RECR – 4

North Lea Joint Venture

Pit Excavation 6/22/12

June 22, 2012
File No.: 122078.3-ALB12RP001

Mr. Jim Griswold
New Mexico Oil Conservation Division
1200 South St. Francis Drive
Santa Fe, New Mexico 87505

Subject: Report of Remediation of a Former Reserve Pit
North Lea Joint Venture Site
Crossroads, New Mexico

Dear Mr. Griswold:

Kleinfelder West, Inc. (Kleinfelder) is pleased to submit this report to the New Mexico Oil Conservation Division (NMOCD) regarding the remediation of a former reserve pit located at the above referenced property (the "Site"). The Site is located approximately 2 miles northwest of Crossroads, New Mexico (see Figure 1, Site Location Map). The Site consisted of an abandoned crude oil pit (see Figure 2, Site Plan). Features at the Site included:

- A former reserve pit that was approximately 80 feet by 80 feet (ft) in size. The former reserve pit was surrounded by an earthen berm that was approximately 4 to 6 ft high and approximately 20 ft wide;
- The former reserve pit was surrounded by a barbed-wire fence;
- A ground water monitoring well was located near the southeastern corner of the fence; and
- A petroleum-stained soil area that was located to the southwest of the fence.

Photographs documenting site conditions are included in Appendix A. The property is privately owned by Mrs. Kileen Bresenham. An access agreement, provided by the NMOCD, was signed by Mrs. Brensenham prior to the start of field work.

Project History

A limited Phase II Environmental Site Assessment (Phase II) was performed at the site in January 2012. The Phase II consisted of advancing three borings at the Site to assess the horizontal and vertical profile of total petroleum hydrocarbon (TPH) and chloride concentrations. The first boring was drilled within the former reserve pit in an area where the berm was removed. Two additional (lateral) borings were drilled northeast and southeast of the corners of the former reserve pit.

The results of the Phase II indicated the following:

- Concentrations of TPH appeared to have migrated vertically, but not horizontally since they were not detected in the soil samples collected from the lateral borings; and

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- Concentrations of chlorides appear to have migrated vertically as well as horizontally at depth.

The observed TPH and chloride concentrations were most likely caused by the migration of meteoric waters through the former reserve pit material and into the subsurface. The analytical results from the pit sample did not indicate the presence of volatile organic compounds or the presence of gasoline-range TPH. This may be the result of degradation and volatilization of these compounds due to the age of these materials.

Soil samples were collected in March 2012 for the analysis of naturally occurring radioactive materials (NORM). Results of these samples indicated that concentrations are below regulatory limits. Laboratory analytical reports are included in Appendix B.

Project Preparation

Prior to project mobilization, a work plan was prepared and submitted for approval to the NMOCD. Upon receiving authorization to proceed from the NMOCD, Kleinfelder performed the following:

- Developed a Site Specific Health and Safety Plan (SSHASP) that addressed field work specified in the Work Plan (included in Appendix C);
- Developed work orders for the subcontractor;
- Notification to the New Mexico One-Call to facilitate location of underground utilities and pipelines was performed by the subcontractor (One Call Ticket number 2012202901); and
- Notified the NMOCD and the property owner a minimum of 48 hours prior to the commencement of remediation activities.

Field Program

The subcontractor selected to perform the field work was EnviroWorks, LLC., of Edgewood, New Mexico. Kleinfelder and subcontractor employees mobilized to the site on May 21, 2012. Prior to the start of field activities, a project kickoff meeting was performed that included reviewing the SSHASP, applicable Job Safety Analyses, and stop work authority (SWA). Tailgate safety meetings were conducted daily at the beginning of the day and as conditions changed.

The former reserve pit contents were excavated to a depth of approximately 10 ft below the top of the existing material. Excavation of the material was performed using a track-mounted excavator. The material was found to be very dense and heavy. A well-cemented soil (caliche) layer was observed at a depth of approximately 10 to 11 ft below the top of the pit contents. A hard rock shelf was observed protruding into the bottom of the pit near the southern edge of the pit. The rock shelf was encountered at approximately 8 ft below ground surface (bgs).

Reserve pit contents were placed in trucks and transported to the Gandy-Marley Landfarm located near Caprock, New Mexico for disposal. Approximately 2,060 cubic yards of material was removed from the former reserve pit (based on approximately 20 cubic yards of material per truck load).

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The stained soil area that was located to the southwest of the former reserve pit was also excavated. A hard caliche layer was also observed within this excavation at a depth of about 10 ft bgs. The area was excavated approximately 23 ft wide, 24 ft long and 16 ft deep. Approximately 340 cubic yards of material was removed and disposed of at the Gandy-Marley Landfarm for a total of approximately 2,400 cubic yards of material removed from both locations. A total of approximately 2,360 cubic yards of clean fill was hauled from the Gandy Marley Landfarm for use as backfill to supplement the berm material.

Drill cuttings from the January 2012 subsurface investigation were removed from the drums that they had been stored in. Soil from the boring that was drilled within the former pit was placed in a truck and disposed of at the Gandy-Marley landfarm. The soil contained in the remaining drums were used as shallow backfill and placed above the liner (see below). The empty drums were disposed of by the subcontractor at a metal recycler.

Berm material was used to backfill the excavation. The imported fill material from the landfarm was assessed to be of better quality for plant growth. This was based on the lack of caliche within the material and the darker color indicating a higher mineral content. Due to this, the berm material was placed in the bottom of the excavation and the imported fill was reserved for the upper portion.

When backfilling reached a depth of approximately 4 ft bgs, a 40-mil polyethylene liner was placed in each excavation. The liner seams were overlapped a minimum of 24 inches. Clean fill was pushed over the liner using a bulldozer to prevent punctures to the liner.

The former reserve pit and stained soil areas were reseeded after completion of backfill activities. The Homestead seed mix was used at a rate of 30 pounds per acre. Seed was broadcasted then wheel-rolled in place in accordance with the seed provider's recommendations. Upon completion of the seed planting process, the reseeded area was watered to promote plant growth. Watering was performed using a water truck (at low pressure to prevent movement of the seed).

Upon completion of seeding, the fence materials were removed from the Site and properly disposed of. Field activities were completed and demobilization occurred on June 8, 2011.

Sample Results

Six soil samples from the former reserve pit and one sample from the surface stained area were collected for laboratory analysis. The samples were placed on ice and hand delivered to Hall Environmental Analysis Laboratory. The samples were analyzed for TPH diesel range organics (DRO) and motor oil range organics (MRO) by EPA method 8015B. Results of the soil samples are:

Sample Location	Depth (ft bgs)	(mg/kg)	(mg/kg)
Former Reserve Pit			
20 feet south of northwest corner	7	580	970
Center of north wall	7	9,000	3,700
Center of east wall	7	980	620

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Sample Location	Depth (ft bgs)	(mg/kg)	(mg/kg)
5 feet west of southeast corner	12	19,000	6,400
#2 Grab (base of rock shelf)	10	23,000	9400
Southwest corner	11	16,000	5,700
Surface Stained Area			
Approximate center of excavation	16	11,000	3,300

mg/kg= milligrams per kilogram

Sample locations are shown in Figure 3. Laboratory analytical reports are included in Appendix B. Sample results indicate that elevated concentrations of TPH remain in the bottom of both excavations. While the majority of the impacted mass has been removed from both excavations, residual TPH concentrations remain.

CLOSING

Kleinfelder offers various levels of investigative and engineering services to suit the varying needs of different clients. It should be recognized that definition and evaluation of geologic and environmental conditions are a difficult and inexact science. Judgments leading to conclusions and recommendations are generally made with incomplete knowledge of the subsurface conditions present due to the limitations of data from field studies. Although risk can never be eliminated, more detailed and extensive studies yield more information, which may help understand and manage the level of risk. Since detailed study and analysis involves greater expense, our clients participate in determining levels of service that provide adequate information for their purposes at acceptable levels of risk. More extensive studies, including subsurface studies or field tests, should be performed to reduce uncertainties. Acceptance of this report will indicate that NMOCD has reviewed the document and determined that it does not need or want a greater level of service than provided.

During the course of the performance of Kleinfelder's services, hazardous materials may have been discovered. Kleinfelder assumes no responsibility or liability whatsoever for any claim, loss of property value, damage, or injury that results from pre-existing hazardous materials being encountered or present on the project site, or from the discovery of such hazardous materials. Nothing contained in this report should be construed or interpreted as requiring Kleinfelder to assume the status of an owner, operator, or generator, or person who arranges for disposal, transport, storage, or treatment of hazardous materials within the meaning of any governmental statute, regulation, or order. NMOCD is solely responsible for directing notification of all governmental agencies, and the public at large, of the existence, release, treatment, or disposal of any hazardous materials observed at the project site, either before or during performance of Kleinfelder's services. NMOCD is responsible for directing all arrangements to lawfully store, treat, recycle, dispose, or otherwise handle hazardous materials, including cuttings and samples resulting from Kleinfelder's services.

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We appreciate the opportunity to provide these services to NMOCD. Should any questions arise concerning this report; we will be pleased to discuss them with you.

Respectfully submitted,

KLEINFELDER WEST, INC.

Bernard Bockisch, PMP
Senior Project Manager

Reviewed by:

Eileen Shannon, PG
Project Professional

Attachments:

Figures:
1 – Site Location Map
2 – Site Plan
3 – Sample Location Map

Appendix A – Site Photographs
Appendix B – Laboratory Analytical Results
Appendix C – Site Specific Health and Safety Plan

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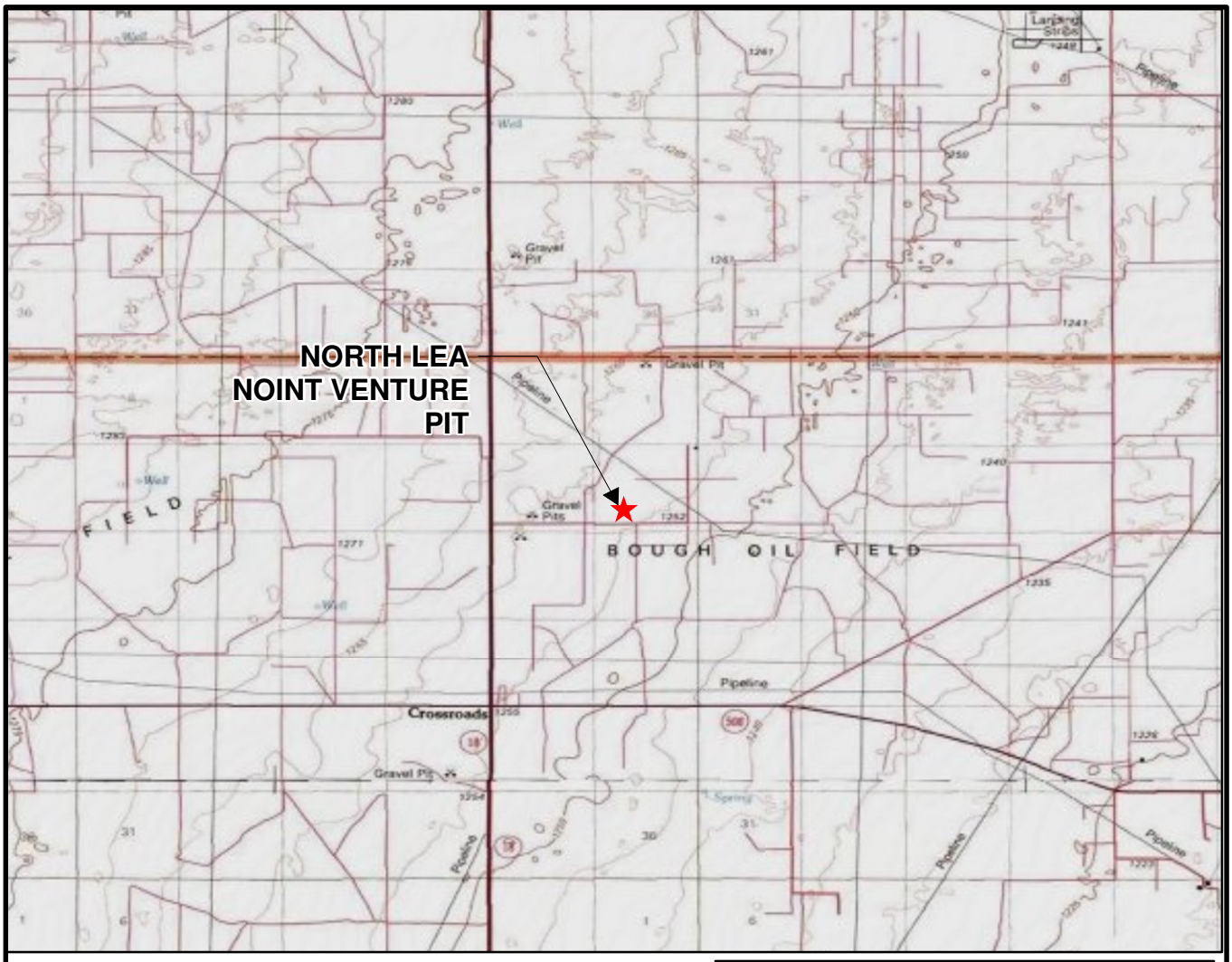
Figures



SOURCES: http://services.arcgisonline.com/ArcGIS/rest/services/NGS_Topo_US_2D/MapServer

