20699	20695		
7	03			20850	20895		
8	04			26879	26884	Lab Filtered	
9	574-01			20454	26479		11/2
10	02			20754	20788	Lab Filtered	
11	03			20748	20741		
12	04			20787	20776	Lab Filtered	
13	575-01			20715	26108		11/2
14	02			26387	26377	Lab Filtered	
15	03			26728	20776		
16	04			20541	20535	Lab Filtered	
17	05			20430	20428		
18	06			20816	20807	Lab Filtered	
19	648 01			20954	20989		10/31
20	02			20737	20724	Lab Filtered	
21	03			20784	20783		
22	04			20952	20950	Lab Filtered	
23	657-02 #			20610	20658		10/31
24							
25							
26							
27							
28							
29							
30							

OK 10/25/07

Comments: # level 4

Primary Review: [signature] 10/25/07 Secondary Review: [signature] 10/25/07

KEMRON Environmental Services

Instrument Run Log

Instrument: ELAN-ICP Dataset: 110107A.REP
Analyst1: JYH Analyst2: N/A
Method: 6020 SOP: ME700 Rev: 4
Maintenance Log ID: 19692

Calibration Std: STD22444 ICV/CCV Std: STD22445 Post Spike: STD21680
ICSA: STD22489 ICSAB: STD22490

Workgroups: 254014,254346,254305,254442

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
1	EL.110107.101016	Blank	Blank		1		11/01/07 10:10
2	EL.110107.101646	WG254456-01	Calibration Point		1		11/01/07 10:16
3	EL.110107.102316	WG254456-02	Calibration Point		1		11/01/07 10:23
4	EL.110107.102948	WG254456-03	Calibration Point		1		11/01/07 10:29
5	EL.110107.103620	WG254456-04	Calibration Point		1		11/01/07 10:36
6	EL.110107.104252	WG254456-05	Initial Calibration Verification		1		11/01/07 10:42
7	EL.110107.104934	WG254456-06	Initial Calib Blank		1		11/01/07 10:49
8	EL.110107.105617	WG254456-07	CRQL Check Solid		1		11/01/07 10:56
9	EL.110107.110253	WG254456-08	CRQL Check Water		1		11/01/07 11:02
10	EL.110107.110928	WG254456-09	Interference Check		1		11/01/07 11:09
11	EL.110107.111602	WG254456-10	Interference Check		1		11/01/07 11:16
12	EL.110107.112235	WG254456-11	CCV		1		11/01/07 11:22
13	EL.110107.112917	WG254456-12	CCB		1		11/01/07 11:29
14	EL.110107.113557	WG253882-02	Method/Prep Blank	40/100	1		11/01/07 11:35
15	EL.110107.114227	WG253882-03	Laboratory Control S	40/100	1		11/01/07 11:42
16	EL.110107.114857	WG253882-01	Reference Sample		10	L0710572-02	11/01/07 11:48
17	EL.110107.115528	WG253882-04	Matrix Spike	40/100	10	L0710572-02	11/01/07 11:55
18	EL.110107.120159	WG253882-05	Matrix Spike Duplica	40/100	10	L0710572-02	11/01/07 12:01
19	EL.110107.120830	L0710648-01	49WW01-102307	40/100	10		11/01/07 12:08
20	EL.110107.121502	L0710648-02	49WW01-102307	40/100	10		11/01/07 12:15
21	EL.110107.122134	WG254014-01	Post Digestion Spike		10	L0710648-02	11/01/07 12:21
22	EL.110107.122806	WG254014-02	Serial Dilution		50	L0710648-02	11/01/07 12:28
23	EL.110107.123439	WG254456-13	CCV		1		11/01/07 12:34
24	EL.110107.124121	WG254456-14	CCB		1		11/01/07 12:41
25	EL.110107.124909	L0710648-03	49WW03-102307	40/100	10		11/01/07 12:49
26	EL.110107.125542	L0710648-04	49WW03-102307	40/100	10		11/01/07 12:55
27	EL.110107.130215	L0710657-02	AV-NCB-EB-1-102307	40/100	1		11/01/07 13:02
28	EL.110107.130849	WG254456-15	CCV		1		11/01/07 13:08
29	EL.110107.131530	WG254456-16	CCB		1		11/01/07 13:15
30	EL.110107.132211	WG254219-03	Method/Prep Blank	.5/200	1		11/01/07 13:22
31	EL.110107.132842	WG254219-04	Laboratory Control S	.5/200	1		11/01/07 13:28
32	EL.110107.133513	L0710617-01	C5-44	.507/200	1		11/01/07 13:35
33	EL.110107.134145	WG254219-01	Reference Sample		1	L0710617-06	11/01/07 13:41
34	EL.110107.134817	WG254219-05	Matrix Spike	.5/200	1	L0710617-06	11/01/07 13:48
35	EL.110107.135450	WG254219-06	Matrix Spike Duplica	.5/200	1	L0710617-06	11/01/07 13:54
36	EL.110107.140123	L0710617-09	MRCSED04-44DUP	.5/200	1		11/01/07 14:01
37	EL.110107.140756	L0710617-10	MRCSED05-44	.503/200	1	WG254260-01	11/01/07 14:07

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Approved: November 02, 2007

Sheri L. Blaszak

KEMRON Environmental Services

Instrument Run Log

Instrument: ELAN-ICP Dataset: 110107A.REP
Analyst1: JYH Analyst2: N/A
Method: 6020 SOP: ME700 Rev: 4
Maintenance Log ID: 19692

Calibration Std: STD22444 ICV/CCV Std: STD22445 Post Spike: STD21680
ICSA: STD22489 ICSAB: STD22490

Workgroups: 254014,254346,254305,254442

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
38	EL.110107.141430	WG254346-03	Post Digestion Spike		1	L0710617-10	11/01/07 14:14
39	EL.110107.142104	WG254346-04	Serial Dilution		5	L0710617-10	11/01/07 14:21
40	EL.110107.142737	WG254456-17	CCV		1		11/01/07 14:27
41	EL.110107.143419	WG254456-18	CCB		1		11/01/07 14:34
42	EL.110107.144100	WG254456-19	Interference Check		1		11/01/07 14:41
43	EL.110107.144734	WG254456-20	Interference Check		1		11/01/07 14:47
44	EL.110107.145408	WG254456-21	CCV		1		11/01/07 14:54
45	EL.110107.150145	WG254456-22	CCB		1		11/01/07 15:01
46	EL.110107.150826	L0710562-01	BACKFILL-1	.5/200	1	WG254326-01	11/01/07 15:08
47	EL.110107.151459	L0710562-02	BACKFILL-2	.502/200	1		11/01/07 15:14
48	EL.110107.152130	L0710562-03	BACKFILL-3	.511/200	1		11/01/07 15:21
49	EL.110107.152802	L0710562-04	BACKFILL-4	.5/200	1		11/01/07 15:28
50	EL.110107.153434	WG254219-02	Reference Sample		1	L0710715-02	11/01/07 15:34
51	EL.110107.154106	WG254219-07	Matrix Spike	.5/200	1	L0710715-02	11/01/07 15:41
52	EL.110107.154739	WG254219-08	Matrix Spike Duplica	.5/200	1	L0710715-02	11/01/07 15:47
53	EL.110107.155411	L0710715-04	BH5-1-4	.5/200	1	WG253954-03	11/01/07 15:54
54	EL.110107.160044	WG254346-01	Post Digestion Spike		1	L0710715-04	11/01/07 16:00
55	EL.110107.160718	WG254346-02	Serial Dilution		5	L0710715-04	11/01/07 16:07
56	EL.110107.161351	WG254456-23	CCV		1		11/01/07 16:13
57	EL.110107.162033	WG254456-24	CCB		1		11/01/07 16:20
58	EL.110107.162715	L0710715-01	BH5-1-2	.5/200	1		11/01/07 16:27
59	EL.110107.163349	L0710772-03	SOL01-SO-01	.503/200	1	WG254213-04	11/01/07 16:33
60	EL.110107.164024	L0710774-01	BH5-2-1	.5/200	1		11/01/07 16:40
61	EL.110107.164657	L0710774-02	BH5-2-2	.502/200	1		11/01/07 16:46
62	EL.110107.165329	L0710774-03	BH5-2-3	.51/200	1		11/01/07 16:53
63	EL.110107.170202	L0710562-01	BACKFILL-1	.5/200	10	WG254326-01	11/01/07 17:02
64	EL.110107.170834	L0710562-02	BACKFILL-2	.502/200	10		11/01/07 17:08
65	EL.110107.171506	L0710562-03	BACKFILL-3	.511/200	10		11/01/07 17:15
66	EL.110107.172137	L0710562-04	BACKFILL-4	.5/200	10		11/01/07 17:21
67	EL.110107.172809	WG254456-25	CCV		1		11/01/07 17:28
68	EL.110107.173451	WG254456-26	CCB		1		11/01/07 17:34
69	EL.110107.174131	L0710572-01	TWP-01	40/100	10		11/01/07 17:41
70	EL.110107.174802	L0710572-03	TWP-02	40/100	10		11/01/07 17:48
71	EL.110107.175433	L0710572-04	TWP-02	40/100	10		11/01/07 17:54
72	EL.110107.180104	L0710574-01	LAS-01	40/100	10		11/01/07 18:01
73	EL.110107.180736	L0710574-02	LAS-01	40/100	10		11/01/07 18:07
74	EL.110107.181407	L0710574-03	LAS-02	40/100	10		11/01/07 18:14

Approved: November 02, 2007

Sheri L. Blakeman

KEMRON Environmental Services

Instrument Run Log

Instrument: ELAN-ICP Dataset: 110107A.REP
Analyst1: JYH Analyst2: N/A
Method: 6020 SOP: ME700 Rev: 4
Maintenance Log ID: 19692

Calibration Std: STD22444 ICV/CCV Std: STD22445 Post Spike: STD21680
ICSA: STD22489 ICSAB: STD22490

Workgroups: 254014,254346,254305,254442

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
75	EL.110107.182040	L0710574-04	LAS-02	40/100	10		11/01/07 18:20
76	EL.110107.182712	L0710575-01	WAR 01	40/100	20		11/01/07 18:27
77	EL.110107.183345	L0710575-02	WAR 01	40/100	10		11/01/07 18:33
78	EL.110107.184019	L0710575-03	WAR 02	40/100	10		11/01/07 18:40
79	EL.110107.184652	WG254456-27	CCV		1		11/01/07 18:46
80	EL.110107.185333	WG254456-28	CCB		1		11/01/07 18:53
81	EL.110107.190015	L0710575-04	WAR 02	40/100	10		11/01/07 19:00
82	EL.110107.190649	L0710575-05	WAR 03	40/100	10		11/01/07 19:06
83	EL.110107.191322	L0710575-06	WAR 03	40/100	10		11/01/07 19:13
84	EL.110107.191953	WG254456-29	CCV		1		11/01/07 19:19
85	EL.110107.192635	WG254456-30	CCB		1		11/01/07 19:26
86	EL.110107.193316	WG254411-02	Method/Prep Blank		1		11/01/07 19:33
87	EL.110107.193948	WG254411-03	Laboratory Control S		1		11/01/07 19:39
88	EL.110107.194621	WG254411-01	Reference Sample		1	L0710829-01	11/01/07 19:46
89	EL.110107.195254	WG254411-04	Matrix Spike		1	L0710829-01	11/01/07 19:52
90	EL.110107.195927	WG254411-05	Matrix Spike Duplica		1	L0710829-01	11/01/07 19:59
91	EL.110107.200600	L0710914-01	ABC 242-1		1	WG254474-01	11/01/07 20:06
92	EL.110107.201234	L0710806-01	BH5-2-4		1		11/01/07 20:12
93	EL.110107.201909	L0710829-07	OB2SE6		1		11/01/07 20:19
94	EL.110107.202543	WG254448-01	Post Digestion Spike		1	L0710829-16	11/01/07 20:25
95	EL.110107.203219	WG254448-02	Serial Dilution		5	L0710829-16	11/01/07 20:32
96	EL.110107.203852	WG254456-31	CCV		1		11/01/07 20:38
97	EL.110107.204534	WG254456-32	CCB		1		11/01/07 20:45
98	EL.110107.205215	L0710829-08	OB2SE6D		1		11/01/07 20:52
99	EL.110107.205847	L0710829-11	OB2SE7		1		11/01/07 20:58
100	EL.110107.210520	L0710829-13	OB2SE8		1		11/01/07 21:05
101	EL.110107.211153	L0710829-16	OB2SE12		1		11/01/07 21:11
102	EL.110107.211826	L0710829-17	OB2SE11		1		11/01/07 21:18
103	EL.110107.212459	L0710829-18	OB2SE4		1		11/01/07 21:24
104	EL.110107.213133	L0710829-20	OB2SE1		1		11/01/07 21:31
105	EL.110107.213808	L0710829-21	OB2SE2		1		11/01/07 21:38
106	EL.110107.214442	L0710829-24	OB2SE10		1		11/01/07 21:44
107	EL.110107.215117	WG254078-01	Reference Sample		5	L0710640-01	11/01/07 21:51
108	EL.110107.215751	WG254456-33	CCV		1		11/01/07 21:57
109	EL.110107.220433	WG254456-34	CCB		1		11/01/07 22:04
110	EL.110107.221115	WG254078-04	Matrix Spike	40/100	5	L0710640-01	11/01/07 22:11
111	EL.110107.221751	WG254078-05	Matrix Spike Duplica	40/100	5	L0710640-01	11/01/07 22:17

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Approved: November 02, 2007

Sheri L. Blaszak

KEMRON Environmental Services

Instrument Run Log

Instrument: ELAN-ICP Dataset: 110107A.REP
Analyst1: JYH Analyst2: N/A
Method: 6020 SOP: ME700 Rev: 4
Maintenance Log ID: 19692

Calibration Std: STD22444 ICV/CCV Std: STD22445 Post Spike: STD21680
ICSA: STD22489 ICSAB: STD22490