N

0 1 2 4 Miles

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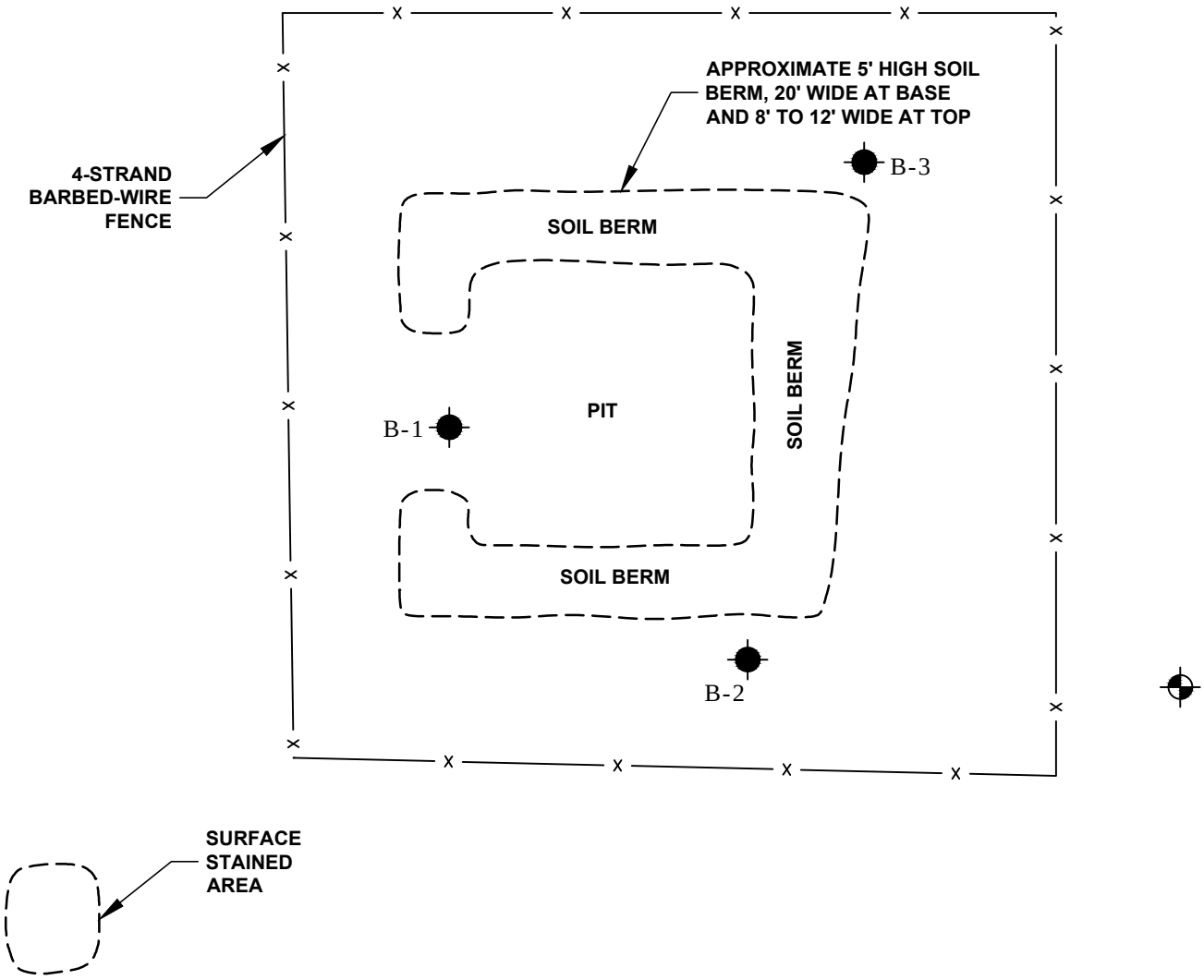
PROJECT NO.	1220708
DRAWN:	02/06/2012
DRAWN BY:	PD
CHECKED BY:	BB
FILE NAME:	122078_SL.mxd

SITE LOCATION MAP

NORTH LEA JOINT VENTURE PIT
2.6 MILES NW OF CROSSROADS, NM
LEA COUNTY, NEW MEXICO

FIGURE

1



LEGEND

- APPROXIMATE MONITORING WELL LOCATION
- B-3 APPROXIMATE BORING LOCATIONS (DRILLED JANUARY 18, 2012)

CAD FILE: G:\Environ\CURRENT WORK FOLDER PROJECTS\122078 - North Lea Pit Abandonment\2.0 Technical\CAD\Figures\ LAYOUT: Layout1

ATTACHED IMAGES:
ATTACHED XREFS:
RIVERSIDE, CA

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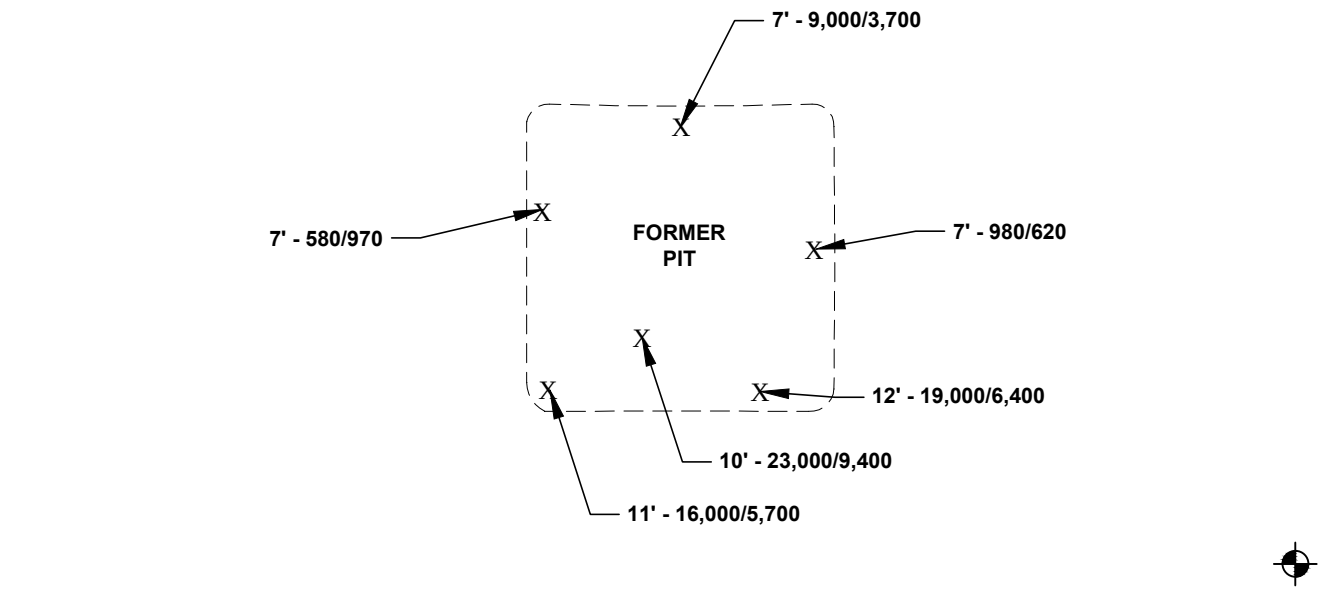
PROJECT NO.	122078
DRAWN:	9/2011
DRAWN BY:	DMF
CHECKED BY:	BB
FILE NAME:	122078-F1.dwg

SITE PLAN

NORTH LEA SITE
NMOCD - NEW MEXICO OIL CONSERVATION DIVISION
CROSS ROADS, NEW MEXICO

FIGURE
2



LEGEND

- APPROXIMATE MONITORING WELL LOCATION
- X APPROXIMATE SOIL SAMPLE LOCATION
- 7' - 580/970 SAMPLE DEPTH (FEET) - TPH DIESEL RANGE ORGANICS/ TPH MOTOR OIL RANGE ORGANICS

ALL CONCENTRATIONS IN MILLIGRAMS PER KILOGRAM

CAD FILE: G:\ENVIRON\CURRENT WORK FOLDER PROJECTS\122078 - North Lea Pit Abandonment\2.0 Technical Information\2.8 - Technical-CADD Figures\ LAYOUT: SAMPL

ATTACHED IMAGES:
ATTACHED XREFS:
RIVERSIDE, CA

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PROJECT NO.	122078
DRAWN:	6/6/2012
DRAWN BY:	DMF/PD
CHECKED BY:	BB
FILE NAME:	122078-F1.dwg

SAMPLE LOCATION MAP

NORTH LEA SITE
NMOCD - NEW MEXICO OIL CONSERVATION DIVISION
CROSS ROADS, NEW MEXICO

FIGURE
3

Appendix A

Site Photographs

No.1 View of Subject Property from southwest property corner (looking north). Note stained soil location in foreground.

No.2 View of surface stained soil area looking north.

No.3 View of interior or pit (looking southeast).

No.4 View of interior of pit (looking northeast).

No.5 Excavation of reserve pit materials (looking east). 6/4/12

No.6 Excavation of reserve pit materials (looking southeast). 6/4/12

No.7 View of pit walls looking northeast (darker colored soil in pit wall is topsoil, impacted soil to the lower left). 6/4/12

No.8 View of pit walls looking east (darker colored soil in pit wall is topsoil). 6/4/12

No.9 View of pit walls looking southeast (darker colored soil in pit wall is topsoil). 6/4/12

No.10 Excavation of stained soil area (looking north). 5/30/12

No.11 View of south wall of stained soil area excavation. 5/30/12

No.12 View of bottom of stained soil area excavation (looking northwest). 5/30/12

No.13 View of east wall of stained soil area excavation. 5/30/12

Appendix B

Laboratory Analytical Results

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

May 30, 2012

Bernard Bockisch
Kleinfelder
9019 Washington NE Building A
Albuquerque, NM 87113
TEL: (505) 344-7373
FAX (505) 344-1711

RE: North LEA Joint Venture OrderNo.: 1205B15

Dear Bernard Bockisch:

Hall Environmental Analysis Laboratory received 2 sample(s) on 5/25/2012 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. All samples are reported as received unless otherwise indicated.

Please don't hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Kleinfelder
Client Sample ID: 5' W of SE Corner
Project: North LEA Joint Venture
Collection Date: 5/23/2012 12:44:00 PM
Lab ID: 1205B15-001 **Matrix:** SOIL **Received Date:** 5/25/2012 4:21:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015B: DIESEL RANGE ORGANICS						Analyst: **JMP**
Diesel Range Organics (DRO)	19,000	1,000		mg/Kg	100	5/30/2012 12:30:10 PM
Motor Oil Range Organics (MRO)	6,400	5,000		mg/Kg	100	5/30/2012 12:30:10 PM
Surr: DNOP	0	82.1-121	S	%REC	100	5/30/2012 12:30:10 PM

Qualifiers:

*/X	Value exceeds Maximum Contaminant Level.
E	Value above quantitation range
J	Analyte detected below quantitation limits
R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits
B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
RL	Reporting Detection Limit

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Kleinfelder
Client Sample ID: #2 Grab
Project: North LEA Joint Venture
Collection Date: 5/24/2012 3:22:00 PM
Lab ID: 1205B15-002 **Matrix:** SOIL **Received Date:** 5/25/2012 4:21:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015B: DIESEL RANGE ORGANICS						Analyst: **JMP**
Diesel Range Organics (DRO)	23,000	990		mg/Kg	100	5/30/2012 12:52:09 PM
Motor Oil Range Organics (MRO)	9,400	5,000		mg/Kg	100	5/30/2012 12:52:09 PM
Surr: DNOP	0	82.1-121	S	%REC	100	5/30/2012 12:52:09 PM

Qualifiers:

*/X	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1205B15**

30-May-12

Client: Kleinfelder

Project: North LEA Joint Venture

Sample ID **MB-2116**	SampType: **MBLK**	TestCode: **EPA Method 8015B: Diesel Range Organics**
Client ID: **PBS**	Batch ID: **2116**	RunNo: **3051**
Prep Date: **5/25/2012**	Analysis Date: **5/29/2012**	SeqNo: **84484** Units: **%REC**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: DNOP	11		10.00		111	82.1	121			

Sample ID **LCS-2116**	SampType: **LCS**	TestCode: **EPA Method 8015B: Diesel Range Organics**
Client ID: **LCSS**	Batch ID: **2116**	RunNo: **3051**
Prep Date: **5/25/2012**	Analysis Date: **5/29/2012**	SeqNo: **84500** Units: **%REC**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: DNOP	4.7		5.000		94.3	82.1	121			

Sample ID **MB-2112**	SampType: **MBLK**	TestCode: **EPA Method 8015B: Diesel Range Organics**
Client ID: **PBS**	Batch ID: **2112**	RunNo: **3051**
Prep Date: **5/25/2012**	Analysis Date: **5/29/2012**	SeqNo: **84501** Units: **%REC**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: DNOP	11		10.00		109	82.1	121			

Sample ID **LCS-2112**	SampType: **LCS**	TestCode: **EPA Method 8015B: Diesel Range Organics**
Client ID: **LCSS**	Batch ID: **2112**	RunNo: **3051**
Prep Date: **5/25/2012**	Analysis Date: **5/29/2012**	SeqNo: **84655** Units: **%REC**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: DNOP	4.8		5.000		96.4	82.1	121			

Sample ID **MB-2129**	SampType: **MBLK**	TestCode: **EPA Method 8015B: Diesel Range Organics**
Client ID: **PBS**	Batch ID: **2129**	RunNo: **3051**
Prep Date: **5/29/2012**	Analysis Date: **5/29/2012**	SeqNo: **84746** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	ND	10								
Motor Oil Range Organics (MRO)	ND	50								
Surr: DNOP	11		10.00		105	82.1	121			

Sample ID **LCS-2129**	SampType: **LCS**	TestCode: **EPA Method 8015B: Diesel Range Organics**
Client ID: **LCSS**	Batch ID: **2129**	RunNo: **3051**
Prep Date: **5/29/2012**	Analysis Date: **5/29/2012**	SeqNo: **84867** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	38	10	50.00	0	76.4	52.6	130			
Surr: DNOP	4.6		5.000		91.2	82.1	121			

Qualifiers:

- */X Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- R RPD outside accepted recovery limits
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- RL Reporting Detection Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1205B15**

30-May-12

Client: Kleinfelder

Project: North LEA Joint Venture

Sample ID	**MB-2136**	SampType:	**MBLK**	TestCode:	**EPA Method 8015B: Diesel Range Organics**					
Client ID:	**PBS**	Batch ID:	**2136**	RunNo:	**3082**					
Prep Date:	**5/29/2012**	Analysis Date:	**5/30/2012**	SeqNo:	**85154**	Units:	**%REC**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: DNOP	11		10.00		106	82.1	121			

Sample ID	**LCS-2136**	SampType:	**LCS**	TestCode:	**EPA Method 8015B: Diesel Range Organics**					
Client ID:	**LCSS**	Batch ID:	**2136**	RunNo:	**3082**					
Prep Date:	**5/29/2012**	Analysis Date:	**5/30/2012**	SeqNo:	**85155**	Units:	**%REC**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: DNOP	4.6		5.000		91.9	82.1	121			

Qualifiers:

*/X	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

Sample Log-In Check List

Client Name: Klein Work Order Number: 1205B15

Received by/date: MG 05/25/12

Logged By: **Anne Thorne** 5/25/2012 4:21:00 PM Anne Thorne

Completed By: **Anne Thorne** 5/29/2012 Anne Thorne

Reviewed By: 05/25/12

Chain of Custody

1. Were seals intact? Yes ☑ No ☐ Not Present ☐
2. Is Chain of Custody complete? Yes ☑ No ☐ Not Present ☐
3. How was the sample delivered? Client