Workgroups: 254014,254346,254305,254442

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
112	EL.110107.222425	L0710640-05	TRC1	40/100	5		11/01/07 22:24
113	EL.110107.223057	L0710640-07	TRC2	40/100	5		11/01/07 22:30
114	EL.110107.223730	L0710640-08	TRC2	40/100	5		11/01/07 22:37
115	EL.110107.224403	L0710640-09	DU-07402	40/100	5		11/01/07 22:44
116	EL.110107.225037	L0710640-10	DU-07402	40/100	5		11/01/07 22:50
117	EL.110107.225711	WG254408-03	Method/Prep Blank	40/100	1		11/01/07 22:57
118	EL.110107.230345	WG254408-04	Laboratory Control S	40/100	1		11/01/07 23:03
119	EL.110107.231020	WG254408-01	Reference Sample		1		11/01/07 23:10
120	EL.110107.231653	WG254456-35	CCV		1		11/01/07 23:16
121	EL.110107.232335	WG254456-36	CCB		1		11/01/07 23:23
122	EL.110107.233017	WG254408-05	Matrix Spike	40/100	1	L0710820-12	11/01/07 23:30
123	EL.110107.233653	WG254408-06	Matrix Spike Duplica	40/100	1	L0710820-12	11/01/07 23:36
124	EL.110107.234328	L0710820-01	10-171-07	40/100	1	WG254291-01	11/01/07 23:43
125	EL.110107.235004	WG254442-01	Post Digestion Spike		1	L0710820-01	11/01/07 23:50
126	EL.110107.235639	WG254442-02	Serial Dilution		5	L0710820-01	11/01/07 23:56
127	EL.110207.000311	L0710899-01	OUTFALL 002/COMP	40/100	4	WG254408-02	11/02/07 00:03
128	EL.110207.000945	WG254408-07	Duplicate		4	L0710899-01	11/02/07 00:09
129	EL.110207.001618	WG254456-37	CCV		1		11/02/07 00:16
130	EL.110207.002259	WG254456-38	CCB		1		11/02/07 00:22
131	EL.110207.002941	L0710915-01	IDW-B711-B711OWS-010	40/100	1		11/02/07 00:29
132	EL.110207.003615	L0710820-02	10-172-07	40/100	1		11/02/07 00:36
133	EL.110207.004249	L0710820-03	10-173-07	40/100	1		11/02/07 00:42
134	EL.110207.004923	L0710820-04	10-174-07	40/100	5		11/02/07 00:49
135	EL.110207.005558	L0710820-05	10-175-07	40/100	5		11/02/07 00:55
136	EL.110207.010234	L0710820-06	10-176-07	40/100	5		11/02/07 01:02
137	EL.110207.010909	L0710820-07	10-177-07	40/100	5		11/02/07 01:09
138	EL.110207.011545	L0710820-08	10-178-07	40/100	1		11/02/07 01:15
139	EL.110207.012221	L0710820-09	10-179-07	40/100	1		11/02/07 01:22
140	EL.110207.012856	L0710820-10	10-180-07	40/100	1		11/02/07 01:28
141	EL.110207.013529	WG254456-39	CCV		1		11/02/07 01:35
142	EL.110207.014210	WG254456-40	CCB		1		11/02/07 01:42
143	EL.110207.014852	L0710820-11	10-181-07	40/100	1		11/02/07 01:48
144	EL.110207.015526	L0710820-15	10-183-07	40/100	1		11/02/07 01:55
145	EL.110207.020159	L0710820-16	10-184-07	40/100	1		11/02/07 02:01
146	EL.110207.020834	L0710820-17	10-185-07	40/100	1		11/02/07 02:08
147	EL.110207.021508	L0710820-18	10-186-07	40/100	1		11/02/07 02:15
148	EL.110207.022142	WG254456-41	CCV		1		11/02/07 02:21

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Approved: November 02, 2007

Sheri L. Blaszak

KEMRON Environmental Services

Instrument Run Log

Instrument: ELAN-ICP Dataset: 110107A.REP
Analyst1: JYH Analyst2: N/A
Method: 6020 SOP: ME700 Rev: 4
Maintenance Log ID: 19692

Calibration Std: STD22444 ICV/CCV Std: STD22445 Post Spike: STD21680
ICSA: STD22489 ICSAB: STD22490

Workgroups: 254014,254346,254305,254442

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
149	EL.110207.022823	WG254456-42	CCB		1		11/02/07 02:28

Approved: November 02, 2007

Sheri L. Blakeman

KEMRON Environmental Services
Data Checklist

Date: 01-NOV-2007
Analyst: JYH
Analyst: NA
Method: 6020
Instrument: ELAN
Curve Workgroup: 254456
Runlog ID: 19066
Analytical Workgroups: 254014,254346,254305,254442

Calibration/Linearity	X
ICV/CCV	X
ICB/CCB	X
ICSA/ICSAB	X
CRI	X
Blank/LCS	X
MS/MSD	X
Post Spike/Serial Dilution	X
Upload Results	X
Data Qualifiers	
Generate PDF Instrument Data	X
Sign/Annotate PDF Data	X
Upload Curve Data	X
Workgroup Forms	
Case Narrative	572,574,575,648,657,562,617,715,772
	774,640
Client Forms	X
Level X	572,574,575,772
Level 3	
Level 4	648,657,562,617,715,774
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Primary Reviewer	JYH
Secondary Reviewer	SLP
Comments	

Primary Reviewer:

Secondary Reviewer:
02-NOV-2007

Generated: NOV-02-2007 14:34:35

KEMRON Environmental Services
HOLDING TIMES
EQUIVALENT TO AFCEE FORM 9

Analytical Method: 6020 **AAB#:** WG254014
Login Number: L0710648

Client ID	Date Collected	Date Received	Date Extracted	Max Hold Time Ext.	Time Held Ext.	Date Analyzed	Max Hold Time Anal	Time Held Anal.	Q
49WW01-102307	10/23/07	10/24/07	10/25/07	180	2.02	11/01/07	180	6.95	
49WW03-102307	10/23/07	10/24/07	10/25/07	180	2.10	11/01/07	180	6.97	
49WW03-102307	10/23/07	10/24/07	10/25/07	180	2.10	11/01/07	180	6.98	
49WW01-102307	10/23/07	10/24/07	10/25/07	180	2.02	11/01/07	180	6.94	

*** EXT = SEE PROJECT QAPP REQUIREMENTS**
***ANAL = SEE PROJECT QAPP REQUIREMENTS**

METHOD BLANK SUMMARY

Login Number:	L0710648	Work Group:	WG254014
Blank File ID:	EL.110107.113557	Blank Sample ID:	WG253882-02
Prep Date:	10/25/07 13:30	Instrument ID:	ELAN-ICP
Analyzed Date:	11/01/07 11:35	Method:	6020
Analyst:	JYH		

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG253882-03	EL.110107.114227	11/01/07 11:42	01
49WW01-102307	L0710648-01	EL.110107.120830	11/01/07 12:08	DL01
49WW01-102307	L0710648-02	EL.110107.121502	11/01/07 12:15	DL01
49WW03-102307	L0710648-03	EL.110107.124909	11/01/07 12:49	DL01
49WW03-102307	L0710648-04	EL.110107.125542	11/01/07 12:55	DL01

Login Number: L0710648 Prep Date: 10/25/07 13:30 Sample ID: WG253882-02
Instrument ID: ELAN-ICP Run Date: 11/01/07 11:35 Prep Method: 3015
File ID: EL.110107.113557 Analyst: JYH Method: 6020
Workgroup (AAB#): WG254014 Matrix: Water Units: mg/L
Contract #: DACA56-94-D-0020 Cal ID: ELAN-I-01-NOV-07

Analytes	SDL	PQL	Concentration	Dilution	Qualifier
Silver, Total	0.000250	0.00100	0.000250	1	U
Arsenic, Total	0.000250	0.00100	0.000250	1	U
Barium, Total	0.000500	0.00300	0.000500	1	U
Cadmium, Total	0.000125	0.000500	0.000125	1	U
Chromium, Total	0.000500	0.00200	0.000500	1	U
Copper, Total	0.000500	0.00200	0.000500	1	U
Lead, Total	0.000250	0.000500	0.000250	1	U
Manganese, Total	0.000500	0.00200	0.000500	1	U
Nickel, Total	0.00100	0.00400	0.00100	1	U
Antimony, Total	0.000250	0.00100	0.000250	1	U
Selenium, Total	0.000500	0.00100	0.000500	1	U
Thallium, Total	0.0000500	0.000200	0.0000500	1	U

SDL Method Detection Limit
PQL Reporting/Practical Quantitation Limit
ND Analyte Not detected at or above reporting limit
* Analyte concentration > RL

KEMRON FORMS - Modified 12/07/2006
Version 1.5 PDF File ID: 920157
Report generated 11/01/2007 15:54

KEMRON Environmental Services

LABORATORY CONTROL SAMPLE (LCS)

Login Number: L0710648 Run Date: 11/01/2007 Sample ID: WG253882-03
Instrument ID: ELAN-ICP Run Time: 11:42 Prep Method: 3015
File ID: EL.110107.114227 Analyst: JYH Method: 6020
Workgroup (AAB#): WG254014 Matrix: Water Units: mg/L
QC Key: STD Lot#: STD21680 Cal ID: ELAN-I-01-NOV-07

Analytes	Expected	Found	% Rec	LCS Limits	Q
Silver, Total	0.0625	0.0618	98.8	80 - 120	
Arsenic, Total	0.0625	0.0647	103	80 - 120	
Barium, Total	0.0625	0.0642	103	80 - 120	
Cadmium, Total	0.0625	0.0657	105	80 - 120	
Chromium, Total	0.0625	0.0687	110	80 - 120	
Copper, Total	0.0625	0.0686	110	80 - 120	
Lead, Total	0.0625	0.0644	103	80 - 120	
Manganese, Total	0.0625	0.0691	111	80 - 120	
Nickel, Total	0.0625	0.0686	110	80 - 120	
Antimony, Total	0.0625	0.0655	105	80 - 120	
Selenium, Total	0.0625	0.0681	109	80 - 120	
Thallium, Total	0.0625	0.0638	102	80 - 120	

KEMRON FORMS - Modified 09/06/2007
Version 1.5 PDF File ID: 920158
Report generated 11/01/2007 15:54

KEMRON Environmental Services

MATRIX SPIKE AND MATRIX SPIKE DUP (MS/MSD)

00074623

Loginnum:L0710648 Cal ID: ELAN-ICP- Worknum:WG254014
Instrument ID:ELAN-ICP Contract #:DACA56-94-D-0020 Method:6020
Parent ID:WG253882-01 File ID:EL.110107.114857 Dil:10 Matrix:WATER
Sample ID:WG253882-04 MS File ID:EL.110107.115528 Dil:10 Units:mg/L
Sample ID:WG253882-05 MSD File ID:EL.110107.120159 Dil:10

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Antimony	0.00315	0.0625	0.0695	106	0.0625	0.0680	104	2.24	75 - 125	20	
Arsenic	0.00270	0.0625	0.0695	107	0.0625	0.0703	108	1.20	75 - 125	20	
Barium	0.00733	0.0625	0.0712	102	0.0625	0.0712	102	0.0421	75 - 125	20	
Cadmium	ND	0.0625	0.0694	111	0.0625	0.0654	105	5.95	75 - 125	20	
Chromium	0.0126	0.0625	0.0854	117	0.0625	0.0863	118	0.984	75 - 125	20	
Copper	0.0129	0.0625	0.0831	112	0.0625	0.0824	111	0.934	75 - 125	20	
Lead	0.00152	0.0625	0.0690	108	0.0625	0.0671	105	2.77	75 - 125	20	
Manganese	0.00881	0.0625	0.0774	110	0.0625	0.0766	109	0.968	75 - 125	20	
Nickel	0.0365	0.0625	0.104	108	0.0625	0.105	110	1.09	75 - 125	20	
Selenium	0.0122	0.0625	0.0732	97.5	0.0625	0.0764	103	4.37	75 - 125	20	
Silver	ND	0.0625	0.0598	95.6	0.0625	0.0596	95.3	0.331	75 - 125	20	
Thallium	0.00149	0.0625	0.0680	106	0.0625	0.0665	104	2.22	75 - 125	20	

* FAILS %REC LIMIT

FAILS RPD LIMIT

NOTE: This is an internal quality control sample.

KEMRON FORMS - Modified 09/25/2007 (wg_ms_msd_drywt)

Version 1.5 PDF File ID: 920159
Report generated 11/01/2007 15:54

KEMRON ENVIRONMENTAL SERVICES
SERIAL DILUTION REPORT

Sample Login ID: L0710648 Worknum: WG254014
Instrument ID: ELAN-ICP Method: 6020
Sample ID: L0710648-02 File ID: EL.110107.121502 Dil: 10 Units: ug/L
Serial Dilution ID: WG254014-02 File ID: EL.110107.122806 Dil: 50

Analyte	Sample	C	Serial Dilution	C	% Difference	Q
Antimony	0	U	7.40	F	666	
Arsenic	1.46	F	0	U	100	
Barium	11.5	F	11.7	F	1.74	
Cadmium	0	U	0	U		
Chromium	3.54	F	0	U	100	
Copper	0	U	0	U		
Lead	0	U	0	U		
Manganese	47.4	X	36.5	F	23.0	X
Nickel	20.5	X	20.1	F	1.95	X
Selenium	6.94	X	0	U	100	X
Silver	ND	U	0	U		
Thallium	1.33	X	1.03	F	22.6	X

U = Result is below MDL
F = Result is between MDL and RL
X = Result is greater than RL and less than 100 times the MDL
E = %D exceeds control limit of 10% and initial
sample result is greater than or equal to 100 times the MDL

KEMRON FORMS - Modified 02/14/2006
Version 1.3 PDF File ID: 920153
Report generated 11/01/2007 15:54

KEMRON ENVIRONMENTAL SERVICES
POST SPIKE REPORT

Sample Login ID: L0710648 **Worknum:** WG254014
Instrument ID: ELAN-ICP **Method:** 6020
Post Spike ID: WG254014-01 **File ID:** EL.110107.122134 **Dil:** 10 **Units:** ug/L
Sample ID: L0710648-02 **File ID:** EL.110107.121502 **Dil:** 10 **Matrix:** Water

Analyte	Post Spike Result	C	Sample Result	C	Spike Added(SA)	% R	Control Limit %R	Q
ANTIMONY	56.4		0	U	50	112.8	75 - 125	
ARSENIC	54.0		0.146	F	50	107.8	75 - 125	
BARIUM	58.2		1.15	F	50	114.1	75 - 125	
CADMIUM	56.9		0	U	50	113.8	75 - 125	
CHROMIUM	52.3		0.354	F	50	103.8	75 - 125	
COPPER	54.3		0	U	50	108.5	75 - 125	
LEAD	55.7		0	U	50	111.4	75 - 125	
MANGANESE	59.2		4.74		50	109.0	75 - 125	
NICKEL	54.8		2.05		50	105.5	75 - 125	
SELENIUM	55.5		0.694		50	109.6	75 - 125	
SILVER	50.9		0	U	50	101.8	75 - 125	
THALLIUM	55.1		0.133		50	110.0	75 - 125	

N = % Recovery exceeds control limits
F = Result is between MDL and RL
U = Sample result is below MDL. A value of zero is used in the calculation

KEMRON FORMS - Modified 04/20/2007 - POST_SPIKE
Version 2.0 PDF File ID: 920154
Report generated 11/01/2007 15:54

KEMRON Environmental Services

INITIAL CALIBRATION SUMMARY

Login Number: L0710648 **Workgroup (AAB#):** WG254014

Analytical Method: 6020 **Instrument ID:** ELAN-ICP

ICAL Worknum: WG254456 **Initial Calibration Date:** 01-NOV-2007 10:36

Analyte	WG254456-01		WG254456-02		WG254456-03		WG254456-04			
	STD	INT	STD	INT	STD	INT	STD	INT	R	Q
Antimony	0	32.574	.4	1996.332	50	221993.715	100	423138.814	0.999958	
Arsenic	0	-226.575	.4	435.382	50	79245.921	100	151860.658	0.999999	
Barium	0	48.001	.4	969.742	50	111310.044	100	210180.051	0.999997	
Cadmium	0	58.735	.4	679.156	50	73866.031	100	140578.095	0.999965	
Chromium	0	16572.036	.4	20567.11	50	496111.049	100	922396.013	0.999988	
Copper	0	297.009	.4	1415.488	50	125089.077	100	232481.402	0.999922	
Lead	0	491.678	.4	13367.654	50	1577069.455	100	2990075.748	0.999983	
Manganese	0	7436.278	.4	13270.782	50	676131.216	100	1267941.215	0.999982	
Nickel	0	43.667	.4	1034.419	50	115473.086	100	213862.455	0.999890	
Selenium	0	16.795	.4	67.73	50	6859.938	100	13055.092	1.00000	
Silver	0	37.667	.4	3486.553	50	407196.831	100	760525.613	0.999999	
Thallium	0	69.668	.4	4098.883	50	493117.52	100	942855.898	0.999998	

INT = Instrument intensity
R = Coefficient of correlation
Q = Data Qualifier
*** = Out of Compliance; R < 0.995**

KEMRON FORMS - Modified 03/08/2007
Version 1.5 PDF File ID: 920162
Report generated 11/01/2007 15:54

KEMRON Environmental Services
INITIAL CALIBRATION BLANK (ICB)

Login Number: L0710648 Run Date: 11/01/2007 Sample ID: WG254456-06
Instrument ID: ELAN-ICP Run Time: 10:49 Method: 6020
File ID: EL.110107.104934 Analyst: JYH Units: mg/L
Workgroup (AAB#): WG254014 Cal ID: ELAN-ICP - 01-NOV-07
Matrix: WATER

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
SILVER	.0001	.0004	.0000077	1	U
ARSENIC	.0001	.0004	-.0000195	1	U
BARIUM	.0002	.0012	.0000008	1	U
CADMIUM	.00005	.0002	.0000006	1	U
CHROMIUM	.0002	.0008	-.0000335	1	U
COPPER	.0002	.0008	-.000005	1	U
MANGANESE	.0002	.0008	-.0000729	1	U
NICKEL	.0004	.0016	-.000004	1	U
LEAD	.0001	.0002	.000006	1	U
ANTIMONY	.0001	.0004	.0002	1	F
SELENIUM	.0002	.0004	.0000046	1	U
THALLIUM	.00002	.00008	.000008	1	U

KEMRON FORMS - Modified 10/02/2007
Version 2.0 PDF File ID: 920164
Report generated 11/01/2007 15:54

KEMRON Environmental Services

00074628

CONTINUING CALIBRATION BLANK (CCB)

Login Number: L0710648 Run Date: 11/01/2007 Sample ID: WG254456-12
Instrument ID: ELAN-ICP Run Time: 11:29 Method: 6020
File ID: EL.110107.112917 Analyst: JYH Units: ug/L
Workgroup (AAB#): WG254014 Cal ID: ELAN-I - 01-NOV-07
Matrix: WATER

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Silver	0.100	0.400	0.00140	1	U
Arsenic	0.100	0.400	-0.0228	1	U
Barium	0.200	1.20	-0.00510	1	U
Cadmium	0.0500	0.200	-0.0109	1	U
Chromium	0.200	0.800	-0.0234	1	U
Copper	0.200	0.800	-0.0256	1	U
Lead	0.100	0.200	0	1	U
Manganese	0.200	0.800	-0.161	1	U
Nickel	0.400	1.60	-0.0101	1	U
Antimony	0.100	0.400	0.204	1	F
Selenium	0.200	0.400	0.0448	1	U
Thallium	0.0200	0.0800	-0.00150	1	U

U = Result is less than MDL
F = Result is between MDL and RL
* = Result is above RL

KEMRON FORMS - Modified 09/27/2006
Version 2.0 PDF File ID: 920167
Report generated 11/01/2007 15:54

KEMRON Environmental Services

00074629

CONTINUING CALIBRATION BLANK (CCB)

Login Number: L0710648 Run Date: 11/01/2007 Sample ID: WG254456-14
Instrument ID: ELAN-ICP Run Time: 12:41 Method: 6020
File ID: EL.110107.124121 Analyst: JYH Units: ug/L
Workgroup (AAB#): WG254014 Cal ID: ELAN-I - 01-NOV-07
Matrix: WATER

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Silver	0.100	0.400	0.00300	1	U
Arsenic	0.100	0.400	0.0433	1	U
Barium	0.200	1.20	-0.00430	1	U
Cadmium	0.0500	0.200	-0.0197	1	U
Chromium	0.200	0.800	-0.137	1	U
Copper	0.200	0.800	-0.0364	1	U
Lead	0.100	0.200	-0.00130	1	U
Manganese	0.200	0.800	-0.261	1	F
Nickel	0.400	1.60	-0.00980	1	U
Antimony	0.100	0.400	0.181	1	F
Selenium	0.200	0.400	0.0928	1	U
Thallium	0.0200	0.0800	-0.00200	1	U

U = Result is less than MDL
F = Result is between MDL and RL
* = Result is above RL

KEMRON FORMS - Modified 09/27/2006
Version 2.0 PDF File ID: 920167
Report generated 11/01/2007 15:54

KEMRON Environmental Services

00074630

CONTINUING CALIBRATION BLANK (CCB)

Login Number: L0710648 Run Date: 11/01/2007 Sample ID: WG254456-16
Instrument ID: ELAN-ICP Run Time: 13:15 Method: 6020
File ID: EL.110107.131530 Analyst: JYH Units: ug/L
Workgroup (AAB#): WG254014 Cal ID: ELAN-I - 01-NOV-07
Matrix: WATER

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Silver	0.100	0.400	0.000200	1	U
Arsenic	0.100	0.400	0.00430	1	U
Barium	0.200	1.20	-0.000400	1	U
Cadmium	0.0500	0.200	-0.0160	1	U
Chromium	0.200	0.800	-0.109	1	U
Copper	0.200	0.800	-0.0403	1	U
Lead	0.100	0.200	-0.000900	1	U
Manganese	0.200	0.800	-0.274	1	F
Nickel	0.400	1.60	-0.00900	1	U
Antimony	0.100	0.400	0.161	1	F
Selenium	0.200	0.400	0.0974	1	U
Thallium	0.0200	0.0800	-0.000900	1	U

U = Result is less than MDL
F = Result is between MDL and RL
* = Result is above RL

KEMRON FORMS - Modified 09/27/2006
Version 2.0 PDF File ID: 920167
Report generated 11/01/2007 15:54

KEMRON Environmental Services

00074631

INITIAL CALIBRATION VERIFICATION (ICV)

Login Number: L0710648 Run Date: 11/01/2007 Sample ID: WG254456-05
Instrument ID: ELAN-ICP Run Time: 10:42 Method: 6020
File ID: EL.110107.104252 Analyst: JYH Units: ug/L
Workgroup (AAB#): WG254014 Cal ID: ELAN-I - 01-NOV-07
QC Key: STD

Analyte		Expected	Found	%REC	LIMITS	Q
Silver		50	48.6	97.2	90 - 110	
Arsenic		50	50.3	101	90 - 110	
Barium		50	50.1	100	90 - 110	
Cadmium		50	50.9	102	90 - 110	
Chromium		50	50.2	100	90 - 110	
Copper		50	51.1	102	90 - 110	
Lead		50	50.1	100	90 - 110	
Manganese		50	50.0	100	90 - 110	
Nickel		50	50.3	101	90 - 110	
Antimony		50	50.5	101	90 - 110	
Selenium		50	51.3	103	90 - 110	
Thallium		50	48.9	97.8	90 - 110	

* Exceeds LIMITS Limit

KEMRON FORMS - Modified 09/06/2007 (ICV)
Version 1.5 PDF File ID: 920163
Report generated 11/01/2007 15:54

KEMRON Environmental Services

00074632

CONTINUING CALIBRATION VERIFICATION (CCV)

Login Number: L0710648 Run Date: 11/01/2007 Sample ID: WG254456-11
Instrument ID: ELAN-ICP Run Time: 11:22 Method: 6020
File ID: EL.110107.112235 Analyst: JYH QC Key: STD
Workgroup (AAB#): WG254014 Cal ID: ELAN-I - 01-NOV-07

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Silver		50.0	48.0	ug/L	96.1	90 - 110		
Arsenic		50.0	49.8	ug/L	99.5	90 - 110		
Barium		50.0	49.9	ug/L	99.8	90 - 110		
Cadmium		50.0	50.5	ug/L	101	90 - 110		
Chromium		50.0	51.3	ug/L	103	90 - 110		
Copper		50.0	51.9	ug/L	104	90 - 110		
Lead		50.0	50.1	ug/L	100	90 - 110		
Manganese		50.0	52.0	ug/L	104	90 - 110		
Nickel		50.0	51.8	ug/L	104	90 - 110		
Antimony		50.0	51.1	ug/L	102	90 - 110		
Selenium		50.0	52.0	ug/L	104	90 - 110		
Thallium		50.0	49.6	ug/L	99.2	90 - 110		

* Exceeds LIMITS Criteria

KEMRON FORMS - Modified 09/06/2007 - (CCV)
Version 1.5 PDF File ID: 920166
Report generated 11/01/2007 15:54

KEMRON Environmental Services

CONTINUING CALIBRATION VERIFICATION (CCV)

00074633

Login Number: L0710648 Run Date: 11/01/2007 Sample ID: WG254456-13
Instrument ID: ELAN-ICP Run Time: 12:34 Method: 6020
File ID: EL.110107.123439 Analyst: JYH QC Key: STD
Workgroup (AAB#): WG254014 Cal ID: ELAN-I - 01-NOV-07

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Silver		50.0	47.7	ug/L	95.5	90 - 110		
Arsenic		50.0	49.2	ug/L	98.3	90 - 110		
Barium		50.0	50.5	ug/L	101	90 - 110		
Cadmium		50.0	50.6	ug/L	101	90 - 110		
Chromium		50.0	47.7	ug/L	95.4	90 - 110		
Copper		50.0	49.9	ug/L	99.8	90 - 110		
Lead		50.0	50.4	ug/L	101	90 - 110		
Manganese		50.0	49.8	ug/L	99.6	90 - 110		
Nickel		50.0	48.4	ug/L	96.8	90 - 110		
Antimony		50.0	50.6	ug/L	101	90 - 110		
Selenium		50.0	52.5	ug/L	105	90 - 110		
Thallium		50.0	49.1	ug/L	98.2	90 - 110		

* Exceeds LIMITS Criteria

KEMRON FORMS - Modified 09/06/2007 - (CCV)
Version 1.5 PDF File ID: 920166
Report generated 11/01/2007 15:54

KEMRON Environmental Services

00074634

CONTINUING CALIBRATION VERIFICATION (CCV)

Login Number: L0710648 Run Date: 11/01/2007 Sample ID: WG254456-15
Instrument ID: ELAN-ICP Run Time: 13:08 Method: 6020
File ID: EL.110107.130849 Analyst: JYH QC Key: STD
Workgroup (AAB#): WG254014 Cal ID: ELAN-I - 01-NOV-07

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Silver		50.0	48.7	ug/L	97.4	90 - 110		
Arsenic		50.0	50.5	ug/L	101	90 - 110		
Barium		50.0	50.2	ug/L	100	90 - 110		
Cadmium		50.0	51.3	ug/L	103	90 - 110		
Chromium		50.0	49.8	ug/L	99.5	90 - 110		
Copper		50.0	51.1	ug/L	102	90 - 110		
Lead		50.0	51.1	ug/L	102	90 - 110		
Manganese		50.0	50.2	ug/L	100	90 - 110		
Nickel		50.0	50.2	ug/L	100	90 - 110		
Antimony		50.0	51.5	ug/L	103	90 - 110		
Selenium		50.0	52.5	ug/L	105	90 - 110		
Thallium		50.0	50.4	ug/L	101	90 - 110		

* Exceeds LIMITS Criteria

KEMRON FORMS - Modified 09/06/2007 - (CCV)
Version 1.5 PDF File ID: 920166
Report generated 11/01/2007 15:54

KEMRON ENVIRONMENTAL SERVICES
INTERFERENCE CHECK SAMPLES

Login number: L0710648 **Workgroup (AAB#):** WG254014
Instrument ID: ELAN-ICP **Method:** 6020
Sol. A : WG254456-09 **File ID:** EL.110107.110928 **Units:** ug/L
Sol. AB : WG254456-10 **File ID:** EL.110107.111602

	Sol. A			Sol. AB			
ANALYTE	True	Found	%Recovery	True	Found	%Recovery	Q
Antimony	NS	0.0589	NS	100	110	110	
Arsenic	NS	-0.0451	NS	100	106	106	
Barium	NS	0.0604	NS	100	106	106	
Cadmium	NS	0.0874	NS	100	108	108	
Chromium	NS	0.176	NS	100	107	107	
Copper	NS	0.383	NS	100	105	105	
Lead	NS	0.0816	NS	100	107	107	
Manganese	NS	0.254	NS	100	108	108	
Nickel	NS	0.872	NS	100	107	107	
Selenium	NS	-0.0594	NS	100	104	104	
Silver	NS	0.00570	NS	100	98.4	98.4	
Thallium	NS	0.00360	NS	100	107	107	

NS = Not spiked
*** = Recovery of spiked element is outside acceptance limit of 80% - 120% of true value.**
 # = Result for unspiked element is outside the acceptance limits of (+/-) the project reporting limit (RL).