Log In

4. Coolers are present? (see 19. for cooler specific information) Yes ☑ No ☐ NA ☐
5. Was an attempt made to cool the samples? Yes ☑ No ☐ NA ☐
6. Were all samples received at a temperature of >0° C to 6.0°C Yes ☑ No ☐ NA ☐
7. Sample(s) in proper container(s)? Yes ☑ No ☐
8. Sufficient sample volume for indicated test(s)? Yes ☑ No ☐
9. Are samples (except VOA and ONG) properly preserved? Yes ☑ No ☐
10. Was preservative added to bottles? Yes ☐ No ☑ NA ☐
11. VOA vials have zero headspace? Yes ☐ No ☐ No VOA Vials ☑
12. Were any sample containers received broken? Yes ☐ No ☑
13. Does paperwork match bottle labels? (Note discrepancies on chain of custody) Yes ☑ No ☐
14. Are matrices correctly identified on Chain of Custody? Yes ☑ No ☐
15. Is it clear what analyses were requested? Yes ☑ No ☐
16. Were all holding times able to be met? (If no, notify customer for authorization.) Yes ☑ No ☐

# of preserved bottles checked for pH: _____ (<2 or >12 unless noted)

Adjusted? _____

Checked by: _____

Special Handling (if applicable)

17. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified: _____ Date _____

By Whom: _____ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding: _____

Client Instructions: _____

18. Additional remarks:

19. **Cooler Information**

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	4.8	Good	Not Present			

Chain-of-Custody Record

Client: KLEINFELDER, INC

Mailing Address: 9019-A WASHINGTON
ALBUQUERQUE NM 87113

Phone #: 505-344-7373

email or Fax#: BBOCKISCH@KLEINFELDER.COM

QA/QC Package:
☑ Standard ☐ Level 4 (Full Validation)

Accreditation
☐ NELAP ☐ Other

☐ EDD (Type)

Turn-Around Time:
☑ Standard ☐ Rush

Project Name: NORTH LEA JOINT VENTURE

Project #: 122078

Project Manager: BERNARD BOCKISCH

Sampler: DAVID HAY

On Ice: ☑ Yes ☐ No

Sample Temperature: 4.8

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

Tel. 505-345-3975 Fax 505-345-4107

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1205815	BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH Method 8015B (Gas/Diesel)	TPH (Method 418.1)	EDB (Method 504.1)	8310 (PNA or PAH)	RCRA 8 Metals	Anions (F,Cl,NO_3,NO_2,PO_4,SO_4)	8081 Pesticides / 8082 PCB's	8260B (VOA)	8270 (Semi-VOA)	Air Bubbles (Y or N)
5/3/12	12:44	SOIL	5' WEST OF S.E. CORNER	1-4OZ	ICE	-001			✓									
5/3/12	3:22	SOIL	#2 GRAB	1-4OZ	ICE	-002			✓									

Date:	Time:	Relinquished by:	Received by:	Date	Time	Remarks:
5/5/12	4:24	David Hay				
Date:	Time:	Relinquished by:	Received by:	05/5/12	1624	INCLUDE MOTOR OIL RANGE

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories.

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

Bernard Bockisch
Kleinfelder
9019 Washington NE Building A
Albuquerque, NM 87113
TEL: (505) 344-7373
FAX: (505) 344-1711

RE: North LEA OrderNo.: 1203847

Dear Bernard Bockisch:

Hall Environmental Analysis Laboratory received 2 sample(s) on 3/22/2012 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. All samples are reported as received unless otherwise indicated.

Please don't hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

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www.pacelabs.com

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

April 30, 2012

Ms. Anne Thorne
Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109

RE: Project: 1203847
Pace Project No.: 3065761

Dear Ms. Thorne:
Enclosed are the analytical results for sample(s) received by the laboratory on March 23, 2012. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Carin A. Ferris

Carin Ferris

carin.ferris@pacelabs.com
Project Manager

Enclosures

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Greensburg, PA 15601
(724)850-5600

CERTIFICATIONS

Project: 1203847
Pace Project No.: 3065761

Pennsylvania Certification IDs
1638 Roseytown Rd Suites 2,3&4 Greensburg, PA 15601
ACLASS DOD-ELAP Accreditation #: ADE-1544
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California/TNI Certification #: 04222CA
Colorado Certification
Connecticut Certification #: PH 0694
Delaware Certification
Florida/TNI Certification #: E87683
Guam/PADEP Certification
Hawaii/PADEP Certification
Idaho Certification
Illinois/PADEP Certification
Indiana/PADEP Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: 90133
Louisiana/TNI Certification #: LA080002
Louisiana/TNI Certification #: 4086
Maine Certification #: PA0091
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification
Missouri Certification #: 235
Montana Certification #: Cert 0082
Nevada Certification
New Hampshire/TNI Certification #: 2976
New Jersey/TNI Certification #: PA 051
New Mexico Certification
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
Oregon/TNI Certification #: PA200002
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
South Dakota Certification
Tennessee Certification #: TN2867
Texas/TNI Certification #: T104704188
Utah/TNI Certification #: ANTE
Virgin Island/PADEP Certification
Virginia Certification #: 00112
Virginia VELAP (Cert # 460198)
Washington Certification #: C868
West Virginia Certification #: 143
Wisconsin/PADEP Certification
Wyoming Certification #: 8TMS-Q

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SAMPLE SUMMARY

Project: 1203847
Pace Project No.: 3065761

Lab ID	Sample ID	Matrix	Date Collected	Date Received
3065761001	**1203847-001A NL1-3/20/12**	Solid	03/20/12 12:10	03/23/12 09:45
3065761002	**1203847-002A NL2-3/20/12**	Solid	03/20/12 12:23	03/23/12 09:45

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SAMPLE ANALYTE COUNT

Project: 1203847
Pace Project No.: 3065761

Lab ID	Sample ID	Method	Analysts	Analytes Reported
3065761001	**1203847-001A NL1-3/20/12**	EPA 900.0m	JC2	2
		EPA 901.1m	AEH	10
		RP280m DOE Method	LAL	1
3065761002	**1203847-002A NL2-3/20/12**	EPA 900.0m	JC2	2
		EPA 901.1m	AEH	10
		RP280m DOE Method	LAL	1

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PROJECT NARRATIVE

Project: 1203847
Pace Project No.: 3065761

Method: **EPA 900.0m**
Description: 900.0 Gross Alpha/Beta
Client: Hall Environmental Analysis Laboratory
Date: April 30, 2012

General Information:
2 samples were analyzed for EPA 900.0m. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

Sample Comments:

The LCS for Lead-210 asscociated with this batch failed high. The acceptable limit for the LCS percent recovery is 125% and the obtained recovery for the LCS was 126.44%, all other QC criteria was acceptable.
- 1203847-001A NL1-3/20/12 (Lab ID: 3065761001)

Analyte Comments:

QC Batch: RADC/11531

N2: The lab does not hold TNI accreditation for this parameter.
- 1203847-001A NL1-3/20/12 (Lab ID: 3065761001)
  - Gross Alpha
  - Gross Beta
- 1203847-002A NL2-3/20/12 (Lab ID: 3065761002)
  - Gross Alpha
  - Gross Beta
- BLANK (Lab ID: 422941)
  - Gross Alpha
  - Gross Beta

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PROJECT NARRATIVE

Project: 1203847
Pace Project No.: 3065761

Method: **EPA 901.1m**
Description: 901.1 Gamma Spec
Client: Hall Environmental Analysis Laboratory
Date: April 30, 2012

General Information:
2 samples were analyzed for EPA 901.1m. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

Sample Comments:

The LCS for Lead-210 asscociated with this batch failed high. The acceptable limit for the LCS percent recovery is 125% and the obtained recovery for the LCS was 126.44%, all other QC criteria was acceptable.
- 1203847-001A NL1-3/20/12 (Lab ID: 3065761001)

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Greensburg, PA 15601
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PROJECT NARRATIVE

Project: 1203847
Pace Project No.: 3065761

Method: **RP280m DOE Method**
Description: PGH-R-042 Lead 210
Client: Hall Environmental Analysis Laboratory
Date: April 30, 2012

General Information:
2 samples were analyzed for RP280m DOE Method. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

Sample Comments:

The LCS for Lead-210 asscociated with this batch failed high. The acceptable limit for the LCS percent recovery is 125% and the obtained recovery for the LCS was 126.44%, all other QC criteria was acceptable.
- 1203847-001A NL1-3/20/12 (Lab ID: 3065761001)

Analyte Comments:

QC Batch: RADC/11526

N2: The lab does not hold TNI accreditation for this parameter.
- 1203847-001A NL1-3/20/12 (Lab ID: 3065761001)
  - Lead-210
- 1203847-002A NL2-3/20/12 (Lab ID: 3065761002)
  - Lead-210
- BLANK (Lab ID: 422936)
  - Lead-210

This data package has been reviewed for quality and completeness and is approved for release.

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ANALYTICAL RESULTS

Project: 1203847
Pace Project No.: 3065761

Sample: 1203847-001A NL1-3/20/12 **Lab ID: 3065761001** Collected: 03/20/12 12:10 Received: 03/23/12 09:45 Matrix: Solid
PWS: Site ID: Sample Type:

Results reported on a "dry-weight" basis
Comments: • The LCS for Lead-210 asscociated with this batch failed high. The acceptable limit for the LCS percent recovery is 125% and the obtained recovery for the LCS was 126.44%, all other QC criteria was acceptable.

Parameters	Method	Act ± Unc (MDC)	Units	Analyzed	CAS No.	Qual
Gross Alpha	EPA 900.0m	**-1.100 ± 2.10 (6.00)**	pCi/g	04/02/12 07:15	12587-46-1	N2
Gross Beta	EPA 900.0m	**2.56 ± 3.32 (6.97)**	pCi/g	04/02/12 07:15	12587-47-2	N2
Bismuth-212	EPA 901.1m	**-0.130 ± 1.81 (1.36)**	pCi/g	04/18/12 10:48	14913-49-6	
Bismuth-214	EPA 901.1m	**8.47 ± 0.951 (0.584)**	pCi/g	04/18/12 10:48	14733-03-0	
Lead-212	EPA 901.1m	**0.230 ± 0.116 (0.179)**	pCi/g	04/18/12 10:48	15092-94-1	
Lead-214	EPA 901.1m	**8.39 ± 0.954 (0.232)**	pCi/g	04/18/12 10:48	15067-28-4	
Potassium-40	EPA 901.1m	**4.10 ± 0.970 (0.691)**	pCi/g	04/18/12 10:48	13966-00-2	
Radium-226	EPA 901.1m	**8.36 ± 0.897 (0.172)**	pCi/g	04/18/12 10:48	13982-63-3	
Radium-228	EPA 901.1m	**0.0870 ± 0.189 (0.332)**	pCi/g	04/18/12 10:48	15262-20-1	
Thallium-208	EPA 901.1m	**0.0580 ± 0.0580 (0.0940)**	pCi/g	04/18/12 10:48	14913-50-9	
Thorium-234	EPA 901.1m	**3.69 ± 4.13 (6.69)**	pCi/g	04/18/12 10:48	15065-10-8	
Uranium-235	EPA 901.1m	**0.591 ± 0.158 (0.154)**	pCi/g	04/18/12 10:48	15117-96-1	
Lead-210	RP280m DOE Method	**18.81 ± 2.23 (0.435)**	pCi/g	04/29/12 10:14	14255-04-0	N2

Sample: 1203847-002A NL2-3/20/12 **Lab ID: 3065761002** Collected: 03/20/12 12:23 Received: 03/23/12 09:45 Matrix: Solid
PWS: Site ID: Sample Type:

Results reported on a "dry-weight" basis

Parameters	Method	Act ± Unc (MDC)	Units	Analyzed	CAS No.	Qual
Gross Alpha	EPA 900.0m	**6.99 ± 4.97 (8.26)**	pCi/g	04/02/12 07:15	12587-46-1	N2
Gross Beta	EPA 900.0m	**4.77 ± 2.69 (4.86)**	pCi/g	04/02/12 07:15	12587-47-2	N2
Bismuth-212	EPA 901.1m	**0.0350 ± 0.493 (0.922)**	pCi/g	04/18/12 11:20	14913-49-6	
Bismuth-214	EPA 901.1m	**1.01 ± 0.184 (0.205)**	pCi/g	04/18/12 11:20	14733-03-0	
Lead-212	EPA 901.1m	**0.428 ± 0.124 (0.121)**	pCi/g	04/18/12 11:20	15092-94-1	
Lead-214	EPA 901.1m	**0.991 ± 0.172 (0.105)**	pCi/g	04/18/12 11:20	15067-28-4	
Potassium-40	EPA 901.1m	**7.83 ± 1.32 (0.579)**	pCi/g	04/18/12 11:20	13966-00-2	
Radium-226	EPA 901.1m	**1.20 ± 0.188 (0.160)**	pCi/g	04/18/12 11:20	13982-63-3	
Radium-228	EPA 901.1m	**0.554 ± 0.184 (0.212)**	pCi/g	04/18/12 11:20	15262-20-1	
Thallium-208	EPA 901.1m	**0.202 ± 0.0710 (0.0630)**	pCi/g	04/18/12 11:20	14913-50-9	
Thorium-234	EPA 901.1m	**0.291 ± 0.431 (3.62)**	pCi/g	04/18/12 11:20	15065-10-8	
Uranium-235	EPA 901.1m	**0.0810 ± 0.0630 (0.1000)**	pCi/g	04/18/12 11:20	15117-96-1	
Lead-210	RP280m DOE Method	**1.180 ± 0.355 (0.504)**	pCi/g	04/29/12 10:12	14255-04-0	N2

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(724)850-5600

QUALITY CONTROL DATA

Project: 1203847
Pace Project No.: 3065761

QC Batch: RADC/11487 Analysis Method: EPA 901.1m
QC Batch Method: EPA 901.1m Analysis Description: 901.1 Gamma Spec
Associated Lab Samples: 3065761001, 3065761002

METHOD BLANK: 421427 Matrix: Solid
Associated Lab Samples: 3065761001, 3065761002

Parameter	Act ± Unc (MDC)	Units	Analyzed	Qualifiers
Bismuth-212	-0.002 ± 0.463 (0.839)	pCi/g	04/18/12 14:07	
Bismuth-214	0.00300 ± 0.229 (0.457)	pCi/g	04/18/12 14:07	
Lead-212	0.00200 ± 0.0530 (0.101)	pCi/g	04/18/12 14:07	
Lead-214	0.00400 ± 0.0650 (0.127)	pCi/g	04/18/12 14:07	
Potassium-40	-0.032 ± 0.488 (0.843)	pCi/g	04/18/12 14:07	
Radium-226	-0.025 ± 0.185 (0.143)	pCi/g	04/18/12 14:07	
Radium-228	-0.058 ± 0.628 (0.270)	pCi/g	04/18/12 14:07	
Thallium-208	0.0120 ± 0.0330 (0.0610)	pCi/g	04/18/12 14:07	
Thorium-234	0.802 ± 1.33 (2.22)	pCi/g	04/18/12 14:07	
Uranium-235	0.0130 ± 0.0340 (0.0590)	pCi/g	04/18/12 14:07	

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Greensburg, PA 15601
(724)850-5600

QUALITY CONTROL DATA

Project: 1203847
Pace Project No.: 3065761

QC Batch: RADC/11526 Analysis Method: RP280m DOE Method
QC Batch Method: RP280m DOE Method Analysis Description: PGH-R-042 Lead 210
Associated Lab Samples: 3065761001, 3065761002

METHOD BLANK: 422936 Matrix: Solid
Associated Lab Samples: 3065761001, 3065761002

Parameter	Act ± Unc (MDC)	Units	Analyzed	Qualifiers
Lead-210	0.313 ± 0.286 (0.471)	pCi/g	04/29/12 10:14	N2

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(724)850-5600

QUALITY CONTROL DATA

Project: 1203847
Pace Project No.: 3065761

QC Batch: RADC/11531 Analysis Method: EPA 900.0m
QC Batch Method: EPA 900.0m Analysis Description: 900.0 Gross Alpha/Beta
Associated Lab Samples: 3065761001, 3065761002

METHOD BLANK: 422941 Matrix: Solid
Associated Lab Samples: 3065761001, 3065761002

Parameter	Act ± Unc (MDC)	Units	Analyzed	Qualifiers
Gross Alpha	-0.130 ± 0.0788 (0.363)	pCi/g	04/02/12 06:38	N2
Gross Beta	-0.066 ± 0.130 (0.364)	pCi/g	04/02/12 06:38	N2

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Greensburg, PA 15601
(724)850-5600

QUALIFIERS

Project: 1203847
Pace Project No.: 3065761

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Act - Activity

Unc - Uncertainty

(MDC) - Minimum Detectable Concentration

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

N2 The lab does not hold TNI accreditation for this parameter.