Login Number: L0710648 Run Date: 11/01/2007 Sample ID: WG254456-08
Instrument ID: ELAN-ICP Run Time: 11:02 Prep Method: 3015
File ID: EL.110107.110253 Analyst: JYH Method: 6020
Workgroup (AAB#): WG254456 Matrix: Water Units: ug/L
Contract #: DACA56-94-D-0020 Cal ID: ELAN-ICP-01-NOV-2007 10:36

Analytes	Expected	Found	% Rec	Limits	Q
Cadmium	0.200	0.181	90.5	50 - 150	
Thallium	0.0800	0.0753	94.1	50 - 150	

KEMRON FORMS - Modified 02/14/2006
Version 1.5 PDF File ID: 920161
Report generated 11/01/2007 15:54

Login Number: L0710648 **Date:** 09/07/2007
Insturment ID: ELAN-ICP **Method:** 6020

Analyte	Integration Time (Sec.)	Concentration (ug/L)
Antimony	1.00	100.0
Arsenic	1.00	100.0
Barium	1.00	100.0
Cadmium	1.00	100.0
Chromium	1.00	100.0
Cobalt	1.00	100.0
Copper	1.00	100.0
Lead	1.00	100.0
Manganese	1.00	100.0
Nickel	1.00	100.0
Selenium	1.00	100.0
Silver	1.00	100.0
Thallium	1.00	100.0
Vanadium	1.00	100.0
Zinc	1.00	100.0

Comments:

2.1.3 Metals CVAA Data (Mercury)

2.1.3.1 Summary Data

LABORATORY REPORT

00074640

L0710648

11/05/07 07:59

Submitted By

KEMRON Environmental Services
156 Starlite Drive
Marietta , OH 45750
(740) 373 - 4071

For

Account Name: Shaw E & I, Inc.
ABB Lummus Biulding
3010 Briarpark Drive Suite 4N
Houston, TX 77042
Attention: Larry Duty

Account Number: 2773
Work ID: LHAAP

P.O. Number: 322255 OP

Sample Analysis Summary

Client ID	Lab ID	Method	Dilution	Date Received
49WW01-102307	L0710648-01	7470A	1	24-OCT-07
49WW01-102307	L0710648-02	7470A	1	24-OCT-07
49WW03-102307	L0710648-03	7470A	1	24-OCT-07
49WW03-102307	L0710648-04	7470A	1	24-OCT-07

Report Number: **L0710648**
Report Date : **November 5, 2007**

00074641

Sample Number: **L0710648-01**
Client ID: **49WW01-102307**
Matrix: **Water**
Workgroup Number: **WG253906**
Collect Date: **10/23/2007 12:55**
Sample Tag: **01**

PrePrep Method: **NONE**
Prep Method: **METHOD**
Analytical Method: **7470A**
Analyst: **ED**
Dilution: **1**
Units: **mg/L**

Instrument: **HYDRA**
Prep Date: **10/25/2007 07:45**
Cal Date: **10/30/2007 16:00**
Run Date: **10/30/2007 16:26**
File ID: **HY.103007.162615**

Analyte	CAS. Number	Result	Qual	PQL	SDL
Mercury	7439-97-6		U	0.000200	0.000100

U Not detected at or above adjusted sample detection limit

Report Number: **L0710648**
Report Date : **November 5, 2007**

00074642

Sample Number: **L0710648-02**
Client ID: **49WW01-102307**
Matrix: **Water**
Workgroup Number: **WG253906**
Collect Date: **10/23/2007 12:55**
Sample Tag: **01**

PrePrep Method: **NONE**
Prep Method: **METHOD**
Analytical Method: **7470A**
Analyst: **ED**
Dilution: **1**
Units: **mg/L**

Instrument: **HYDRA**
Prep Date: **10/25/2007 07:45**
Cal Date: **10/30/2007 16:00**
Run Date: **10/30/2007 16:37**
File ID: **HY.103007.163726**

Analyte	CAS. Number	Result	Qual	PQL	SDL
Mercury, Dissolved	7439-97-6	0.000114	J	0.000200	0.000100

J The analyte was positively identified, but the quantitation was below the RL

Report Number: **L0710648**
Report Date : **November 5, 2007**

00074643

Sample Number: **L0710648-03**
Client ID: **49WW03-102307**
Matrix: **Water**
Workgroup Number: **WG253906**
Collect Date: **10/23/2007 11:10**
Sample Tag: **01**

PrePrep Method: **NONE**
Prep Method: **METHOD**
Analytical Method: **7470A**
Analyst: **ED**
Dilution: **1**
Units: **mg/L**

Instrument: **HYDRA**
Prep Date: **10/25/2007 07:45**
Cal Date: **10/30/2007 16:00**
Run Date: **10/30/2007 16:39**
File ID: **HY.103007.163905**

Analyte	CAS. Number	Result	Qual	PQL	SDL
Mercury	7439-97-6		U	0.000200	0.000100

U Not detected at or above adjusted sample detection limit

Report Number: **L0710648**
Report Date : **November 5, 2007**

00074644

Sample Number: **L0710648-04**
Client ID: **49WW03-102307**
Matrix: **Water**
Workgroup Number: **WG253906**
Collect Date: **10/23/2007 11:10**
Sample Tag: **01**

PrePrep Method: **NONE**
Prep Method: **METHOD**
Analytical Method: **7470A**
Analyst: **ED**
Dilution: **1**
Units: **mg/L**

Instrument: **HYDRA**
Prep Date: **10/25/2007 07:45**
Cal Date: **10/30/2007 16:00**
Run Date: **10/30/2007 16:41**
File ID: **HY.103007.164103**

Analyte	CAS. Number	Result	Qual	PQL	SDL
Mercury, Dissolved	7439-97-6		U	0.000200	0.000100

U Not detected at or above adjusted sample detection limit

2.1.3.2 QC Summary Data

Example Cold Vapor Mercury Calculations
Hydra AA Mercury Analyzer

1.0 Initial Calibration (ICAL) Parameters
The system performs linear regression from data consisting of a blank and five standards.

2.0 Calculating the concentration (C) of an element in water using data from run log and quantitation report (note:the data system performs this calculation automatically when correction factors have been entered):

$$Cx = Cs \times \frac{Vf}{Vi} \times D$$

Where:	**Example:**
Cs = Concentration computed by the data system (ug/L)	0.1
Vf = Diluted to Volume (mL)	40
Vi = Aliquot Volume (mL)	40
D = Manual dilution factor, if required (10X = 10)	1
Cx = Concentration of element in ppb (ug/L)	0.1

3.0 Calculating the concentration (C) of an element in soil using data from prep log and quantitation report (note: the data system performs this calculation automatically when correction factors have been entered):

$$Cx = Cs \times \frac{Vf}{Ws} \times D$$

Where:	**Example:**
Cs = Concentration computed by the data system (ug/L)	0.1
Vf = Diluted to volume (mL)	40
Ws = Aliquot weight (g)	0.6
D = Manual dilution factor	1
Cx = Concentration of element in ug/kg	6.67

4.0 Adjusting the concentration to dry weight:

$$Cdry = \frac{Cx \times 100}{Px}$$

1 Cx = Concentration calculated as received (wet basis)	6.67
Px = Percent solids of sample (%wt)	80
$Cdry$ = Concentration calculated as dry weight (ug/kg)	8.33

8.33 ug/kg = 0.00833 mg/kg

KEMRON Environmental Services

Instrument Run Log

Instrument: HYDRA Dataset: 103007G.PRN
Analyst1: ED Analyst2: N/A
Method: 7470A SOP: 404 Rev: 10
Maintenance Log ID: 21494

Calibration Std: STD22689 ICV/CCV Std: STD22683 Post Spike: STD22689
ICSA: N/A ICSAB: N/A

Workgroups: 253906

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
1	HY.103007.155159	WG254297-01	Calibration Point		1		10/30/07 15:51
2	HY.103007.155336	WG254297-02	Calibration Point		1		10/30/07 15:53
3	HY.103007.155513	WG254297-03	Calibration Point		1		10/30/07 15:55
4	HY.103007.155654	WG254297-04	Calibration Point		1		10/30/07 15:56
5	HY.103007.155855	WG254297-05	Calibration Point		1		10/30/07 15:58
6	HY.103007.160036	WG254297-06	Calibration Point		1		10/30/07 16:00
7	HY.103007.160258	WG254297-07	Initial Calibration Verification		1		10/30/07 16:02
8	HY.103007.160435	WG254297-08	Initial Calib Blank		1		10/30/07 16:04
9	HY.103007.160714	WG254297-09	CCV		1		10/30/07 16:07
10	HY.103007.160851	WG254297-10	CCB		1		10/30/07 16:08
11	HY.103007.161051	WG253806-02	Method/Prep Blank	40/40	1		10/30/07 16:10
12	HY.103007.161228	WG253806-03	Laboratory Control S	40/40	1		10/30/07 16:12
13	HY.103007.161419	L0710543-02	SUC-01	40/40	1		10/30/07 16:14
14	HY.103007.161555	WG253906-01	Post Digestion Spike		1	L0710543-02	10/30/07 16:15
15	HY.103007.161745	L0710543-04	SUC-02		1		10/30/07 16:17
16	HY.103007.161925	L0710571-02	LCR-01	40/40	1		10/30/07 16:19
17	HY.103007.162105	L0710572-02	TWP-01	40/40	1		10/30/07 16:21
18	HY.103007.162243	L0710572-04	TWP-02	40/40	1		10/30/07 16:22
19	HY.103007.162436	L0710573-02	ELK-01	40/40	1		10/30/07 16:24
20	HY.103007.162615	WG253806-01	Reference Sample		1	L0710648-01	10/30/07 16:26
21	HY.103007.162752	WG254297-11	CCV		1		10/30/07 16:27
22	HY.103007.162959	WG254297-12	CCB		1		10/30/07 16:29
23	HY.103007.163152	WG253806-04	Matrix Spike	36/40	1	L0710648-01	10/30/07 16:31
24	HY.103007.163434	WG253806-05	Matrix Spike Duplica	36/40	1	L0710648-01	10/30/07 16:34
25	HY.103007.163726	L0710648-02	49WW01-102307	40/40	1		10/30/07 16:37
26	HY.103007.163905	L0710648-03	49WW03-102307	40/40	1	WG254080-04	10/30/07 16:39
27	HY.103007.164103	L0710648-04	49WW03-102307	40/40	1	WG253902-01	10/30/07 16:41
28	HY.103007.164245	L0710657-02	AV-NCB-EB-1-102307	40/40	1		10/30/07 16:42
29	HY.103007.164444	WG253747-02	Fluid Blank		1		10/30/07 16:44
30	HY.103007.164644	L0710580-01	AV-NCB-HG-STP-7-C-101	40/40	1		10/30/07 16:46
31	HY.103007.164842	WG253906-02	Post Digestion Spike		1	L0710580-01	10/30/07 16:48
32	HY.103007.165032	L0710657-01	AV-NCB-AS-UNK-91-1022		1	WG253850-01	10/30/07 16:50
33	HY.103007.165220	WG254297-13	CCV		1		10/30/07 16:52
34	HY.103007.165400	WG254297-14	CCB		1		10/30/07 16:54
35	HY.103007.165618	WG253741-01	Fluid Blank		1		10/30/07 16:56
36	HY.103007.165818	L0710595-01	AA - TCLP	4/40	1		10/30/07 16:58
37	HY.103007.170002	WG253906-03	Post Digestion Spike		1	L0710595-01	10/30/07 17:00

Page: 1

Approved: October 31, 2007

Maren Berry

KEMRON Environmental Services

Instrument Run Log

Instrument: HYDRA Dataset: 103007G.PRN
Analyst1: ED Analyst2: N/A
Method: 7470A SOP: 404 Rev: 10
Maintenance Log ID: 21494

Calibration Std: STD22689 ICV/CCV Std: STD22683 Post Spike: STD22689
ICSA: N/A ICSAB: N/A

Workgroups: 253906

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
38	HY.103007.170140	L0710595-03	SRD01 - TCLP	4/40	1		10/30/07 17:01
39	HY.103007.170338	L0710619-01	HW0065	4/40	1	WG253876-01	10/30/07 17:03
40	HY.103007.170550	WG253637-01	Fluid Blank		1		10/30/07 17:05
41	HY.103007.170819	L0710561-01	CS070035	4/40	1		10/30/07 17:08
42	HY.103007.171001	WG253906-04	Post Digestion Spike		1	L0710561-01	10/30/07 17:10
43	HY.103007.171212	WG254297-15	CCV		1		10/30/07 17:12
44	HY.103007.171412	WG254297-16	CCB		1		10/30/07 17:14