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

Sample Log-In Check List

Client Name: Klein Work Order Number: 1203847

Received by/date: AT 03/22/12

Logged By: **Anne Thorne** 3/22/2012 9:05:00 AM Anne Thorne

Completed By: **Anne Thorne** 3/22/2012 Anne Thorne

Reviewed By:

Chain of Custody

1. Were seals intact? Yes ☐ No ☐ Not Present ☑
2. Is Chain of Custody complete? Yes ☑ No ☐ Not Present ☐
3. How was the sample delivered? Client

Log In

4. Coolers are present? (see 19. for cooler specific information) Yes ☑ No ☐ NA ☐
5. Was an attempt made to cool the samples? Yes ☑ No ☐ NA ☐
6. Were all samples received at a temperature of >0° C to 6.0°C Yes ☑ No ☐ NA ☐
7. Sample(s) in proper container(s)? Yes ☑ No ☐
8. Sufficient sample volume for indicated test(s)? Yes ☑ No ☐
9. Are samples (except VOA and ONG) properly preserved? Yes ☑ No ☐
10. Was preservative added to bottles? Yes ☐ No ☑ NA ☐
11. VOA vials have zero headspace? Yes ☐ No ☐ No VOA Vials ☑
12. Were any sample containers received broken? Yes ☐ No ☑
13. Does paperwork match bottle labels? (Note discrepancies on chain of custody) Yes ☑ No ☐
14. Are matrices correctly identified on Chain of Custody? Yes ☑ No ☐
15. Is it clear what analyses were requested? Yes ☑ No ☐
16. Were all holding times able to be met? (If no, notify customer for authorization.) Yes ☑ No ☐

# of preserved bottles checked for pH: _____ (<2 or >12 unless noted)

Adjusted? _____

Checked by: _____

Special Handling (if applicable)

17. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified: _____ Date _____

By Whom: _____ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding: _____

Client Instructions: _____

18. Additional remarks:

19. **Cooler Information**

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	2.4	Good	Not Present			

Chain-of-Custody Record

Client: KLEINFELDER, INC

Mailing Address: 9019-A WASHINGTON NE
ALBUQUERQUE, NM 87113

Phone #: 505-344-7373

email or Fax#: TBOCKISCH@KLEINFELDER.COM

QA/QC Package:
☑ Standard ☐ Level 4 (Full Validation)

Accreditation
☐ NELAP ☐ Other _____

☐ EDD (Type) _____

Turn-Around Time:
☑ Standard ☐ Rush _____

Project Name:
NORTH LEA

Project #:
122078

Project Manager:
BERNARD BOCKISCH

Sampler: BERNARD BOCKISCH

On Ice: ☑ Yes ☐ No

Sample Temperature: 2.4°

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

Tel. 505-345-3975 Fax 505-345-4107

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No 1203847	BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH Method 8015B (Gas/Diesel)	TPH (Method 418.1)	EDB (Method 504.1)	8310 (PNA or PAH)	RCRA 8 Metals	Anions ($F, Cl, NO_3, NO_2, PO_4, SO_4$)	8081 Pesticides / 8082 PCB's	8260B (VOA)	8270 (Semi-VOA)	RADIUM 226/228	GAMMA EMISSION SPECTROSCOPY	GROSS ALPHA/BETA	LEAD 210	Air Bubbles (Y or N)
3/20/12	12:10	SOLID	NL1-3/20/12	2x80Z	ICE	-001												✓	✓	✓	✓	
3/20/12	12:23	SOLID	NL2-3/20/12	2x80Z	ICE	-002												✓	✓	✓	✓	

Date: 3/20/12 Time: 9:05 Relinquished by: _____ Received by: _____ Date: 03/22/12 Time: 0905

Date: _____ Time: _____ Relinquished by: _____ Received by: _____ Date: _____ Time: _____

Remarks:

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

June 04, 2012

Bernard Bockisch
Kleinfelder
9019 Washington NE Building A
Albuquerque, NM 87113
TEL: (505) 344-7373
FAX (505) 344-1711

RE: North Lea J.N. OrderNo.: 1206028

Dear Bernard Bockisch:

Hall Environmental Analysis Laboratory received 5 sample(s) on 6/1/2012 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. All samples are reported as received unless otherwise indicated.

Please don't hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Kleinfelder
Client Sample ID: East Wall @ 7.0' FG
Project: North Lea J.N.
Collection Date: 5/30/2012 8:22:00 AM
Lab ID: 1206028-001 **Matrix:** SOIL **Received Date:** 6/1/2012 11:14:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015B: DIESEL RANGE ORGANICS						Analyst: **SCC**
Diesel Range Organics (DRO)	980	100		mg/Kg	10	6/4/2012 12:05:16 AM
Motor Oil Range Organics (MRO)	620	520		mg/Kg	10	6/4/2012 12:05:16 AM
Surr: DNOP	0	82.1-121	S	%REC	10	6/4/2012 12:05:16 AM

Qualifiers:

*/X	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Kleinfelder
Client Sample ID: Bottom SW Corner @ 11.0' FG
Project: North Lea J.N.
Collection Date: 5/30/2012 8:10:00 AM
Lab ID: 1206028-002 **Matrix:** SOIL **Received Date:** 6/1/2012 11:14:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015B: DIESEL RANGE ORGANICS						Analyst: **SCC**
Diesel Range Organics (DRO)	16000	980		mg/Kg	100	6/4/2012 12:30:53 AM
Motor Oil Range Organics (MRO)	5700	4900		mg/Kg	100	6/4/2012 12:30:53 AM
Surr: DNOP	0	82.1-121	S	%REC	100	6/4/2012 12:30:53 AM

Qualifiers:

*/X	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Kleinfelder
Client Sample ID: 20' W Wall @ 7' FG
Project: North Lea J.N.
Collection Date: 5/30/2012 8:20:00 AM
Lab ID: 1206028-003 **Matrix:** SOIL **Received Date:** 6/1/2012 11:14:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015B: DIESEL RANGE ORGANICS						Analyst: **SCC**
Diesel Range Organics (DRO)	580	99		mg/Kg	10	6/4/2012 7:06:38 AM
Motor Oil Range Organics (MRO)	970	490		mg/Kg	10	6/4/2012 7:06:38 AM
Surr: DNOP	0	82.1-121	S	%REC	10	6/4/2012 7:06:38 AM

Qualifiers:

*/X	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Kleinfelder
Client Sample ID: N Wall 7.0' FG
Project: North Lea J.N.
Collection Date: 5/30/2012 8:25:00 AM
Lab ID: 1206028-004 **Matrix:** SOIL **Received Date:** 6/1/2012 11:14:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015B: DIESEL RANGE ORGANICS						Analyst: **SCC**
Diesel Range Organics (DRO)	9000	510		mg/Kg	50	6/4/2012 1:22:10 AM
Motor Oil Range Organics (MRO)	3700	2500		mg/Kg	50	6/4/2012 1:22:10 AM
Surr: DNOP	0	82.1-121	S	%REC	50	6/4/2012 1:22:10 AM

Qualifiers:

*/X	Value exceeds Maximum Contaminant Level.
E	Value above quantitation range
J	Analyte detected below quantitation limits
R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits
B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
RL	Reporting Detection Limit

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Kleinfelder
Client Sample ID: Stained Area @ 16' FG
Project: North Lea J.N.
Collection Date: 5/30/2012 12:05:00 PM
Lab ID: 1206028-005 **Matrix:** SOIL **Received Date:** 6/1/2012 11:14:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015B: DIESEL RANGE ORGANICS						Analyst: **SCC**
Diesel Range Organics (DRO)	11000	200		mg/Kg	20	6/4/2012 1:47:47 AM
Motor Oil Range Organics (MRO)	3300	1000		mg/Kg	20	6/4/2012 1:47:47 AM
Surr: DNOP	0	82.1-121	S	%REC	20	6/4/2012 1:47:47 AM

Qualifiers:

*/X	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1206028**

04-Jun-12

Client: Kleinfelder

Project: North Lea J.N.

Sample ID **MB-2197**	SampType: **MBLK**	TestCode: **EPA Method 8015B: Diesel Range Organics**
Client ID: **PBS**	Batch ID: **2197**	RunNo: **3139**
Prep Date: **6/1/2012**	Analysis Date: **6/1/2012**	SeqNo: **87007** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	ND	10								
Motor Oil Range Organics (MRO)	ND	50								
Surr: DNOP	11		10.00		109	82.1	121			

Sample ID **LCS-2197**	SampType: **LCS**	TestCode: **EPA Method 8015B: Diesel Range Organics**
Client ID: **LCSS**	Batch ID: **2197**	RunNo: **3139**
Prep Date: **6/1/2012**	Analysis Date: **6/1/2012**	SeqNo: **87008** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	39	10	50.00	0	78.1	52.6	130			
Surr: DNOP	4.6		5.000		92.8	82.1	121			

Qualifiers:

*/X	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

Sample Log-In Check List

Client Name: Klein — Work Order Number: 1206028

Received by/date: MG 06/01/12

Logged By: **Anne Thorne** 6/1/2012 11:14:00 AM Anne Thorne

Completed By: **Anne Thorne** 6/1/2012 Anne Thorne

Reviewed By: 06/01/12

Chain of Custody

1. Were seals intact?	Yes ☑	No ☐	Not Present ☐
2. Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
3. How was the sample delivered?	Client		

Log In

4. Coolers are present? (see 19. for cooler specific information)	Yes ☑	No ☐	NA ☐
5. Was an attempt made to cool the samples?	Yes ☑	No ☐	NA ☐
6. Were all samples received at a temperature of >0° C to 6.0°C	Yes ☑	No ☐	NA ☐
7. Sample(s) in proper container(s)?	Yes ☑	No ☐	
8. Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
9. Are samples (except VOA and ONG) properly preserved?	Yes ☑	No ☐	
10. Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
11. VOA vials have zero headspace?	Yes ☐	No ☐	No VOA Vials ☑
12. Were any sample containers received broken?	Yes ☐	No ☑	
13. Does paperwork match bottle labels? (Note discrepancies on chain of custody)	Yes ☑	No ☐	
14. Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
15. Is it clear what analyses were requested?	Yes ☑	No ☐	
16. Were all holding times able to be met? (If no, notify customer for authorization.)	Yes ☑	No ☐	

# of preserved bottles checked for pH: _____ (<2 or >12 unless noted)

Adjusted? _____

Checked by: _____

Special Handling (if applicable)

17. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified: _____ Date _____

By Whom: _____ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding: _____

Client Instructions: _____

18. Additional remarks:

19. **Cooler Information**

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	1.0	Good	Not Present			

Chain-of-Custody Record

Client: KLEINFELDER INC

Mailing Address: 1035 Pasco 9019-A WASHINGTON NE
ALBUQUERQUE, NM 87113

Phone #: 505-344-7373

email or Fax#: BBOCKISCH@KLEINFELDER.COM

QA/QC Package:
☐ Standard ☐ Level 4 (Full Validation)

Accreditation
☐ NELAP ☐ Other _____

☐ EDD (Type) _____

Turn-Around Time:
☐ Standard ☑ Rush 48 HOUR

Project Name: NORTH LEA J.V

Project #: 122078/14

Project Manager: BERNARD BOCKISCH

Sampler: DAVID GAY

On Ice: ☒ Yes ☐ No

Sample Temperature: 1.0

HALL ENVIRONMENTAL ANALYSIS LABORATORY
www.hallenvironmental.com
4901 Hawkins NE - Albuquerque, NM 87109
Tel. 505-345-3975 Fax 505-345-4107

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1206028	BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH 8015B (GRO / DRO / MRO)	TPH (Method 418.1)	EDB (Method 504.1)	PAH's (8310 or 8270 SIMS)	RCRA 8 Metals	Anions (F,Cl,NO_3,NO_2,PO_4,SO_4)	8081 Pesticides / 8082 PCB's	8260B (VOA)	8270 (Semi-VOA)	Air Bubbles (Y or N)
5/30/12	8:22	SOIL	EAST WALL @ -7.0' F.G.	4OZ	ICE	-001			✓									
5/30/12	8:10	SOIL	BOTTOM S.W. CORNER @ 11.0' FG	4OZ	ICE	-002			✓									
5/30/12	8:20	SOIL	20' W. WALL @ -7' FG	4OZ	ICE	-003			✓									
5/30/12	8:25	SOIL	N. WALL -7.0' FG	4OZ	ICE	-004			✓									
5/30/12	12:05	SOIL	STAINED AREA @ -16' FG	4OZ	ICE	-005			✓									

Date	Time	Relinquished by:	Received by:	Date	Time
6/1/12	11:14				
Date:	Time:	Relinquished by:	Received by:	Date	Time
				06/01/12	11:14

Remarks:

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

Appendix C

Site Specific Health and Safety Plan

I. GENERAL INFORMATION

Site Name: North Lea Joint Venture Pit Remediation

Site Address: Near Crossroads, NM. Coordinates: latitude 33.515033, longitude 103.317064 (see Attachment A, "Site Location Map").