Approved: October 31, 2007

Maren Berry

KEMRON Environmental Services
Data Checklist

Date: 30-OCT-2007
Analyst: ED
Analyst: NA
Method: 7470A
Instrument: HYDRA
Curve Workgroup: 254297
Runlog ID: 19036
Analytical Workgroups: 253906

Calibration/Linearity	X
ICV/CCV	X
ICB/CCB	X
ICSA/ICSAB	
CRI	
Blank/LCS	X
MS/MSD	X
Post Spike/Serial Dilution	X
Upload Results	X
Data Qualifiers	
Generate PDF Instrument Data	X
Sign/Annotate PDF Data	X
Upload Curve Data	X
Workgroup Forms	X
Case Narrative	543, 571, 572, 573, 648, 657, 580, 595, 619, 56
Client Forms	X
Level X	543, 571, 572, 573, 595
Level 3	648
Level 4	657, 580
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Primary Reviewer	SLP
Secondary Reviewer	MMB
Comments	

Primary Reviewer:
31-OCT-2007
Sheri L. Blodgett

Secondary Reviewer:
31-OCT-2007
Maren Beery

Generated: OCT-31-2007 21:50:31

KEMRON Environmental Services
HOLDING TIMES
EQUIVALENT TO AFCEE FORM 9

Analytical Method: 7470A **AAB#:** WG253906
Login Number: L0710648

Client ID	Date Collected	Date Received	Date Extracted	Max Hold Time Ext.	Time Held Ext.	Date Analyzed	Max Hold Time Anal	Time Held Anal.	Q
49WW01-102307	10/23/07	10/24/07	10/25/07	28	1.78	10/30/07	28	5.36	
49WW03-102307	10/23/07	10/24/07	10/25/07	28	1.86	10/30/07	28	5.37	

*** EXT = SEE PROJECT QAPP REQUIREMENTS**
***ANAL = SEE PROJECT QAPP REQUIREMENTS**

KEMRON Environmental Services
HOLDING TIMES
EQUIVALENT TO AFCEE FORM 9

Analytical Method: 7470A **AAB#:** WG253906
Login Number: L0710648

Client ID	Date Collected	Date Received	Date Extracted	Max Hold Time Ext.	Time Held Ext.	Date Analyzed	Max Hold Time Anal	Time Held Anal.	Q
49WW01-102307	10/23/07	10/24/07	10/25/07	28	1.78	10/30/07	28	5.37	
49WW03-102307	10/23/07	10/24/07	10/25/07	28	1.86	10/30/07	28	5.37	

*** EXT = SEE PROJECT QAPP REQUIREMENTS**
***ANAL = SEE PROJECT QAPP REQUIREMENTS**

METHOD BLANK SUMMARY

Login Number: L0710648
Work Group: WG253906
Blank File ID: HY.103007.161051
Blank Sample ID: WG253806-02
Prep Date: 10/25/07 07:45
Instrument ID: HYDRA
Analyzed Date: 10/30/07 16:10
Method: 7470A
Analyst: ED

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG253806-03	HY.103007.161228	10/30/07 16:12	01
49WW01-102307	L0710648-01	HY.103007.162615	10/30/07 16:26	01
49WW01-102307	L0710648-02	HY.103007.163726	10/30/07 16:37	01
49WW03-102307	L0710648-03	HY.103007.163905	10/30/07 16:39	01
49WW03-102307	L0710648-04	HY.103007.164103	10/30/07 16:41	01

KEMRON FORMS - Modified 01/31/2007
Version 1.5 PDF File ID: 917917
Report generated 10/31/2007 10:07

METHOD BLANK SUMMARY

Login Number: L0710648
Work Group: WG253906
Blank File ID: HY.103007.161051
Blank Sample ID: WG253806-02
Prep Date: 10/25/07 07:45
Instrument ID: HYDRA
Analyzed Date: 10/30/07 16:10
Method: 7470A
Analyst: ED

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG253806-03	HY.103007.161228	10/30/07 16:12	01
49WW01-102307	L0710648-01	HY.103007.162615	10/30/07 16:26	01
49WW01-102307	L0710648-02	HY.103007.163726	10/30/07 16:37	01
49WW03-102307	L0710648-03	HY.103007.163905	10/30/07 16:39	01
49WW03-102307	L0710648-04	HY.103007.164103	10/30/07 16:41	01

KEMRON FORMS - Modified 01/31/2007
Version 1.5 PDF File ID: 917928
Report generated 10/31/2007 10:07

KEMRON Environmental Services

METHOD BLANK REPORT

Login Number: L0710648 Prep Date: 10/25/07 07:45 Sample ID: WG253806-02
Instrument ID: HYDRA Run Date: 10/30/07 16:10 Prep Method: METHOD
File ID: HY.103007.161051 Analyst: ED Method: 7470A
Workgroup (AAB#): WG253906 Matrix: Water Units: mg/L
Contract #: DACA56-94-D-0020 Cal ID: HYDRA-30-OCT-07

Analytes	SDL	PQL	Concentration	Dilution	Qualifier
Mercury	0.000100	0.000200	0.000100	1	U

SDL Method Detection Limit
PQL Reporting/Practical Quantitation Limit
ND Analyte Not detected at or above reporting limit
* Analyte concentration > RL

KEMRON FORMS - Modified 12/07/2006
Version 1.5 PDF File ID: 917918
Report generated 10/31/2007 10:07

Login Number: L0710648 Prep Date: 10/25/07 07:45 Sample ID: WG253806-02
Instrument ID: HYDRA Run Date: 10/30/07 16:10 Prep Method: METHOD
File ID: HY.103007.161051 Analyst: ED Method: 7470A
Workgroup (AAB#): WG253906 Matrix: Water Units: mg/L
Contract #: DACA56-94-D-0020 Cal ID: HYDRA-30-OCT-07

Analytes	SDL	PQL	Concentration	Dilution	Qualifier
Mercury, Dissolved	0.000100	0.000200	0.000100	1	U

SDL Method Detection Limit
PQL Reporting/Practical Quantitation Limit
ND Analyte Not detected at or above reporting limit
* Analyte concentration > RL

KEMRON FORMS - Modified 12/07/2006
Version 1.5 PDF File ID: 917929
Report generated 10/31/2007 10:07

KEMRON Environmental Services

LABORATORY CONTROL SAMPLE (LCS)

Login Number: L0710648 Run Date: 10/30/2007 Sample ID: WG253806-03
Instrument ID: HYDRA Run Time: 16:12 Prep Method: METHOD
File ID: HY.103007.161228 Analyst: ED Method: 7470A
Workgroup (AAB#): WG253906 Matrix: Water Units: mg/L
QC Key: STD Lot#: MI-7470-01 Cal ID: HYDRA-30-OCT-07

Analytes	Expected	Found	% Rec	LCS Limits	Q
Mercury	0.00400	0.00429	107	85 - 115	

KEMRON FORMS - Modified 09/06/2007
Version 1.5 PDF File ID: 917919
Report generated 10/31/2007 10:07

KEMRON Environmental Services

LABORATORY CONTROL SAMPLE (LCS)

Login Number: L0710648 Run Date: 10/30/2007 Sample ID: WG253806-03
Instrument ID: HYDRA Run Time: 16:12 Prep Method: METHOD
File ID: HY.103007.161228 Analyst: ED Method: 7470A
Workgroup (AAB#): WG253906 Matrix: Water Units: mg/L
QC Key: STD Lot#: MI-7470-01 Cal ID: HYDRA-30-OCT-07

Analytes	Expected	Found	% Rec	LCS Limits	Q
Mercury, Dissolved	0.00400	0.00429	107	85 - 115	

KEMRON FORMS - Modified 09/06/2007
Version 1.5 PDF File ID: 917930
Report generated 10/31/2007 10:07

KEMRON Environmental Services

MATRIX SPIKE AND MATRIX SPIKE DUP (MS/MSD)

Loginnum:L0710648 Cal ID:HYDRA- Worknum:WG253906
Instrument ID:HYDRA Contract #:DACA56-94-D-0020 Method:7470A
Parent ID:WG253806-01 File ID:HY.103007.162615 Dil:1 Matrix:WATER
Sample ID:WG253806-04 MS File ID:HY.103007.163152 Dil:1 Units:mg/L
Sample ID:WG253806-05 MSD File ID:HY.103007.163434 Dil:1

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Mercury	ND	0.00444	0.00478	108	0.00444	0.00479	108	0.232	85 - 115	20	

* FAILS %REC LIMIT

FAILS RPD LIMIT

NOTE: This is an internal quality control sample.

KEMRON FORMS - Modified 09/25/2007 (wg_ms_msd_drywt)

Version 1.5 PDF File ID: 917920
Report generated 10/31/2007 10:07

KEMRON Environmental Services

MATRIX SPIKE AND MATRIX SPIKE DUP (MS/MSD)

Loginnum:L0710648 Cal ID:HYDRA- Worknum:WG253906
Instrument ID:HYDRA Contract #:DACA56-94-D-0020 Method:7470A
Parent ID:WG253806-01 File ID:HY.103007.162615 Dil:1 Matrix:WATER
Sample ID:WG253806-04 MS File ID:HY.103007.163152 Dil:1 Units:mg/L
Sample ID:WG253806-05 MSD File ID:HY.103007.163434 Dil:1

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Mercury, Dissolved	ND	0.00444	0.00478	108	0.00444	0.00479	108	0.232	85 - 115	20	

* FAILS %REC LIMIT

FAILS RPD LIMIT

NOTE: This is an internal quality control sample.

KEMRON FORMS - Modified 09/25/2007 (wg_ms_msd_drywt)

Version 1.5 PDF File ID: 917931
Report generated 10/31/2007 10:07

KEMRON ENVIRONMENTAL SERVICES
POST SPIKE REPORT

Sample Login ID: L0710648 **Worknum:** WG253906
Instrument ID: HYDRA **Method:** 7470A
Post Spike ID: WG253906-01 **File ID:** HY.103007.161555 **Dil:** 1 **Units:** ug/L
Sample ID: L0710543-02 **File ID:** HY.103007.161419 **Dil:** 1 **Matrix:** Water

Analyte	Post Spike Result	C	Sample Result	C	Spike Added(SA)	% R	Control Limit %R	Q
MERCURY	0.898		0	U	1	89.8	85 - 115	

N = % Recovery exceeds control limits
F = Result is between MDL and RL
U = Sample result is below MDL. A value of zero is used in the calculation

KEMRON FORMS - Modified 04/20/2007 - POST_SPIKE
Version 2.0 PDF File ID: 917915
Report generated 10/31/2007 10:07

KEMRON ENVIRONMENTAL SERVICES
POST SPIKE REPORT

Sample Login ID: L0710648 **Worknum:** WG253906
Instrument ID: HYDRA **Method:** 7470A
Post Spike ID: WG253906-01 **File ID:** HY.103007.161555 **Dil:** 1 **Units:** ug/L
Sample ID: L0710543-02 **File ID:** HY.103007.161419 **Dil:** 1 **Matrix:** Water

Analyte	Post Spike Result	C	Sample Result	C	Spike Added(SA)	% R	Control Limit %R	Q
MERCURY	0.898		0	U	1	89.8	85 - 115	

N = % Recovery exceeds control limits
F = Result is between MDL and RL
U = Sample result is below MDL. A value of zero is used in the calculation

KEMRON FORMS - Modified 04/20/2007 - POST_SPIKE
Version 2.0 PDF File ID: 917926
Report generated 10/31/2007 10:07

Login Number:L0710648
Analytical Method:7470A
ICAL Worknum:WG254297

Workgroup (AAB#):WG253906
Instrument ID:HYDRA
Initial Calibration Date:10/30/2007 16:00

Analyte	WG254297-01		WG254297-02		WG254297-03		WG254297-04		WG254297-05		WG254297-06	
	STD	INT	STD	INT	STD	INT	STD	INT	STD	INT	STD	INT
Mercury	0	8516	0.200	14882	1.00	45064	2.00	88728	5.00	228885	10.0	450173

INT = Instrument intensity
R = Coefficient of correlation
Q = Data Qualifier
* = Out of Compliance; R < 0.995

KEMRON FORMS - Modified 02/02/2007
Version 1.5 PDF File ID: 917921
Report generated 10/31/2007 10:07

Login Number: L0710648
Analytical Method: 7470A
ICAL Worknum: WG254297

Workgroup (AAB#): WG253906
Instrument ID: HYDRA
Initial Calibration Date: 10/30/2007 16:00

Analyte	R	Q
Mercury	1.000	

INT = Instrument intensity
R = Coefficient of correlation
Q = Data Qualifier
* = Out of Compliance; R < 0.995

KEMRON FORMS - Modified 02/02/2007
Version 1.5 PDF File ID: 917921
Report generated 10/31/2007 10:07

Login Number:L0710648
Analytical Method:7470A
ICAL Worknum:WG254297

Workgroup (AAB#):WG253906
Instrument ID:HYDRA
Initial Calibration Date:10/30/2007 16:00

Analyte	WG254297-01		WG254297-02		WG254297-03		WG254297-04		WG254297-05		WG254297-06	
	STD	INT	STD	INT	STD	INT	STD	INT	STD	INT	STD	INT
Mercury	0	8516	0.200	14882	1.00	45064	2.00	88728	5.00	228885	10.0	450173

INT = Instrument intensity
R = Coefficient of correlation
Q = Data Qualifier
* = Out of Compliance; R < 0.995

KEMRON FORMS - Modified 02/02/2007
Version 1.5 PDF File ID: 917932
Report generated 10/31/2007 10:07

Login Number: L0710648
Analytical Method: 7470A
ICAL Worknum: WG254297

Workgroup (AAB#): WG253906
Instrument ID: HYDRA
Initial Calibration Date: 10/30/2007 16:00