Site Description:

The Site is located approximately 2 miles northwest of Crossroads, New Mexico (see Attachment A, Site Location Map). The Site consists of an abandoned crude oil pit that is surrounded by an earthen berm. It is the intent of the New Mexico Oil Conservation Division (NMOCD) to close out this pit. The property is privately owned by Mrs. Kileen Bresenham.

The reserve pit is approximately 80 feet (ft) by 80 ft in size. The depth is unknown. Hydrocarbon-impacted materials within the reserve pit and an adjacent stained area will be excavated and disposed of at an off-site facility. The contractor performing the work will be EnviroWorks, LLC of Edgewood, New Mexico.

A limited Phase II Environmental Site Assessment (Phase II) was performed at the site in February 2012. The Phase II consisted of advancing three borings at the Subject Site to assess the horizontal and vertical profile of TPH and chloride concentrations. The first boring was drilled within the former reserve pit in an area where the berm was removed. Two additional borings were drilled northeast and southeast of the corners of the former reserve pit.

The results of the Phase II indicated the following:

- Concentrations of TPH appeared to have migrated vertically, but not horizontally since they do not appear to extend laterally beyond the boundaries of the former reserve pit; and
- Concentrations of chlorides appear to have migrated vertically as well as horizontally at depth.

The observed TPH and chloride concentrations are most likely caused by the migration of meteoric waters through the former reserve pit material and into the subsurface. The analytical results from the pit sample did not indicate the presence of volatile organic compounds or the presence of gasoline-range TPH. This may be the result of degradation and volatilization of these compounds due to the age of the former reserve pit.

A volumetric estimate of the berm materials indicates that there are approximately 1100 cubic yards (yd3) of available backfill soil on site. The berm is currently stabilized with native vegetation, a good indication that the material is suitable for use as a top soil.

Soil samples have been collected for analysis of naturally occurring radioactive materials (NORM). Results of these samples do not indicate the presence on NORM associated with the pit materials.

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Scope of Work: A NMOCD representative (if available), Kleinfelder and the selected contractor employees will mobilize to the site to perform a project kickoff meeting. Prior to performing site work, a Kleinfelder representative will brief the contractor employees on site conditions as part of the project kickoff meeting. Also discussed during the project kickoff meeting will be the HASP, applicable JSA's, and stop work authority (SWA). Tailgate safety meetings will be conducted daily at the beginning of the day and as conditions change. The field program will consist of the following:

- The former reserve pit contents shall be excavated to a depth of approximately 10 ft below the top of the existing material. Removal of this amount of material will allow for some mixing of berm soil into the former reserve pit material to increase stability and workability. This volume has been estimated at approximately 3600 yd3 (including a swell factor of 50%). These materials will be disposed of at the nearby NMOCD-approved Gandy-Marley landfill. Up to 2000 cubic yards of clean backfill soil will be backhauled from the Gandy-Marley landfill. This backhauled clean soil will be used to supplement the on-site berm material for backfill.
- The stained soil area shall also be excavated for disposal. The area to be will be a maximum of 20 ft by 20 ft by 20 ft deep. The maximum amount to be excavated will be approximately 450 yd3, including a swell factor of 50%. Soils shall be field screened during excavation. If field screening samples indicate that soils are below regulatory levels, excavation would halt to minimize the amount of soil to be excavated. Final excavation depths will be confirmed with laboratory analytical data.
- Any on-site drill cuttings that are contained in drums will either be disposed of at the landfill, or used for pit backfill above the liner.
- A 40 mil polyethylene liner shall be placed in the bottom of both excavations. Liner seams shall be overlapped a minimum of 24 inches. The liner to be placed in the former reserve pit shall be a minimum of 90 ft by 90 ft, overlapping the former reserve pit materials by a minimum of 5 ft. Each liner shall be placed without rips or tears. A minimum of 1 foot of clean sand shall be placed over each liner to prevent damage during backfilling.
- Each excavation will be backfilled to grade using the berm material. The backfill material shall be wheel-roll compacted using the on-site equipment.
- After completion of backfill activities, the former reserve pit and stained soil areas will be reseeded with a seed mix and rate that is approved by the New Mexico State Land Office. Seed can be hand raked into place, but must be mulched. Upon completion of the seed planting process, each reseeded area will be watered to promote plant growth. The contractor will use a water truck and a hose (at low pressure to prevent movement of the seed) to apply the water to the planted areas one time only. Water is not available on site and will need to be hauled to the site.
- All fence materials shall be removed from the Site and properly disposed of.

A Kleinfelder representative will be present to observe and document the field activities. The Kleinfelder representative will maintain daily reports of field activities.

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Site Personnel

Contact Name	Company	Phone Number	Project Role
Jim Grippa	Kleinfelder	(858) 320-2000	Division Safety Rep
Bernie Bockisch	Kleinfelder	(505) 401-1955	Project Manager
Maxi Brown	NMOCD	(575) 370-3179	NMOCD Representative
Jim Griswold	NMOCD	(505) 476-3465	NMOCD Project Manager
Elizabeth Bresenhan	Property Owner	(575) 675-2390	Property Owner

II. JOB LOSS ANALYSIS

The following **Job Loss Analysis (JLA)** forms shall be used for this project (Attachment C):

1. General Site Activities
2. Chain of Custody Preparation
3. Backfill and Compaction
4. Excavation
5. Shovel Spreading, Tamping, and Filling
6. Soil Sampling (Contaminated)
7. Drum Removal and Transport – Nonhazardous
8. Fieldwork with Biological Hazards
9. Heavy Equipment Loading and Unloading
10. Moving and Loading Equipment by Hand
11. Sample Collection
12. Site Preparation
13. Site Restoration
14. Soil Sampling with Hand Tools
15. Utility Clearance Before Drilling

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III. ENVIRONMENTAL MONITORING

The contaminants of concern (COCs) are TPH-DRO/MRO and chlorides. Volatile organics are not anticipated. Field screening using a Petroflag Test Kit will be performed to assess the vertical extent of hydrocarbons in the soil.

IV. TRAINING REQUIREMENTS

All Kleinfelder site personnel shall be current in Loss Prevention System (LPS) training. Workers entering restricted work areas, where remediation of contaminated soil and/or groundwater occur, are required to be trained in accordance with 29 CFR 1910.120 (40-hour Hazardous Waste Operations and Emergency Response [HAZWOPER]). Workers must have current 8-hour HAZWOPER refresher training. Documents verifying adequate training will be maintained by the Project Manager. Subcontractor supervisors must have current training in first aid and CPR.

V. SITE-SPECIFIC PHYSICAL HAZARDS

Utilities: New Mexico One Call has been contacted by the subcontractor (ticket number 2012202901). On-site utilities shall be marked prior to earth moving activities. From previous utility locates, a natural gas line is present on site that runs north-south. The natural gas line is located adjacent to the western fence line between the abandoned pit and the stained soil area. Make sure this line is marked prior to earth moving activities.

On-Site Traffic: Site is located in a remote area behind a locked gate. Caution should still be exercised when working near roads. All field representatives should wear safety vests at all times.

Snakes and Insects: The field work will be performed near an abandoned pit. Site vegetation often consists of tall grasses and low-lying brush. All field staff shall stay alert for the presence of snakes and harmful insects and ensure that the area surrounding the engineer or geologist's field truck is located in an area clear of tall vegetation to the extent possible in case snakes and insects are active.

Excavation Hazards: Excavations deeper than 5 feet require shoring or sloping prior to entry. Excavations deeper than 4 feet require ladders or other safe means of entering or exiting. Ladders must be secured and must be spaced not beyond 25 feet apart. Personnel shall not enter the excavation once it reaches a depth of 5 feet. All sloping and benching will be performed in accordance with OSHA 1926.650 Subpart P. A copy of this regulation is attached.

VI. SITE CONTROL

Entry and Exit Control Measures:

1. All personnel entering the work area shall wear Personnel Protective Equipment (PPE), as appropriate, to include, but not be limited to, safety glasses, gloves, hearing protection, reflective safety vest, and sturdy safety toe boots.

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Security:

1. The Kleinfelder Field Technician shall monitor all visitors entering the work area.
2. The Kleinfelder Field Technician shall ensure that all personnel entering the work area shall read and sign the SSHASP signature page.

Communications:

1. On-site communications between site personnel shall be verbal and shall not compromise the safety of any individual.
2. An operational cellular phone shall be made available to all site personnel by the Kleinfelder Field Technician and shall be used for off-site communication. The Kleinfelder Field Technician shall ensure that all site personnel are alerted to the location of the cellular phone.

VII. EMERGENCY PROCEDURES

Communication: Call 911 immediately for all emergencies using the Kleinfelder-provided cellular phone.

Emergency Contacts: See Attachment D, "Emergency Contacts and Map to Hospital" for emergency contact information.

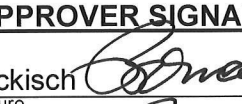
Medical Facility: See Attachment D for directions to the nearest Medical Facility.

Identification of Potential Emergencies: See Attachment C for Job Safety Analyses pertaining to site-specific tasks.

On Site Response: First aid shall be administered by a competent person until off-site emergency assistance arrives. A first aid kit shall be maintained by the Kleinfelder Field Technician at all times. The Kleinfelder Field Technician shall ensure that all site personnel are alerted to the location of the first aid kit.

Off-Site Response: The 911 service shall be used to determine all necessary off-site response (ambulance, fire response, etc.)

VIII. ORIGINATOR AND APPROVER SIGNATURES

Prepared By:	Bernard Bockisch 	5/18/2012
	Print Name/Signature	Date
PM Approval:	Bernard Bockisch 	5/18/2012
	Print Name/Signature	Date

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SSHASP SIGNATURE SHEET

All personnel are required to read this SSHASP (and addenda, if necessary). The following site personnel have reviewed the above plan, are familiar with its provisions.

Name (print)	Signature/Date	Company
BERNARD BOCKISCH		KLEINFELDER
DAVID GAY		KLF
Courtney Vallejo		KLF
James Short		Environ ark
Buddy Davis		Environwork

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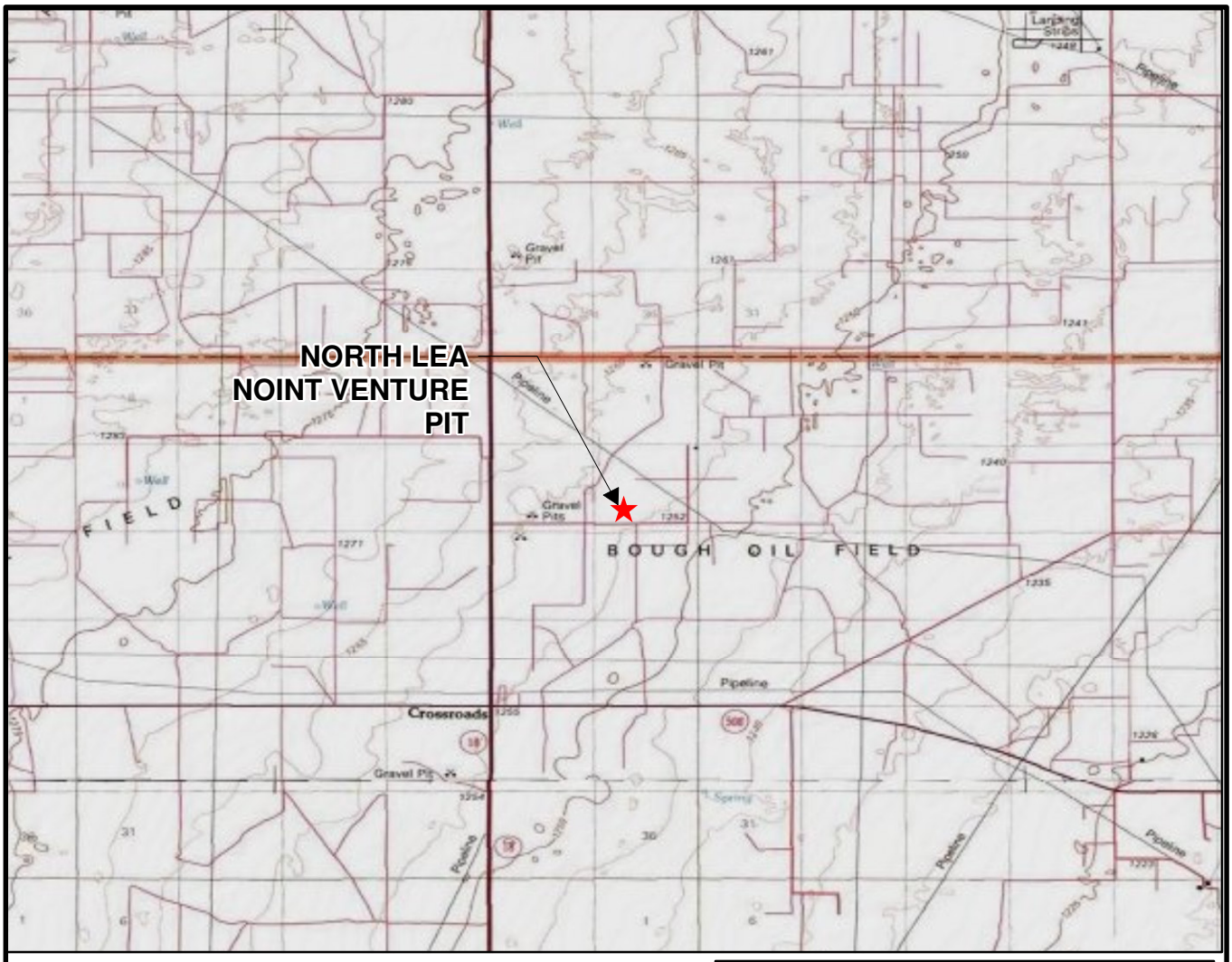
Attachment A
Site Location Map



SOURCES: http://services.arcgisonline.com/ArcGIS/rest/services/NGS_Topo_US_2D/MapServer

N

0 1 2 4 Miles

KLEINFELDER
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www.kleinfelder.com

PROJECT NO.	1220708
DRAWN:	02/06/2012
DRAWN BY:	PD
CHECKED BY:	BB
FILE NAME:	122078_SL.mxd

SITE LOCATION MAP

NORTH LEA JOINT VENTURE PIT
2.6 MILES NW OF CROSSROADS, NM
LEA COUNTY, NEW MEXICO

FIGURE

1

Attachment B
Excavation Regulations

Electronic Code of Federal Regulations
e-CFR™

e-CFR Data is current as of May 14, 2012

Title 29: Labor

PART 1926—SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION
Subpart P—Excavations

Browse Previous | Browse Next

§ 1926.651 Specific excavation requirements.