Analyte	R	Q
Mercury	1.000	

INT = Instrument intensity
R = Coefficient of correlation
Q = Data Qualifier
* = Out of Compliance; R < 0.995

KEMRON FORMS - Modified 02/02/2007
Version 1.5 PDF File ID: 917932
Report generated 10/31/2007 10:07

KEMRON Environmental Services
INITIAL CALIBRATION BLANK (ICB)

Login Number: L0710648 Run Date: 10/30/2007 Sample ID: WG254297-08
Instrument ID: HYDRA Run Time: 16:04 Method: 7471
File ID: HY.103007.160435 Analyst: ED Units: mg/L
Workgroup (AAB#): WG253906 Cal ID: HYDRA - 30-OCT-07
Matrix: WATER

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
MERCURY	.0001	.0002	-.000196	1	U

KEMRON FORMS - Modified 10/02/2007
Version 2.0 PDF File ID: 917923
Report generated 10/31/2007 10:07

KEMRON Environmental Services
INITIAL CALIBRATION BLANK (ICB)

Login Number: L0710648 Run Date: 10/30/2007 Sample ID: WG254297-08
Instrument ID: HYDRA Run Time: 16:04 Method: 7471
File ID: HY.103007.160435 Analyst: ED Units: mg/L
Workgroup (AAB#): WG253906 Cal ID: HYDRA - 30-OCT-07
Matrix: WATER

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
MERCURY	.0001	.0002	-.000196	1	U

KEMRON FORMS - Modified 10/02/2007
Version 2.0 PDF File ID: 917934
Report generated 10/31/2007 10:07

KEMRON Environmental Services

00074668

CONTINUING CALIBRATION BLANK (CCB)

Login Number: L0710648 Run Date: 10/30/2007 Sample ID: WG254297-10
Instrument ID: HYDRA Run Time: 16:08 Method: 7470A
File ID: HY.103007.160851 Analyst: ED Units: ug/L
Workgroup (AAB#): WG253906 Cal ID: HYDRA - 30-OCT-07
Matrix: WATER

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Mercury	0.100	0.200	-0.148	1	F

U = Result is less than MDL
F = Result is between MDL and RL
* = Result is above RL

KEMRON FORMS - Modified 09/27/2006
Version 2.0 PDF File ID: 917925
Report generated 10/31/2007 10:07

KEMRON Environmental Services

00074669

CONTINUING CALIBRATION BLANK (CCB)

Login Number: L0710648 Run Date: 10/30/2007 Sample ID: WG254297-12
Instrument ID: HYDRA Run Time: 16:29 Method: 7470A
File ID: HY.103007.162959 Analyst: ED Units: ug/L
Workgroup (AAB#): WG253906 Cal ID: HYDRA - 30-OCT-07
Matrix: WATER

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Mercury	0.100	0.200	-0.0730	1	U

U = Result is less than MDL
F = Result is between MDL and RL
* = Result is above RL

KEMRON FORMS - Modified 09/27/2006
Version 2.0 PDF File ID: 917925
Report generated 10/31/2007 10:07

KEMRON Environmental Services

00074670

CONTINUING CALIBRATION BLANK (CCB)

Login Number: L0710648 Run Date: 10/30/2007 Sample ID: WG254297-14
Instrument ID: HYDRA Run Time: 16:54 Method: 7470A
File ID: HY.103007.165400 Analyst: ED Units: ug/L
Workgroup (AAB#): WG253906 Cal ID: HYDRA - 30-OCT-07
Matrix: WATER

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Mercury	0.100	0.200	-0.0920	1	U

U = Result is less than MDL
F = Result is between MDL and RL
* = Result is above RL

KEMRON FORMS - Modified 09/27/2006
Version 2.0 PDF File ID: 917925
Report generated 10/31/2007 10:07

KEMRON Environmental Services

00074671

CONTINUING CALIBRATION BLANK (CCB)

Login Number: L0710648 Run Date: 10/30/2007 Sample ID: WG254297-16
Instrument ID: HYDRA Run Time: 17:14 Method: 7470A
File ID: HY.103007.171412 Analyst: ED Units: ug/L
Workgroup (AAB#): WG253906 Cal ID: HYDRA - 30-OCT-07
Matrix: WATER

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Mercury	0.100	0.200	0.0430	1	U

U = Result is less than MDL
F = Result is between MDL and RL
* = Result is above RL

KEMRON FORMS - Modified 09/27/2006
Version 2.0 PDF File ID: 917925
Report generated 10/31/2007 10:07

KEMRON Environmental Services

00074672

CONTINUING CALIBRATION BLANK (CCB)

Login Number: L0710648 Run Date: 10/30/2007 Sample ID: WG254297-10
Instrument ID: HYDRA Run Time: 16:08 Method: 7470A
File ID: HY.103007.160851 Analyst: ED Units: ug/L
Workgroup (AAB#): WG253906 Cal ID: HYDRA - 30-OCT-07
Matrix: WATER

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Mercury	0.100	0.200	-0.148	1	F

U = Result is less than MDL
F = Result is between MDL and RL
* = Result is above RL

KEMRON FORMS - Modified 09/27/2006
Version 2.0 PDF File ID: 917936
Report generated 10/31/2007 10:07

KEMRON Environmental Services

00074673

CONTINUING CALIBRATION BLANK (CCB)

Login Number: L0710648 Run Date: 10/30/2007 Sample ID: WG254297-12
Instrument ID: HYDRA Run Time: 16:29 Method: 7470A
File ID: HY.103007.162959 Analyst: ED Units: ug/L
Workgroup (AAB#): WG253906 Cal ID: HYDRA - 30-OCT-07
Matrix: WATER

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Mercury	0.100	0.200	-0.0730	1	U

U = Result is less than MDL
F = Result is between MDL and RL
* = Result is above RL

KEMRON FORMS - Modified 09/27/2006
Version 2.0 PDF File ID: 917936
Report generated 10/31/2007 10:07

KEMRON Environmental Services

00074674

CONTINUING CALIBRATION BLANK (CCB)

Login Number: L0710648 Run Date: 10/30/2007 Sample ID: WG254297-14
Instrument ID: HYDRA Run Time: 16:54 Method: 7470A
File ID: HY.103007.165400 Analyst: ED Units: ug/L
Workgroup (AAB#): WG253906 Cal ID: HYDRA - 30-OCT-07
Matrix: WATER

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Mercury	0.100	0.200	-0.0920	1	U

U = Result is less than MDL
F = Result is between MDL and RL
* = Result is above RL

KEMRON FORMS - Modified 09/27/2006
Version 2.0 PDF File ID: 917936
Report generated 10/31/2007 10:07

KEMRON Environmental Services

00074675

CONTINUING CALIBRATION BLANK (CCB)

Login Number: L0710648 Run Date: 10/30/2007 Sample ID: WG254297-16
Instrument ID: HYDRA Run Time: 17:14 Method: 7470A
File ID: HY.103007.171412 Analyst: ED Units: ug/L
Workgroup (AAB#): WG253906 Cal ID: HYDRA - 30-OCT-07
Matrix: WATER

Analytes	MDL	RDL	Concentration	Dilution	Qualifier
Mercury	0.100	0.200	0.0430	1	U

U = Result is less than MDL
F = Result is between MDL and RL
* = Result is above RL

KEMRON FORMS - Modified 09/27/2006
Version 2.0 PDF File ID: 917936
Report generated 10/31/2007 10:07

KEMRON Environmental Services

INITIAL CALIBRATION VERIFICATION (ICV)

00074676

Login Number: L0710648 Run Date: 10/30/2007 Sample ID: WG254297-07
Instrument ID: HYDRA Run Time: 16:02 Method: 7470A
File ID: HY.103007.160258 Analyst: ED Units: ug/L
Workgroup (AAB#): WG253906 Cal ID: HYDRA - 30-OCT-07
QC Key: STD

Analyte		Expected	Found	%REC	LIMITS	Q
Mercury		2	2.07	104	90 - 110	

* Exceeds LIMITS Limit

KEMRON FORMS - Modified 09/06/2007 (ICV)
Version 1.5 PDF File ID: 917922
Report generated 10/31/2007 10:07

KEMRON Environmental Services

00074677

INITIAL CALIBRATION VERIFICATION (ICV)

Login Number: L0710648 Run Date: 10/30/2007 Sample ID: WG254297-07
Instrument ID: HYDRA Run Time: 16:02 Method: 7470A
File ID: HY.103007.160258 Analyst: ED Units: ug/L
Workgroup (AAB#): WG253906 Cal ID: HYDRA - 30-OCT-07
QC Key: STD

Analyte		Expected	Found	%REC	LIMITS	Q
Mercury		2	2.07	104	90 - 110	

* Exceeds LIMITS Limit

KEMRON FORMS - Modified 09/06/2007 (ICV)
Version 1.5 PDF File ID: 917933
Report generated 10/31/2007 10:07

KEMRON Environmental Services

CONTINUING CALIBRATION VERIFICATION (CCV)

00074678

Login Number: L0710648 Run Date: 10/30/2007 Sample ID: WG254297-09
Instrument ID: HYDRA Run Time: 16:07 Method: 7470A
File ID: HY.103007.160714 Analyst: ED QC Key: STD
Workgroup (AAB#): WG253906 Cal ID: HYDRA - 30-OCT-07

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Mercury, Total		0.00200	0.00196	mg/L	98.0	80 - 120		

* Exceeds LIMITS Criteria

KEMRON FORMS - Modified 09/06/2007 - (CCV)
Version 1.5 PDF File ID: 917924
Report generated 10/31/2007 10:07

KEMRON Environmental Services

CONTINUING CALIBRATION VERIFICATION (CCV)

00074679

Login Number: L0710648 Run Date: 10/30/2007 Sample ID: WG254297-11
Instrument ID: HYDRA Run Time: 16:27 Method: 7470A
File ID: HY.103007.162752 Analyst: ED QC Key: STD
Workgroup (AAB#): WG253906 Cal ID: HYDRA - 30-OCT-07

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Mercury, Total		0.00200	0.00207	mg/L	104	80 - 120		

* Exceeds LIMITS Criteria

KEMRON FORMS - Modified 09/06/2007 - (CCV)
Version 1.5 PDF File ID: 917924
Report generated 10/31/2007 10:07

KEMRON Environmental Services

CONTINUING CALIBRATION VERIFICATION (CCV)

00074680

Login Number: L0710648 Run Date: 10/30/2007 Sample ID: WG254297-13
Instrument ID: HYDRA Run Time: 16:52 Method: 7470A
File ID: HY.103007.165220 Analyst: ED QC Key: STD
Workgroup (AAB#): WG253906 Cal ID: HYDRA - 30-OCT-07

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Mercury, Total		0.00200	0.00195	mg/L	97.5	80 - 120		

* Exceeds LIMITS Criteria

KEMRON FORMS - Modified 09/06/2007 - (CCV)
Version 1.5 PDF File ID: 917924
Report generated 10/31/2007 10:07

KEMRON Environmental Services

CONTINUING CALIBRATION VERIFICATION (CCV)

00074681

Login Number: L0710648 Run Date: 10/30/2007 Sample ID: WG254297-15
Instrument ID: HYDRA Run Time: 17:12 Method: 7470A
File ID: HY.103007.171212 Analyst: ED QC Key: STD
Workgroup (AAB#): WG253906 Cal ID: HYDRA - 30-OCT-07

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Mercury, Total		0.00200	0.00196	mg/L	98.0	80 - 120		

* Exceeds LIMITS Criteria

KEMRON FORMS - Modified 09/06/2007 - (CCV)
Version 1.5 PDF File ID: 917924
Report generated 10/31/2007 10:07

KEMRON Environmental Services

CONTINUING CALIBRATION VERIFICATION (CCV)

00074682

Login Number: L0710648 Run Date: 10/30/2007 Sample ID: WG254297-09
Instrument ID: HYDRA Run Time: 16:07 Method: 7470A
File ID: HY.103007.160714 Analyst: ED QC Key: STD
Workgroup (AAB#): WG253906 Cal ID: HYDRA - 30-OCT-07

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Mercury, Total		0.00200	0.00196	mg/L	98.0	80 - 120		

* Exceeds LIMITS Criteria

KEMRON FORMS - Modified 09/06/2007 - (CCV)
Version 1.5 PDF File ID: 917935
Report generated 10/31/2007 10:07

KEMRON Environmental Services

CONTINUING CALIBRATION VERIFICATION (CCV)

00074683

Login Number: L0710648 Run Date: 10/30/2007 Sample ID: WG254297-11
Instrument ID: HYDRA Run Time: 16:27 Method: 7470A
File ID: HY.103007.162752 Analyst: ED QC Key: STD
Workgroup (AAB#): WG253906 Cal ID: HYDRA - 30-OCT-07

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Mercury, Total		0.00200	0.00207	mg/L	104	80 - 120		

* Exceeds LIMITS Criteria

KEMRON FORMS - Modified 09/06/2007 - (CCV)
Version 1.5 PDF File ID: 917935
Report generated 10/31/2007 10:07

KEMRON Environmental Services

CONTINUING CALIBRATION VERIFICATION (CCV)

00074684

Login Number: L0710648 Run Date: 10/30/2007 Sample ID: WG254297-13
Instrument ID: HYDRA Run Time: 16:52 Method: 7470A
File ID: HY.103007.165220 Analyst: ED QC Key: STD
Workgroup (AAB#): WG253906 Cal ID: HYDRA - 30-OCT-07

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Mercury, Total		0.00200	0.00195	mg/L	97.5	80 - 120		

* Exceeds LIMITS Criteria

KEMRON FORMS - Modified 09/06/2007 - (CCV)
Version 1.5 PDF File ID: 917935
Report generated 10/31/2007 10:07

KEMRON Environmental Services

CONTINUING CALIBRATION VERIFICATION (CCV)

00074685

Login Number: L0710648 Run Date: 10/30/2007 Sample ID: WG254297-15
Instrument ID: HYDRA Run Time: 17:12 Method: 7470A
File ID: HY.103007.171212 Analyst: ED QC Key: STD
Workgroup (AAB#): WG253906 Cal ID: HYDRA - 30-OCT-07

Analyte		Expected	Found	UNITS	%REC	LIMITS		Q
Mercury, Total		0.00200	0.00196	mg/L	98.0	80 - 120		

* Exceeds LIMITS Criteria

KEMRON FORMS - Modified 09/06/2007 - (CCV)
Version 1.5 PDF File ID: 917935
Report generated 10/31/2007 10:07

2.2 General Chemistry Data

KEMRON ENVIRONMENTAL SERVICES
GENERAL CHEMISTRY

KEMRON Login No.: L0710648

METHOD

Analysis: See report for method reference.