(a) *Surface encumbrances.* All surface encumbrances that are located so as to create a hazard to employees shall be removed or supported, as necessary, to safeguard employees.

(b) *Underground installations.* (1) The estimated location of utility installations, such as sewer, telephone, fuel, electric, water lines, or any other underground installations that reasonably may be expected to be encountered during excavation work, shall be determined prior to opening an excavation.

(2) Utility companies or owners shall be contacted within established or customary local response times, advised of the proposed work, and asked to establish the location of the utility underground installations prior to the start of actual excavation. When utility companies or owners cannot respond to a request to locate underground utility installations within 24 hours (unless a longer period is required by state or local law), or cannot establish the exact location of these installations, the employer may proceed, provided the employer does so with caution, and provided detection equipment or other acceptable means to locate utility installations are used.

(3) When excavation operations approach the estimated location of underground installations, the exact location of the installations shall be determined by safe and acceptable means.

(4) While the excavation is open, underground installations shall be protected, supported or removed as necessary to safeguard employees.

(c) *Access and egress* —(1) *Structural ramps.* (i) Structural ramps that are used solely by employees as a means of access or egress from excavations shall be designed by a competent person. Structural ramps used for access or egress of equipment shall be designed by a competent person qualified in structural design, and shall be constructed in accordance with the design.

(ii) Ramps and runways constructed of two or more structural members shall have the structural members connected together to prevent displacement.

(iii) Structural members used for ramps and runways shall be of uniform thickness.

(iv) Cleats or other appropriate means used to connect runway structural members shall be attached to the bottom of the runway or shall be attached in a manner to prevent tripping.

(v) Structural ramps used in lieu of steps shall be provided with cleats or other surface treatments on the top surface to prevent slipping.

(2) *Means of egress from trench excavations.* A stairway, ladder, ramp or other safe means of egress shall be located in trench excavations that are 4 feet (1.22 m) or more in depth so as to require no more than 25 feet (7.62 m) of lateral travel for employees.

(d) *Exposure to vehicular traffic.* Employees exposed to public vehicular traffic shall be provided with, and shall wear, warning vests or other suitable garments marked with or made of reflectorized or high-visibility material.

(e) *Exposure to falling loads.* No employee shall be permitted underneath loads handled by lifting or digging equipment. Employees shall be required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials. Operators may remain in the cabs of vehicles being loaded or unloaded when the vehicles are equipped, in accordance with §1926.601(b)(6), to provide adequate protection for the operator during loading and unloading operations.

(f) *Warning system for mobile equipment.* When mobile equipment is operated adjacent to an excavation, or when such equipment is required to approach the edge of an excavation, and the operator does not have a clear and direct view of the edge of the excavation, a warning system shall be utilized such as barricades, hand or mechanical signals, or stop logs. If possible, the grade should be away from the excavation.

(g) *Hazardous atmospheres* —(1) *Testing and controls.* In addition to the requirements set forth in subparts D and E of this part (29 CFR 1926.50–1926.107) to prevent exposure to harmful levels of atmospheric contaminants and to assure acceptable atmospheric conditions, the following requirements shall apply:

(i) Where oxygen deficiency (atmospheres containing less than 19.5 percent oxygen) or a hazardous atmosphere exists or could reasonably be expected to exist, such as in excavations in landfill areas or excavations in areas where hazardous substances are stored nearby, the atmospheres in the excavation shall be tested before employees enter excavations greater than 4 feet (1.22 m) in depth.

(ii) Adequate precautions shall be taken to prevent employee exposure to atmospheres containing less than 19.5 percent oxygen and other hazardous atmospheres. These precautions include providing proper respiratory protection or ventilation in accordance with subparts D and E of this part respectively.

(iii) Adequate precaution shall be taken such as providing ventilation, to prevent employee exposure to an atmosphere containing a concentration of a flammable gas in excess of 20 percent of the lower flammable limit of the gas.

(iv) When controls are used that are intended to reduce the level of atmospheric contaminants to acceptable levels, testing shall be conducted as often as necessary to ensure that the atmosphere remains safe.

(2) *Emergency rescue equipment.* (i) Emergency rescue equipment, such as breathing apparatus, a safety harness and line, or a basket stretcher, shall be readily available where hazardous atmospheric conditions exist or may reasonably be expected to develop during work in an excavation. This equipment shall be attended when in use.

(ii) Employees entering bell-bottom pier holes, or other similar deep and confined footing excavations, shall wear a harness with a life-line securely attached to it. The lifeline shall be separate from any line used to handle materials, and shall be individually attended at all times while the employee wearing the lifeline is in the excavation.

(h) *Protection from hazards associated with water accumulation.* (1) Employees shall not work in excavations in which there is accumulated water, or in excavations in which water is accumulating, unless adequate precautions have been taken to protect employees against the hazards posed by water accumulation. The precautions necessary to protect employees adequately vary with each situation, but could include special support or shield systems to protect from cave-ins, water removal to control the level of accumulating water, or use of a safety harness and lifeline.

(2) If water is controlled or prevented from accumulating by the use of water removal equipment, the water removal equipment and operations shall be monitored by a competent person to ensure proper operation.

(3) If excavation work interrupts the natural drainage of surface water (such as streams), diversion ditches, dikes, or other suitable means shall be used to prevent surface water from entering the excavation and to provide adequate drainage of the area adjacent to the excavation. Excavations subject to runoff from heavy rains will require an inspection by a competent person and compliance with paragraphs (h)(1) and (h)(2) of this section.

(i) *Stability of adjacent structures.* (1) Where the stability of adjoining buildings, walls, or other structures is endangered by excavation operations, support systems such as shoring, bracing, or underpinning shall be provided to ensure the stability of such structures for the protection of employees.

(2) Excavation below the level of the base or footing of any foundation or retaining wall that could be reasonably expected to pose a hazard to employees shall not be permitted except when:

(i) A support system, such as underpinning, is provided to ensure the safety of employees and the stability of the structure; or

(ii) The excavation is in stable rock; or

(iii) A registered professional engineer has approved the determination that the structure is sufficently removed from the excavation so as to be unaffected by the excavation activity; or

(iv) A registered professional engineer has approved the determination that such excavation work will not pose a hazard to employees.

(3) Sidewalks, pavements, and appurtenant structure shall not be undermined unless a support system or another method of protection is provided to protect employees from the possible collapse of such structures.

(j) *Protection of employees from loose rock or soil.* (1) Adequate protection shall be provided to protect employees from loose rock or soil that could pose a hazard by falling or rolling from an excavation face. Such protection shall consist of scaling to remove loose material; installation of protective barricades at intervals as necessary on the face to stop and contain falling material; or other means that provide equivalent protection.

(2) Employees shall be protected from excavated or other materials or equipment that could pose a hazard by falling or rolling into excavations. Protection shall be provided by placing and keeping such materials or equipment at least 2 feet (.61 m) from the edge of excavations, or by the use of retaining devices that are sufficient to prevent materials or equipment from falling or rolling into excavations, or by a combination of both if necessary.

(k) *Inspections.* (1) Daily inspections of excavations, the adjacent areas, and protective systems shall be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection shall be conducted by the competent person prior to the start of work and as needed throughout the shift. Inspections shall also be made after every rainstorm or other hazard increasing occurrence. These inspections are only required when employee exposure can be reasonably anticipated.

(2) Where the competent person finds evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions, exposed employees shall be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

(l) Walkways shall be provided where employees or equipment are required or permitted to cross over excavations. Guardrails which comply with §1926.502(b) shall be provided where walkways are 6 feet (1.8 m) or more above lower levels.

[54 FR 45959, Oct. 31, 1989, as amended by 59 FR 40730, Aug. 9, 1994]

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§ 1926.652 Requirements for protective systems.

(a) *Protection of employees in excavations.* (1) Each employee in an excavation shall be protected from cave-ins by an adequate protective system designed in accordance with paragraph (b) or (c) of this section except when:

(i) Excavations are made entirely in stable rock; or

(ii) Excavations are less than 5 feet (1.52m) in depth and examination of the ground by a competent person provides no indication of a potential cave-in.

(2) Protective systems shall have the capacity to resist without failure all loads that are intended or could reasonably be expected to be applied or transmitted to the system.

(b) *Design of sloping and benching systems.* The slopes and configurations of sloping and benching systems shall be selected and constructed by the employer or his designee and shall be in accordance with the requirements of paragraph (b)(1); or, in the alternative, paragraph (b)(2); or, in the alternative, paragraph (b)(3), or, in the alternative, paragraph (b)(4), as follows:

(1) *Option (1)—Allowable configurations and slopes.* (i) Excavations shall be sloped at an angle not steeper than one and one-half horizontal to one vertical (34 degrees measured from the horizontal), unless the employer uses one of the other options listed below.

(ii) Slopes specified in paragraph (b)(1)(i) of this section, shall be excavated to form configurations that are in accordance with the slopes shown for Type C soil in appendix B to this subpart.

(2) *Option (2)—Determination of slopes and configurations using Appendices A and B.* Maximum allowable slopes, and allowable configurations for sloping and benching systems, shall be determined in accordance with the conditions and requirements set forth in appendices A and B to this subpart.

(3) *Option (3)—Designs using other tabulated data.* (i) Designs of sloping or benching systems shall be selected from and be in accordance with tabulated data, such as tables and charts.

(ii) The tabulated data shall be in written form and shall include all of the following:

(A) Identification of the parameters that affect the selection of a sloping or benching system drawn from such data;

(B) Identification of the limits of use of the data, to include the magnitude and configuration of slopes determined to be safe;

(C) Explanatory information as may be necessary to aid the user in making a correct selection of a

protective system from the data.

(iii) At least one copy of the tabulated data which identifies the registered professional engineer who approved the data, shall be maintained at the jobsite during construction of the protective system. After that time the data may be stored off the jobsite, but a copy of the data shall be made available to the Secretary upon request.

(4) *Option (4)—Design by a registered professional engineer.* (i) Sloping and benching systems not utilizing Option (1) or Option (2) or Option (3) under paragraph (b) of this section shall be approved by a registered professional engineer.

(ii) Designs shall be in written form and shall include at least the following:

(A) The magnitude of the slopes that were determined to be safe for the particular project;

(B) The configurations that were determined to be safe for the particular project; and

(C) The identity of the registered professional engineer approving the design.

(iii) At least one copy of the design shall be maintained at the jobsite while the slope is being constructed. After that time the design need not be at the jobsite, but a copy shall be made available to the Secretary upon request.

(c) *Design of support systems, shield systems, and other protective systems.* Designs of support systems shield systems, and other protective systems shall be selected and constructed by the employer or his designee and shall be in accordance with the requirements of paragraph (c)(1); or, in the alternative, paragraph (c)(2); or, in the alternative, paragraph (c)(3); or, in the alternative, paragraph (c)(4) as follows:

(1) *Option (1)—Designs using appendices A, C and D.* Designs for timber shoring in trenches shall be determined in accordance with the conditions and requirements set forth in appendices A and C to this subpart. Designs for aluminum hydraulic shoring shall be in accordance with paragraph (c)(2) of this section, but if manufacturer's tabulated data cannot be utilized, designs shall be in accordance with appendix D.

(2) *Option (2)—Designs Using Manufacturer's Tabulated Data.* (i) Design of support systems, shield systems, or other protective systems that are drawn from manufacturer's tabulated data shall be in accordance with all specifications, recommendations, and limitations issued or made by the manufacturer.

(ii) Deviation from the specifications, recommendations, and limitations issued or made by the manufacturer shall only be allowed after the manufacturer issues specific written approval.

(iii) Manufacturer's specifications, recommendations, and limitations, and manufacturer's approval to deviate from the specifications, recommendations, and limitations shall be in written form at the jobsite during construction of the protective system. After that time this data may be stored off the jobsite, but a copy shall be made available to the Secretary upon request.

(3) *Option (3)—Designs using other tabulated data.* (i) Designs of support systems, shield systems, or other protective systems shall be selected from and be in accordance with tabulated data, such as tables and charts.

(ii) The tabulated data shall be in written form and include all of the following:

(A) Identification of the parameters that affect the selection of a protective system drawn from such data;

(B) Identification of the limits of use of the data;

(C) Explanatory information as may be necessary to aid the user in making a correct selection of a protective system from the data.

(iii) At least one copy of the tabulated data, which identifies the registered professional engineer who

approved the data, shall be maintained at the jobsite during construction of the protective system. After that time the data may be stored off the jobsite, but a copy of the data shall be made available to the Secretary upon request.

(4) *Option (4)—Design by a registered professional engineer.* (i) Support systems, shield systems, and other protective systems not utilizing Option 1, Option 2 or Option 3, above, shall be approved by a registered professional engineer.

(ii) Designs shall be in written form and shall include the following:

(A) A plan indicating the sizes, types, and configurations of the materials to be used in the protective system; and

(B) The identity of the registered professional engineer approving the design.

(iii) At least one copy of the design shall be maintained at the jobsite during construction of the protective system. After that time, the design may be stored off the jobsite, but a copy of the design shall be made available to the Secretary upon request.

(d) *Materials and equipment.* (1) Materials and equipment used for protective systems shall be free from damage or defects that might impair their proper function.

(2) Manufactured materials and equipment used for protective systems shall be used and maintained in a manner that is consistent with the recommendations of the manufacturer, and in a manner that will prevent employee exposure to hazards.

(3) When material or equipment that is used for protective systems is damaged, a competent person shall examine the material or equipment and evaluate its suitability for continued use. If the competent person cannot assure the material or equipment is able to support the intended loads or is otherwise suitable for safe use, then such material or equipment shall be removed from service, and shall be evaluated and approved by a registered professional engineer before being returned to service.

(e) *Installation and removal of support* —(1) *General.* (i) Members of support systems shall be securely connected together to prevent sliding, falling, kickouts, or other predictable failure.

(ii) Support systems shall be installed and removed in a manner that protects employees from cave-ins, structural collapses, or from being struck by members of the support system.

(iii) Individual members of support systems shall not be subjected to loads exceeding those which those members were designed to withstand.

(iv) Before temporary removal of individual members begins, additional precautions shall be taken to ensure the safety of employees, such as installing other structural members to carry the loads imposed on the support system.

(v) Removal shall begin at, and progress from, the bottom of the excavation. Members shall be released slowly so as to note any indication of possible failure of the remaining members of the structure or possible cave-in of the sides of the excavation.

(vi) Backfilling shall progress together with the removal of support systems from excavations.