HOLDING TIMES

Sample Preparation: All holding times were met.

Sample Analysis: Nitrate is analyzed by subtracting the nitrite result from the nitrate-nitrite result. The nitrite was analyzed within the 48 hour hold time. Nitrate-nitrite has a 28 day hold, so the analysis was performed within hold.

PREPARATION

Sample preparation proceeded normally.

BATCH QA/QC

Method Blank: All acceptance criteria were met.

Laboratory Control Sample: All acceptance criteria were met.

Duplicates: All acceptance criteria were met.

Matrix Spikes: All acceptance criteria were met.

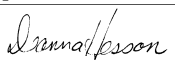
SAMPLES

There were no technical difficulties with the sample group.

I certify that this data package is in compliance with the terms and conditions agreed to by the client and KEMRON Environmental Services, both technically and for completeness, except for the conditions noted above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designated person, as verified by the following signature.

Analyst: DIH

Approved: 01-NOV-07



2.2.1 Nitrate Data

2.2.1.1 Summary Data

LABORATORY REPORT

00074690

L0710648

11/05/07 07:59

Submitted By

KEMRON Environmental Services
156 Starlite Drive
Marietta , OH 45750
(740) 373 - 4071

For

Account Name: Shaw E & I, Inc.
ABB Lummus Biulding
3010 Briarpark Drive Suite 4N
Houston, TX 77042
Attention: Larry Duty

Account Number: 2773
Work ID: LHAAP

P.O. Number: 322255 OP

Sample Analysis Summary

Client ID	Lab ID	Method	Dilution	Date Received
49WW01-102307	L0710648-01	353.2	1	24-OCT-07
49WW03-102307	L0710648-03	353.2	1	24-OCT-07

Report Number: **L0710648**
Report Date : **November 5, 2007**

00074691

Sample Number: **L0710648-01**
Client ID: **49WW01-102307**
Matrix: **Water**
Workgroup Number: **WG254080**
Collect Date: **10/23/2007 12:55**

PrePrep Method: **NONE**
Prep Method: **353.2**
Analytical Method: **353.2**
Analyst: **DIH**
Dilution: **1**
Units: **mg/L**

Instrument: **SMARTCHEM**
Prep Date: **10/29/2007 11:55**
Cal Date:
Run Date: **10/29/2007 11:55**
File ID: **SC07110109102901**

Analyte	CAS. Number	Result	Qual	PQL	SDL
Nitrate	14797-55-8		U	0.0500	0.0250

U Not detected at or above adjusted sample detection limit

Report Number: **L0710648**
Report Date : **November 5, 2007**

Sample Number: **L0710648-03**
Client ID: **49WW03-102307**
Matrix: **Water**
Workgroup Number: **WG254080**
Collect Date: **10/23/2007 11:10**

PrePrep Method: **NONE**
Prep Method: **353.2**
Analytical Method: **353.2**
Analyst: **DIH**
Dilution: **1**
Units: **mg/L**

Instrument: **SMARTCHEM**
Prep Date: **10/29/2007 11:55**
Cal Date:
Run Date: **10/29/2007 11:55**
File ID: **SC07110109104001**

Analyte	CAS. Number	Result	Qual	PQL	SDL
Nitrate	14797-55-8	0.0330	J	0.0500	0.0250

J The analyte was positively identified, but the quantitation was below the RL

2.2.1.2 QC Summary Data

Example Nitrate Calculations

(absorbance - intercept)/(slope * dilution) = mg/L

where:

absorbance = reading from the spectrophotometer
intercept = calculated from calibration standard absorbencies
slope = calculated from calibration standard absorbencies
dilution = dilution of the distillate in decimal form (ex. 1/5 dilution = 0.2)

KEMRON Environmental Services
Data Checklist

Date: 29-OCT-2007
Analyst: DIH
Analyst: NA
Method: NO3
Instrument: SC
Curve Workgroup: NA
Runlog ID:
Analytical Workgroups: WG254080 WG254084 WG254087

Calibration/Linearity	10/29/2007
Second Source Check	X
ICV/CCV (std)	X
ICB/CCB	X
Blank	X
LCS/LCS Dup	X
MS/MSD	X
Duplicate	X
Upload Results	X
Client Forms	X
QC Violation Sheet	X
Case Narratives	X
Signed Raw Data	X
STD/LCS on benchsheet	X
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Primary Reviewer	DIH
Secondary Reviewer	
Comments	

Primary Reviewer:
05-NOV-2007

Secondary Reviewer:

Generated: NOV-05-2007 07:47:15

KEMRON Environmental Services
HOLDING TIMES
EQUIVALENT TO AFCEE FORM 9

Analytical Method: 353.2 **AAB#:** WG254080
Login Number: L0710648

Client ID	Date Collected	Date Received	Date Extracted	Max Hold Time Ext.	Time Held Ext.	Date Analyzed	Max Hold Time Anal	Time Held Anal.	Q
49WW03-102307	10/23/07	10/24/07	10/29/07	2	6.03	10/29/07	2	6.03	*ANAL
49WW01-102307	10/23/07	10/24/07	10/29/07	2	5.96	10/29/07	2	5.96	*ANAL

*** EXT = SEE PROJECT QAPP REQUIREMENTS**
***ANAL = SEE PROJECT QAPP REQUIREMENTS**

KEMRON FORMS - Modified 11/20/2006
Version 1.5 PDF File ID: 923368
Report generated 11/01/2007 12:20

METHOD BLANK SUMMARY

Login Number: L0710648
Work Group: WG254080
Blank File ID: SC07110109134901
Blank Sample ID: WG254080-01
Prep Date: 10/29/07 11:55
Instrument ID: SMARTCHEM
Analyzed Date: 10/29/07 11:55
Method: 353.2
Analyst: DIH

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
49WW03-102307	L0710648-03	SC07110109104001	10/29/07 11:55	
LCS2	WG254080-03	SC07110109140901	10/29/07 11:55	
49WW01-102307	L0710648-01	SC07110109102901	10/29/07 11:55	
DUP	WG254080-05	SC07110109142501	10/29/07 11:55	
LCS	WG254080-02	SC07110109140001	10/29/07 11:55	

KEMRON FORMS - Modified 01/31/2007
Version 1.5 PDF File ID: 923369
Report generated 11/01/2007 12:20

Login Number: L0710648 Prep Date: 10/29/07 11:55 Sample ID: WG254080-01
Instrument ID: SMARTCHEM Run Date: 10/29/07 11:55 Prep Method: 353.2
File ID: SC07110109134901 Analyst: DIH Method: 353.2
Workgroup (AAB#): WG254080 Matrix: Water Units: mg/L
Contract #: DACA56-94-D-0020 Cal ID: SMARTC-

Analytes	SDL	PQL	Concentration	Dilution	Qualifier
Nitrate	0.0250	0.0500	0.0250	1	U

SDL Method Detection Limit
PQL Reporting/Practical Quantitation Limit
ND Analyte Not detected at or above reporting limit
* Analyte concentration > RL

KEMRON FORMS - Modified 12/07/2006
Version 1.5 PDF File ID: 923370
Report generated 11/01/2007 12:20

KEMRON Environmental Services

LABORATORY CONTROL SAMPLE (LCS)

Login Number:L0710648 Analyst:DIH Prep Method:353.2
Instrument ID:SMARTCHEM Matrix:Water Method:353.2
Workgroup (AAB#):WG254080 Units:mg/L
QC Key:STD Lot #:STD22436

Sample ID:WG254080-02 LCS File ID:SC07110109140001 Run Date:10/29/2007 11:55
Sample ID:WG254080-03 LCS2 File ID:SC07110109140901 Run Date:10/29/2007 11:55

Analytes	LCS			LCS2			%RPD	%Rec Limits	RPD Lmt	Q
	Known	Found	% REC	Known	Found	% REC				
Nitrate	1.00	0.985	98.5	1.00	0.959	95.9	2.67	90 - 110	15	

KEMRON FORMS - Modified 02/08/2007
Version 1.5 PDF File ID: 923371
Report generated 11/01/2007 12:20

2.2.1.3 Raw Data

KEMRON ENVIRONMENTAL SERVICES

WORKGROUP: WG254080

254084
254087

SMARTCHEM RUN LOG

Daily Check

- [x] Lamp On
- [x] Probe Rinse Full
- [x] DI Water > ½ Full
- [x] Wash Solution > ½ Full
- [x] NO3 Reagent bottle connected / purged
- [x] NO3 pH adj to pH 5-9
- [x] WBL Run
- [x] Reagents Full
- [x] Dilution H_2O Full
- [x] Waste Container Check

1) **Workgroup Plan #** 20071029002
2) **Workgroup Plan #** _____
3) **Workgroup Plan #** _____

Analyte		1 NO3	2	3
User Prepared Curve				
SC Prepared Curve				
Position				
1-1	ICV 1.5			
1-2	BLK			
1-3	LCS 1			
1-4	LCSDUP			
1-5	NO2			
1-6	10-651-07			
1-7	08			
1-8	09			
1-9	10			
1-10	17			
1-11	10-709-01			
1-12	02			
1-13	03		•	
1-14	05			
1-15	06		•	
1-16	07			
1-17	08			
1-18	11		•	
1-19	10-648-01			
1-20	03			
1-21	DUP			
1-22	MS			
2-1	MSD			
2-2	BLK			
2-3	LCS 1			

Analyte		1	2	3
Position				
2-4	LCSDUP			
2-5	10-692-01	1/5		color
2-6	02	1/5		↓
2-7	10-680-01			
2-8	10-676-01	1/40		
2-9	10-737-01	1/3		
2-10	10-787-01		•	
2-11	10-767-01			
2-12	02			
2-13	03		•	reran autodil on 1/4
2-14	04			
2-15	05		•	"
2-16	10-809-04			
2-17	10-655-01		•	
2-18	10-693-01	1/5		color
2-19	02	↓		↓
2-20	03	↓		↓
2-21	10-694-01	1/5		
2-22	02	↓		↓
2-23	10-700-01	1/5		
2-24	02	↓		
2-25	DUP	↓		
2-26	MS	↓		
3-1	MSD	↓		↓
3-2	BLK			

NOTES:
* Run NO2 std on NO3 runs
* LCS/LCS Dup all parameters
* MS/MSD (NO3, TKN, NH3)

DCN#71621

KEMRON ENVIRONMENTAL SERVICES

WORKGROUP: WG254080

SMARTCHEM RUN LOG

Position	Analyte	1	2	3
3-3	LCS			
3-4	LCSDUP			
3-5	10-6688-01			
3-6	02			
3-7	10-670-01			
3-8	10-764-01	1/5	color/matrix	
3-9	10-769-01			
3-10	03			
3-11	10-771-01			
3-12	10-772-01			
3-13	10-766-01			
3-14	DUP			
3-15	MS			

Position	Analyte	1	2	3
3-16	MSD 766-01	1/5		
3-17	NO2			
3-18	LCS ?			
3-19	10-787-01	1/10		
3-20				
3-21				
3-22				
3-23				
3-24				
3-25				
3-26				
3-27				
3-28				

- ☐ Chloride — EPA 325.2/SM 4500-Cl⁻ E
- ☐ Sulfate — EPA 375.4
- ☐ Alkalinity — EPA 310.2
- ☑ Nitrate-Nitrite — EPA 353.2/SM 4500-NO3 F
- ☐ Ammonia — EPA 350.1/SM 4500-NH3 B
- ☐ TKN — EPA 351.2
- ☐ Phos — EPA 365.4

Analyte	NO3		NO2
SOP & Revision	K 3532		
Curve Stock (SC made)	std 22433		
Curve ID (user made)			
ICV	std 22435		
CCV	std 22434		
LCS	std 22436		std 22074
MS	std 93984		
Dilution	0.1/5(25)=0.5		

Comments: _____

Analyst: Deanna Bosa Date: 10/29/07

DCN#71621

KEMRON ENVIRONMENTAL

SMARTCHEM REPORT

UNITS: MG/L

Method : WNO3 - EPA 353.2 Nitrate-NitrIte

Smp#/[Dil Fact]	Sample ID	Conc	OD	%Recovery/RPD	Flag	Analysis Time
DIL-1	RBL	0.000	0.0449	0.00		11:37:05 AM
DIL-1	RBL	0.000	0.0141	0.00		11:38:35 AM
DIL-1	RBL	0.000	0.0150	0.00		11:40:05 AM
DIL-1	Std-1	0.000	-0.0008	0.00	INV	11:41:36 AM
SR5-1	Std-2	0.040	0.0049	0.00		11:43:06 AM
SR5-2	Std-3	0.100	0.0271	0.00		11:44:36 AM
SR5-3	Std-4	0.500	0.1456	0.00		11:46:06 AM
SR5-4	Std-5	1.000	0.2847	0.00		11:47:36 AM
ST-1	Std-6	2.000	0.5833	0.00		11:49:23 AM
1	ICV 1.5	1.483	0.4304	0.00		11:50:53 AM
2	WG254080-01 BLANK	-0.016	-0.0081	0.00	INV,><,LL	11:52:23 AM
3	WG254080-02 LCS	0.985	0.2848	0.00		11:53:53 AM
4	WG254080-03 LCSDUP	0.959	0.2772	0.00		11:55:23 AM
5	NO2 1	1.254	0.3635	0.00		11:56:54 AM
6	L0710651-07	0.006	-0.0018	0.00	INV,><	11:58:23 AM
7	L0710651-08	0.565	0.1618	0.00		11:59:53 AM
8	L0710651-09	1.077	0.3117	0.00		12:01:23 PM
9	L0710651-10	1.074	0.3109	0.00		12:02:53 PM
10	L0710651-17	1.333	0.3865	0.00		12:04:42 PM
ST-2	CCV3 (1 mg/L)	1.083	0.3136	108.33		12:06:29 PM
ST-3	CCB (0 mg/L)	-0.017	-0.0083	0.00	INV,EPL,><	12:07:59 PM
11	L0710709-01	-0.015	-0.0078	0.00	INV,><,LL	12:09:29 PM
12	L0710709-02	-0.009	-0.0061	0.00	INV,><,LL	12:11:00 PM
13	L0710709-03	3.513	1.0243	0.00	><,LH	12:12:30 PM
14	L0710709-05	0.458	0.1307	0.00		12:14:00 PM
15	L0710709-06	2.395	0.6972	0.00	><,LH	12:15:30 PM
16	L0710709-07	0.876	0.2529	0.00		12:17:00 PM
17	L0710709-08	1.814	0.5273	0.00		12:18:47 PM
18	L0710709-11	5.008	1.4618	0.00	><,LH	12:20:17 PM
19	L0710648-01	-0.006	-0.0052	0.00	INV,><,LL	12:21:47 PM
20	L0710648-03	0.033	0.0063	0.00		12:23:17 PM
ST-2	CCV3 (1 mg/L)	1.134	0.3285	113.43		12:24:47 PM