(2) *Additional requirements for support systems for trench excavations.* (i) Excavation of material to a level no greater than 2 feet (.61 m) below the bottom of the members of a support system shall be permitted, but only if the system is designed to resist the forces calculated for the full depth of the trench, and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the support system.

(ii) Installation of a support system shall be closely coordinated with the excavation of trenches.

(f) *Sloping and benching systems.* Employees shall not be permitted to work on the faces of sloped or benched excavations at levels above other employees except when employees at the lower levels are adequately protected from the hazard of falling, rolling, or sliding material or equipment.

(g) *Shield systems* —(1) *General.* (i) Shield systems shall not be subjected to loads exceeding those which the system was designed to withstand.

(ii) Shields shall be installed in a manner to restrict lateral or other hazardous movement of the shield in the event of the application of sudden lateral loads.

(iii) Employees shall be protected from the hazard of cave-ins when entering or exiting the areas protected by shields.

(iv) Employees shall not be allowed in shields when shields are being installed, removed, or moved vertically.

(2) *Additional requirement for shield systems used in trench excavations.* Excavations of earth material to a level not greater than 2 feet (.61 m) below the bottom of a shield shall be permitted, but only if the shield is designed to resist the forces calculated for the full depth of the trench, and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the shield.

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§ 1926.650 Scope, application, and definitions applicable to this subpart.

(a) *Scope and application.* This subpart applies to all open excavations made in the earth's surface. Excavations are defined to include trenches.

(b) *Definitions applicable to this subpart.*

Accepted engineering practices means those requirements which are compatible with standards of practice required by a registered professional engineer.

Aluminum Hydraulic Shoring means a pre-engineered shoring system comprised of aluminum hydraulic cylinders (crossbraces) used in conjunction with vertical rails (uprights) or horizontal rails (walers). Such system is designed, specifically to support the sidewalls of an excavation and prevent cave-ins.

Bell-bottom pier hole means a type of shaft or footing excavation, the bottom of which is made larger than the cross section above to form a belled shape.

Benching (Benching system) means a method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.

Cave-in means the separation of a mass of soil or rock material from the side of an excavation, or the loss of soil from under a trench shield or support system, and its sudden movement into the excavation, either by falling or sliding, in sufficient quantity so that it could entrap, bury, or otherwise injure and immobilize a person.

Competent person means one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

Cross braces mean the horizontal members of a shoring system installed perpendicular to the sides of the excavation, the ends of which bear against either uprights or wales.

Excavation means any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.

Faces or *sides* means the vertical or inclined earth surfaces formed as a result of excavation work.

Failure means the breakage, displacement, or permanent deformation of a structural member or connection so as to reduce its structural integrity and its supportive capabilities.

Hazardous atmosphere means an atmosphere which by reason of being explosive, flammable,

poisonous, corrosive, oxidizing, irritating, oxygen deficient, toxic, or otherwise harmful, may cause death, illness, or injury.

Kickout means the accidental release or failure of a cross brace.

Protective system means a method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from the collapse of adjacent structures. Protective systems include support systems, sloping and benching systems, shield systems, and other systems that provide the necessary protection.

Ramp means an inclined walking or working surface that is used to gain access to one point from another, and is constructed from earth or from structural materials such as steel or wood.

Registered Professional Engineer means a person who is registered as a professional engineer in the state where the work is to be performed. However, a professional engineer, registered in any state is deemed to be a "registered professional engineer" within the meaning of this standard when approving designs for "manufactured protective systems" or "tabulated data" to be used in interstate commerce.

Sheeting means the members of a shoring system that retain the earth in position and in turn are supported by other members of the shoring system.

Shield (Shield system) means a structure that is able to withstand the forces imposed on it by a cave-in and thereby protect employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Additionally, shields can be either premanufactured or job-built in accordance with §1926.652 (c)(3) or (c)(4). Shields used in trenches are usually referred to as "trench boxes" or "trench shields."

Shoring (Shoring system) means a structure such as a metal hydraulic, mechanical or timber shoring system that supports the sides of an excavation and which is designed to prevent cave-ins.

Sides. See "Faces."

Sloping (Sloping system) means a method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.

Stable rock means natural solid mineral material that can be excavated with vertical sides and will remain intact while exposed. Unstable rock is considered to be stable when the rock material on the side or sides of the excavation is secured against caving-in or movement by rock bolts or by another protective system that has been designed by a registered professional engineer.

Structural ramp means a ramp built of steel or wood, usually used for vehicle access. Ramps made of soil or rock are not considered structural ramps.

Support system means a structure such as underpinning, bracing, or shoring, which provides support to an adjacent structure, underground installation, or the sides of an excavation.

Tabulated data means tables and charts approved by a registered professional engineer and used to design and construct a protective system.

Trench (Trench excavation) means a narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet (4.6 m). If forms or other structures are installed or constructed in an excavation so as to reduce the dimension measured from the forms or structure to the side of the excavation to 15 feet (4.6 m) or less (measured at the bottom of the excavation), the excavation is also considered to be a trench.

Trench box. See "Shield."

Trench shield. See "Shield."

Uprights means the vertical members of a trench shoring system placed in contact with the earth and

usually positioned so that individual members do not contact each other. Uprights placed so that individual members are closely spaced, in contact with or interconnected to each other, are often called "sheeting."

Wales means horizontal members of a shoring system placed parallel to the excavation face whose sides bear against the vertical members of the shoring system or earth.

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Appendix A to Subpart P of Part 1926—Soil Classification

(a) *Scope and application* —(1) *Scope.* This appendix describes a method of classifying soil and rock deposits based on site and environmental conditions, and on the structure and composition of the earth deposits. The appendix contains definitions, sets forth requirements, and describes acceptable visual and manual tests for use in classifying soils.

(2) *Application.* This appendix applies when a sloping or benching system is designed in accordance with the requirements set forth in §1926.652(b)(2) as a method of protection for employees from cave-ins. This appendix also applies when timber shoring for excavations is designed as a method of protection from cave-ins in accordance with appendix C to subpart P of part 1926, and when aluminum hydraulic shoring is designed in accordance with appendix D. This appendix also applies if other protective systems are designed and selected for use from data prepared in accordance with the requirements set forth in §1926.652(c), and the use of the data is predicated on the use of the soil classification system set forth in this appendix.

(b) *Definitions.* The definitions and examples given below are based on, in whole or in part, the following: American Society for Testing Materials (ASTM) Standards D653–85 and D2488; The Unified Soils Classification System, The U.S. Department of Agriculture (USDA) Textural Classification Scheme; and The National Bureau of Standards Report BSS–121.

Cemented soil means a soil in which the particles are held together by a chemical agent, such as calcium carbonate, such that a hand-size sample cannot be crushed into powder or individual soil particles by finger pressure.

Cohesive soil means clay (fine grained soil), or soil with a high clay content, which has cohesive strength. Cohesive soil does not crumble, can be excavated with vertical sideslopes, and is plastic when moist. Cohesive soil is hard to break up when dry, and exhibits significant cohesion when submerged. Cohesive soils include clayey silt, sandy clay, silty clay, clay and organic clay.

Dry soil means soil that does not exhibit visible signs of moisture content.

Fissured means a soil material that has a tendency to break along definite planes of fracture with little resistance, or a material that exhibits open cracks, such as tension cracks, in an exposed surface.

Granular soil means gravel, sand, or silt, (coarse grained soil) with little or no clay content. Granular soil has no cohesive strength. Some moist granular soils exhibit apparent cohesion. Granular soil cannot be molded when moist and crumbles easily when dry.

Layered system means two or more distinctly different soil or rock types arranged in layers. Micaceous seams or weakened planes in rock or shale are considered layered.

Moist soil means a condition in which a soil looks and feels damp. Moist cohesive soil can easily be

shaped into a ball and rolled into small diameter threads before crumbling. Moist granular soil that contains some cohesive material will exhibit signs of cohesion between particles.

Plastic means a property of a soil which allows the soil to be deformed or molded without cracking, or appreciable volume change.

Saturated soil means a soil in which the voids are filled with water. Saturation does not require flow. Saturation, or near saturation, is necessary for the proper use of instruments such as a pocket penetrometer or sheer vane.

Soil classification system means, for the purpose of this subpart, a method of categorizing soil and rock deposits in a hierarchy of Stable Rock, Type A, Type B, and Type C, in decreasing order of stability. The categories are determined based on an analysis of the properties and performance characteristics of the deposits and the environmental conditions of exposure.

Stable rock means natural solid mineral matter that can be excavated with vertical sides and remain intact while exposed.

Submerged soil means soil which is underwater or is free seeping.

Type A means cohesive soils with an unconfined compressive strength of 1.5 ton per square foot (tsf) (144 kPa) or greater. Examples of cohesive soils are: clay, silty clay, sandy clay, clay loam and, in some cases, silty clay loam and sandy clay loam. Cemented soils such as caliche and hardpan are also considered Type A. However, no soil is Type A if:

(i) The soil is fissured; or

(ii) The soil is subject to vibration from heavy traffic, pile driving, or similar effects; or

(iii) The soil has been previously disturbed; or

(iv) The soil is part of a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or greater; or

(v) The material is subject to other factors that would require it to be classified as a less stable material.

Type B means:

(i) Cohesive soil with an unconfined compressive strength greater than 0.5 tsf (48 kPa) but less than 1.5 tsf (144 kPa); or

(ii) Granular cohesionless soils including: angular gravel (similar to crushed rock), silt, silt loam, sandy loam and, in some cases, silty clay loam and sandy clay loam.

(iii) Previously disturbed soils except those which would otherwise be classed as Type C soil.

(iv) Soil that meets the unconfined compressive strength or cementation requirements for Type A, but is fissured or subject to vibration; or

(v) Dry rock that is not stable; or

(vi) Material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than four horizontal to one vertical (4H:1V), but only if the material would otherwise be classified as Type B.

Type C means:

(i) Cohesive soil with an unconfined compressive strength of 0.5 tsf (48 kPa) or less; or

(ii) Granular soils including gravel, sand, and loamy sand; or

(iii) Submerged soil or soil from which water is freely seeping; or

(iv) Submerged rock that is not stable, or

(v) Material in a sloped, layered system where the layers dip into the excavation or a slope of four horizontal to one vertical (4H:1V) or steeper.

Unconfined compressive strength means the load per unit area at which a soil will fail in compression. It can be determined by laboratory testing, or estimated in the field using a pocket penetrometer, by thumb penetration tests, and other methods.

Wet soil means soil that contains significantly more moisture than moist soil, but in such a range of values that cohesive material will slump or begin to flow when vibrated. Granular material that would exhibit cohesive properties when moist will lose those cohesive properties when wet.

(c) *Requirements* —(1) *Classification of soil and rock deposits.* Each soil and rock deposit shall be classified by a competent person as Stable Rock, Type A, Type B, or Type C in accordance with the definitions set forth in paragraph (b) of this appendix.

(2) *Basis of classification.* The classification of the deposits shall be made based on the results of at least one visual and at least one manual analysis. Such analyses shall be conducted by a competent person using tests described in paragraph (d) below, or in other recognized methods of soil classification and testing such as those adopted by the America Society for Testing Materials, or the U.S. Department of Agriculture textural classification system.

(3) *Visual and manual analyses.* The visual and manual analyses, such as those noted as being acceptable in paragraph (d) of this appendix, shall be designed and conducted to provide sufficient quantitative and qualitative information as may be necessary to identify properly the properties, factors, and conditions affecting the classification of the deposits.

(4) *Layered systems.* In a layered system, the system shall be classified in accordance with its weakest layer. However, each layer may be classified individually where a more stable layer lies under a less stable layer.

(5) *Reclassification.* If, after classifying a deposit, the properties, factors, or conditions affecting its classification change in any way, the changes shall be evaluated by a competent person. The deposit shall be reclassified as necessary to reflect the changed circumstances.

(d) *Acceptable visual and manual tests* —(1) *Visual tests.* Visual analysis is conducted to determine qualitative information regarding the excavation site in general, the soil adjacent to the excavation, the soil forming the sides of the open excavation, and the soil taken as samples from excavated material.

(i) Observe samples of soil that are excavated and soil in the sides of the excavation. Estimate the range of particle sizes and the relative amounts of the particle sizes. Soil that is primarily composed of fine-grained material is cohesive material. Soil composed primarily of coarse-grained sand or gravel is granular material.

(ii) Observe soil as it is excavated. Soil that remains in clumps when excavated is cohesive. Soil that breaks up easily and does not stay in clumps is granular.

(iii) Observe the side of the opened excavation and the surface area adjacent to the excavation. Crack-like openings such as tension cracks could indicate fissured material. If chunks of soil spall off a vertical side, the soil could be fissured. Small spalls are evidence of moving ground and are indications of potentially hazardous situations.

(iv) Observe the area adjacent to the excavation and the excavation itself for evidence of existing utility and other underground structures, and to identify previously disturbed soil.

(v) Observe the opened side of the excavation to identify layered systems. Examine layered systems to identify if the layers slope toward the excavation. Estimate the degree of slope of the layers.

(vi) Observe the area adjacent to the excavation and the sides of the opened excavation for evidence of surface water, water seeping from the sides of the excavation, or the location of the level of the water

table.

(vii) Observe the area adjacent to the excavation and the area within the excavation for sources of vibration that may affect the stability of the excavation face.

(2) *Manual tests.* Manual analysis of soil samples is conducted to determine quantitative as well as qualitative properties of soil and to provide more information in order to classify soil properly.

(i) *Plasticity.* Mold a moist or wet sample of soil into a ball and attempt to roll it into threads as thin as1/8-inch in diameter. Cohesive material can be successfully rolled into threads without crumbling. For example, if at least a two inch (50 mm) length of1/8-inch thread can be held on one end without tearing, the soil is cohesive.

(ii) *Dry strength.* If the soil is dry and crumbles on its own or with moderate pressure into individual grains or fine powder, it is granular (any combination of gravel, sand, or silt). If the soil is dry and falls into clumps which break up into smaller clumps, but the smaller clumps can only be broken up with difficulty, it may be clay in any combination with gravel, sand or silt. If the dry soil breaks into clumps which do not break up into small clumps and which can only be broken with difficulty, and there is no visual indication the soil is fissured, the soil may be considered unfissured.