Report Date :10/29/2007 **Run Date :10/29/2007** **Operator : WESTCO** **Plan # :20071029002**

Plan Description : NO3-A-DIH/10/29/2007

KEMRON ENVIRONMENTAL

SMARTCHEM REPORT

UNITS: MG/L

Method : WNO3 - EPA 353.2 Nitrate-Nitrite

Smp#/[Dil Fact]	Sample ID	Conc	OD	%Recovery/RPD	Flag	Analysis Time
ST-3	CCB (0 mg/L)	-0.001	-0.0038	0.00	INV,><,LL	12:26:18 PM
21	DUP 648-03	0.032	0.0059	0.00		12:27:47 PM
22	MS 648-03	0.566	0.1623	0.00		12:29:17 PM
23	MSD 648-03	0.573	0.1644	0.00		12:30:47 PM
24	WG254084-01 BLANK	-0.017	-0.0084	0.00	INV,><,LL	12:32:17 PM
25	WG254084-02 LCS	1.096	0.3173	0.00		12:34:06 PM
26	WG254084-03 LCSDUP	1.067	0.3088	0.00		12:35:53 PM
27	L0710692-01 (5)	-0.018	-0.0086	0.00	INV,><,LL	12:37:23 PM
28	L0710692-02 (5)	-0.008	-0.0059	0.00	INV,><,LL	12:38:53 PM
29	L0710680-01	0.003	-0.0026	0.00	INV,><	12:40:24 PM
30	L0710676-01 (40)	1.303	0.3778	0.00		12:41:54 PM
ST-2	CCV3 (1 mg/L)	1.144	0.3312	114.35		12:43:24 PM
ST-3	CCB (0 mg/L)	-0.020	-0.0094	0.00	INV,><,LL	12:44:54 PM
31	L0710767-01 (3)	1.507	0.4375	0.00		12:46:24 PM
32	L0710787-01	6.840	1.9977	0.00	EPL,><,LH	12:48:11 PM
33	L0710767-01	0.938	0.2711	0.00	EPL	12:49:41 PM
34	L0710767-02	0.911	0.2633	0.00		12:51:11 PM
35	L0710767-03	8.877	2.5936	0.00	EPL,><,LH	12:52:41 PM
36	L0710767-04	0.219	0.0606	0.00		12:54:11 PM
37	L0710767-05	5.960	1.7404	0.00	><,LH	12:55:42 PM
38	L0710809-04	0.007	-0.0013	0.00	INV,><	12:57:11 PM
39	L0710655-01	2.795	0.8144	0.00	><,LH	12:58:41 PM
40	L0710693-01 (5)	-0.002	-0.0039	0.00	INV,><,LL	1:00:11 PM
ST-2	CCV3 (1 mg/L)	1.142	0.3307	114.18		1:01:41 PM
ST-3	CCB (0 mg/L)	-0.010	-0.0064	0.00	INV,><,LL	1:03:30 PM
41	L0710693-02 (5)	-0.002	-0.0040	0.00	INV,><,LL	1:05:17 PM
42	L0710693-*03 (5)	-0.017	-0.0083	0.00	INV,><,LL	1:06:47 PM
43	L0710694-01 (5)	0.049	0.0110	0.00		1:08:17 PM
44	L0710694-02 (5)	0.111	0.0292	0.00		1:09:48 PM
45	L0710700-01 (5)	-0.030	-0.0122	0.00	INV,><,LL	1:11:18 PM
46	L0710700-02 (5)	0.002	-0.0030	0.00	INV,><	1:12:48 PM
47	DUP 700-02 (5)	-0.007	-0.0054	0.00	INV,><,LL	1:14:18 PM

Report Date :10/29/2007 **Run Date :10/29/2007** **Operator : WESTCO** **Plan # :20071029002**

Plan Description : NO3-A-DIH/10/29/2007

KEMRON ENVIRONMENTAL
SMARTCHEM REPORT
UNITS: MG/L

Method : WNO3 - EPA 353.2 Nitrate-Nitrite

Smp#/[Dil Fact]	Sample ID	Conc	OD	%Recovery/RPD	Flag	Analysis Time
48	MS 700-02 (5)	0.110	0.0287	0.00		1:15:48 PM
49	MSD 700-02 (5)	0.122	0.0322	0.00		1:17:35 PM
50	WG254087-01 BLANK	-0.017	-0.0083	0.00	INV,><,LL	1:19:05 PM
ST-2	CCV3 (1 mg/L)	1.100	0.3186	110.04		1:20:35 PM
ST-3	CCB (0 mg/L)	0.003	-0.0025	0.00	INV,><	1:22:05 PM
51	WG254087-02 LCS	1.074	0.3108	0.00		1:23:35 PM
52	WG254087-03 LCSDUP	1.120X	0.3244	0.00		1:25:06 PM
53	L0710668-01	5.237X	1.5287	0.00	><,LH	1:26:35 PM
54	L0710668-02	0.084	0.0212	0.00		1:28:05 PM
55	L0710670-01	1.630	0.4736	0.00		1:29:35 PM
56	L0710764-01 (5)	-0.005	-0.0050	0.00	INV,><,LL	1:31:05 PM
57	L0710769-01 (5)	0.003	-0.0025	0.00	INV,><	1:32:54 PM
58	L0710769-03 (5)	0.012	0.0001	0.00		1:34:41 PM
59	L0710771-01 (5)	-0.013	-0.0071	0.00	INV,><,LL	1:36:11 PM
60	L0710772-01 (5)	0.039	0.0080	0.00		1:37:41 PM
ST-2	CCV3 (1 mg/L)	1.112	0.3221	111.24		1:39:12 PM
ST-3	CCB (0 mg/L)	-0.040	-0.0151	0.00	INV,><,LL	1:40:42 PM
61	L0710766-01 (5)	0.010	-0.0004	0.00	INV	1:42:12 PM
62	DUP 766-01 (5)	-0.005	-0.0050	0.00	INV,><,LL	1:43:42 PM
63	MS 766-01 (5)	0.117	0.0310	0.00		1:45:12 PM
64	MSD 766-01 (5)	0.119	0.0316	0.00		1:46:59 PM
65	ID 65 NO2 (1)	0.975	0.2818	0.00		1:48:29 PM
66	ID 66 LCS	0.946 X0.2733		0.00		1:49:59 PM
67	ID 67 10-787-01 (10)	0.593	0.1701	0.00		1:51:29 PM
ST-2	CCV3 (1 mg/L)	1.092	0.3161	109.19		1:52:59 PM
ST-3	CCB (0 mg/L)	-0.011	-0.0067	0.00	INV,><,LL	1:54:29 PM
13-[1/4]	L0710709-03	3.815	0.2757	0.00	LH	2:03:39 PM
15-[1/4]	L0710709-06	2.412	0.1731	0.00	LH	2:05:27 PM
18-[1/4]	L0710709-11	5.310	0.3850	0.00	LH	2:07:15 PM
ST-2	CCV3 (1 mg/L)	1.125	0.3258	112.50		2:08:27 PM
ST-3	CCB (0 mg/L)	-0.012	-0.0068	0.00	INV,><,LL	2:09:56 PM
32-[1/4]	L0710787-01	7.224	0.5250	0.00	LH	2:12:03 PM

Report Date :10/29/2007 **Run Date :10/29/2007** **Operator : WESTCO** **Plan # :20071029002**

Plan Description : NO3-A-DIH/10/29/2007

KEMRON ENVIRONMENTAL
SMARTCHEM REPORT
UNITS: MG/L

Method : WNO3 - EPA 353.2 Nitrate-Nitrite

Smp#/[Dil Fact]	Sample ID	Conc	OD	%Recovery/RPD	Flag	Analysis Time
35-[1/4]	L0710767-03	3.728	0.2693	0.00	LH	2:13:51 PM
37-[1/4]	L0710767-05	1.470	0.1042	0.00		2:15:39 PM
39-[1/4]	L0710655-01	2.690	0.1934	0.00	LH	2:17:27 PM
53-[1/4]	L0710668-01	5.487	0.3980	0.00	LH	2:19:15 PM
ST-2	CCV3 (1 mg/L)	1.147	0.3321	114.66		2:20:26 PM
ST-3	CCB (0 mg/L)	-0.017	-0.0083	0.00	INV,><,LL	2:21:57 PM

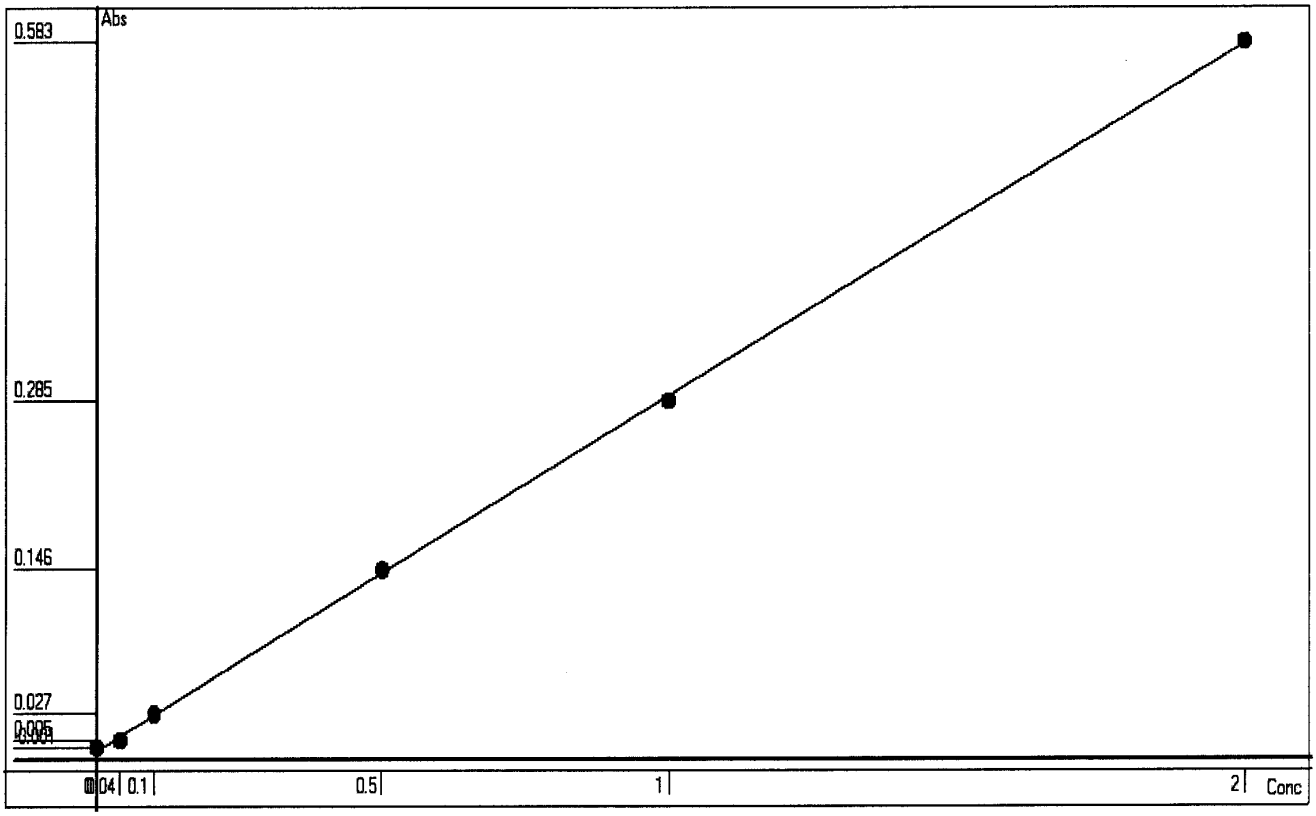
Report Date :10/29/2007 **Run Date :10/29/2007** **Operator : WESTCO** **Plan # :20071029002**

Plan Description : NO3-A-DIH/10/29/2007

Calibrant Report - WNO3 -

Calib Lot #:010104 Exp Date:1/1/2010 User:Westco Scientific

Plan # : 20071029002 Description : [NO3-A-DIH/10/29/2007]



Point	OD	Conc	Recalc Conc	% Error
1	-0.0008	0	0.0089	0.89
2	0.0049	0.04	0.0283	-29.25
3	0.0271	0.1	0.1042	4.20
4	0.1456	0.5	0.5093	1.86
5	0.2847	1	0.9847	-1.53
6	0.5833	2	2.0054	0.27

Conc= +3.4181*Abso +0.0116 **R^2=0.9998**

RBL
0.0146
0

Report Date 10/29/2007 Run Date 10/29/2007