(iii) *Thumb penetration.* The thumb penetration test can be used to estimate the unconfined compressive strength of cohesive soils. (This test is based on the thumb penetration test described in American Society for Testing and Materials (ASTM) Standard designation D2488—"Standard Recommended Practice for Description of Soils (Visual—Manual Procedure).") Type A soils with an unconfined compressive strength of 1.5 tsf can be readily indented by the thumb; however, they can be penetrated by the thumb only with very great effort. Type C soils with an unconfined compressive strength of 0.5 tsf can be easily penetrated several inches by the thumb, and can be molded by light finger pressure. This test should be conducted on an undisturbed soil sample, such as a large clump of spoil, as soon as practicable after excavation to keep to a miminum the effects of exposure to drying influences. If the excavation is later exposed to wetting influences (rain, flooding), the classification of the soil must be changed accordingly.

(iv) *Other strength tests.* Estimates of unconfined compressive strength of soils can also be obtained by use of a pocket penetrometer or by using a hand-operated shearvane.

(v) *Drying test.* The basic purpose of the drying test is to differentiate between cohesive material with fissures, unfissured cohesive material, and granular material. The procedure for the drying test involves drying a sample of soil that is approximately one inch thick (2.54 cm) and six inches (15.24 cm) in diameter until it is thoroughly dry:

(A) If the sample develops cracks as it dries, significant fissures are indicated.

(B) Samples that dry without cracking are to be broken by hand. If considerable force is necessary to break a sample, the soil has significant cohesive material content. The soil can be classified as a unfissured cohesive material and the unconfined compressive strength should be determined.

(C) If a sample breaks easily by hand, it is either a fissured cohesive material or a granular material. To distinguish between the two, pulverize the dried clumps of the sample by hand or by stepping on them. If the clumps do not pulverize easily, the material is cohesive with fissures. If they pulverize easily into very small fragments, the material is granular.

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Title 29: Labor

PART 1926—SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION
Subpart P—Excavations

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Appendix B to Subpart P of Part 1926—Sloping and Benching

(a) *Scope and application.* This appendix contains specifications for sloping and benching when used as methods of protecting employees working in excavations from cave-ins. The requirements of this appendix apply when the design of sloping and benching protective systems is to be performed in accordance with the requirements set forth in §1926.652(b)(2).

(b) *Definitions.*

Actual slope means the slope to which an excavation face is excavated.

Distress means that the soil is in a condition where a cave-in is imminent or is likely to occur. Distress is evidenced by such phenomena as the development of fissures in the face of or adjacent to an open excavation; the subsidence of the edge of an excavation; the slumping of material from the face or the bulging or heaving of material from the bottom of an excavation; the spalling of material from the face of an excavation; and ravelling, i.e., small amounts of material such as pebbles or little clumps of material suddenly separating from the face of an excavation and trickling or rolling down into the excavation.

Maximum allowable slope means the steepest incline of an excavation face that is acceptable for the most favorable site conditions as protection against cave-ins, and is expressed as the ratio of horizontal distance to vertical rise (H:V).

Short term exposure means a period of time less than or equal to 24 hours that an excavation is open.

(c) *Requirements* —(1) *Soil classification.* Soil and rock deposits shall be classified in accordance with appendix A to subpart P of part 1926.

(2) *Maximum allowable slope.* The maximum allowable slope for a soil or rock deposit shall be determined from Table B–1 of this appendix.

(3) *Actual slope.* (i) The actual slope shall not be steeper than the maximum allowable slope.

(ii) The actual slope shall be less steep than the maximum allowable slope, when there are signs of distress. If that situation occurs, the slope shall be cut back to an actual slope which is at least1/2horizontal to one vertical (1/2H:1V) less steep than the maximum allowable slope.

(iii) When surcharge loads from stored material or equipment, operating equipment, or traffic are present, a competent person shall determine the degree to which the actual slope must be reduced below the maximum allowable slope, and shall assure that such reduction is achieved. Surcharge loads from adjacent structures shall be evaluated in accordance with §1926.651(i).

(4) *Configurations.* Configurations of sloping and benching systems shall be in accordance with Figure

B–1.

TABLE B-1
MAXIMUM ALLOWABLE SLOPES

SOIL OR ROCK TYPE	MAXIMUM ALLOWABLE SLOPES (H:V)[1] FOR EXCAVATIONS LESS THAN 20 FEET DEEP [3]
STABLE ROCK TYPE A [2] TYPE B TYPE C	VERTICAL (90°) 3/4 : 1 (53°) 1:1 (45°) 1½: 1 (34°)

NOTES:

1. Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angles have been rounded off.
2. A short-term maximum allowable slope of 1/2H:1V (63°) is allowed in excavations in Type A soil that are 12 feet (3.67 m) or less in depth. Short-term maximum allowable slopes for excavations greater than 12 feet (3.67 m) in depth shall be 3/4H:1V (53°).
3. Sloping or benching for excavations greater than 20 feet deep shall be designed by a registered professional engineer.

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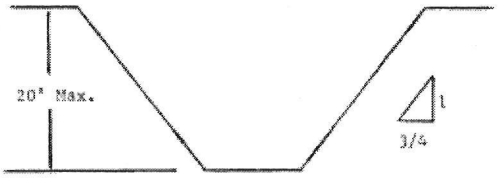
Figure B–1

Slope Configurations

(All slopes stated below are in the horizontal to vertical ratio)

B–1.1 Excavations made in Type A soil.

1. All simple slope excavation 20 feet or less in depth shall have a maximum allowable slope of3/4:1.



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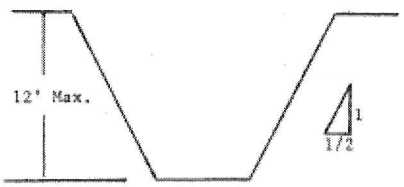
Simple Slope—General

Exception: Simple slope excavations which are open 24 hours or less (short term) and which are 12 feet or less in depth shall have a maximum allowable slope of1/2:1.



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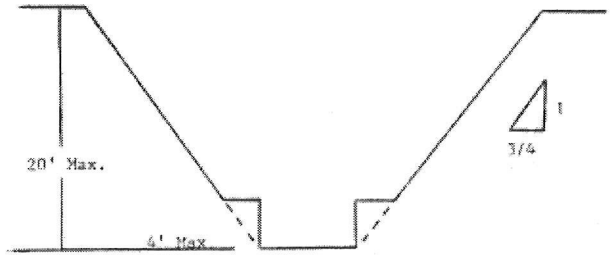
Simple Slope—Short Term

2. All benched excavations 20 feet or less in depth shall have a maximum allowable slope of3/4to 1 and maximum bench dimensions as follows:



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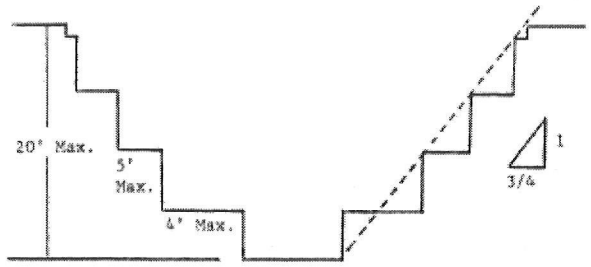
Simple Bench



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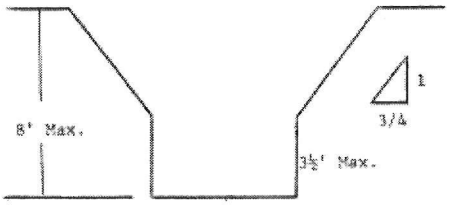
Multiple Bench

3. All excavations 8 feet or less in depth which have unsupported vertically sided lower portions shall have a maximum vertical side of 31/2feet.



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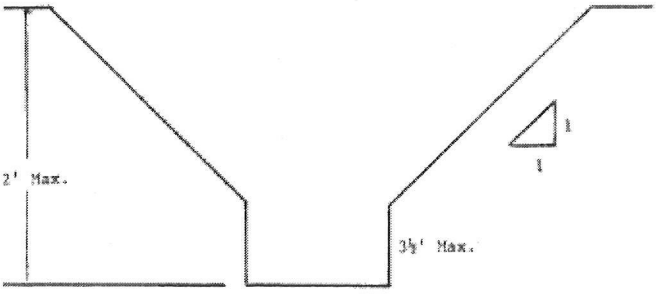
Unsupported Vertically Sided Lower Portion—Maximum 8 Feet in Depth

All excavations more than 8 feet but not more than 12 feet in depth which unsupported vertically sided lower portions shall have a maximum allowable slope of 1:1 and a maximum vertical side of 31/2feet.



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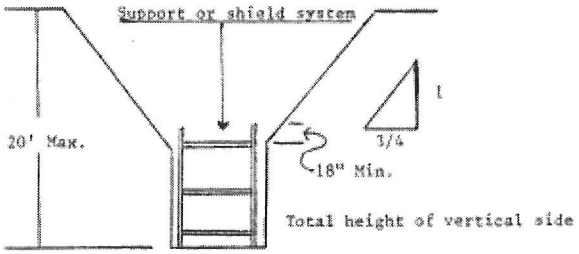
Unsupported Vertically Sided Lower Portion—Maximum 12 Feet in Depth

All excavations 20 feet or less in depth which have vertically sided lower portions that are supported or shielded shall have a maximum allowable slope of3/4:1. The support or shield system must extend at least 18 inches above the top of the vertical side.



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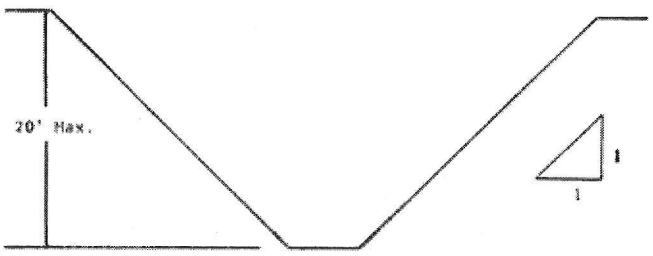
Supported or Shielded Vertically Sided Lower Portion

4. All other simple slope, compound slope, and vertically sided lower portion excavations shall be in accordance with the other options permitted under §1926.652(b).

B–1.2 Excavations Made in Type B Soil

1. All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1.



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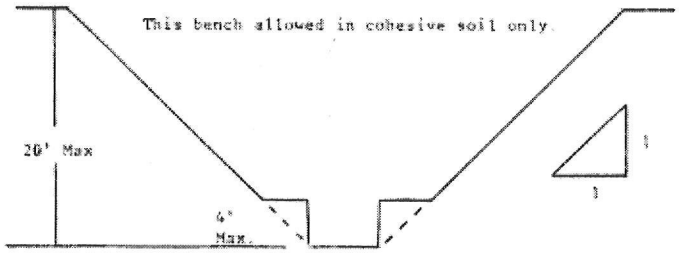
Simple Slope

2. All benched excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1 and maximum bench dimensions as follows:



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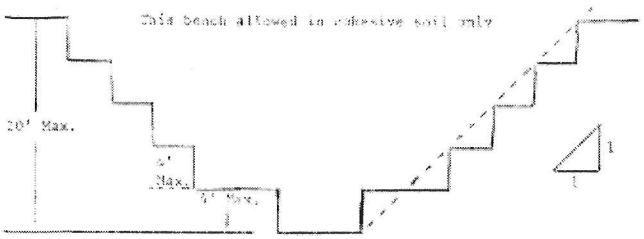
Single Bench



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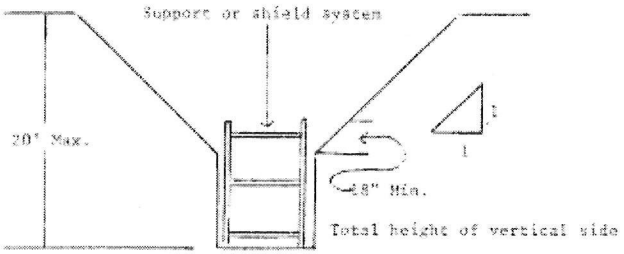
Multiple Bench

3. All excavations 20 feet or less in depth which have vertically sided lower portions shall be shielded or supported to a height at least 18 inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of 1:1.



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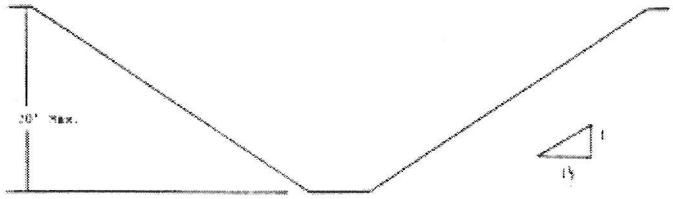
Vertically Sided Lower Portion

4. All other sloped excavations shall be in accordance with the other options permitted in §1926.652(b).

B–1.3 Excavations Made in Type C Soil

1. All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 11/2:1.



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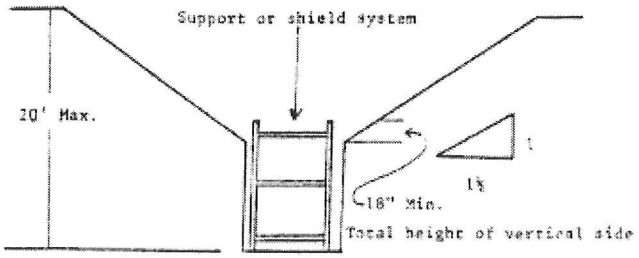
Simple Slope

2. All excavations 20 feet or less in depth which have vertically sided lower portions shall be shielded or supported to a height at least 18 inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of 11/2:1.



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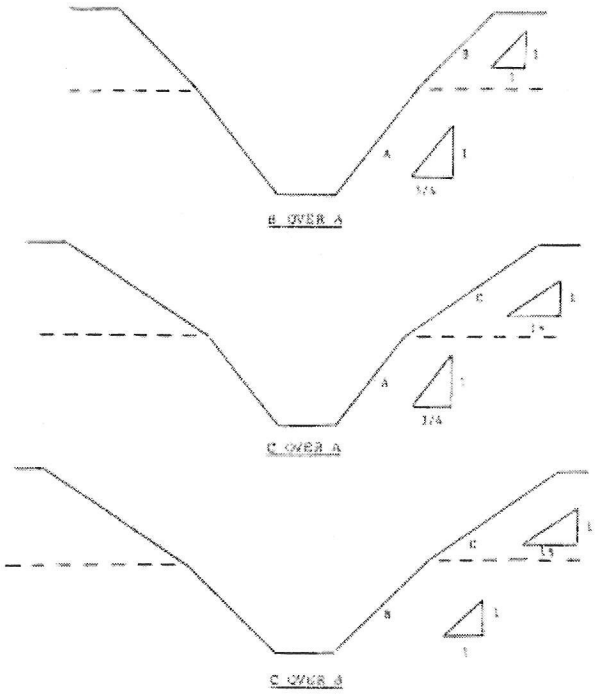
Vertical Sided Lower Portion

3. All other sloped excavations shall be in accordance with the other options permitted in §1926.652(b).

B–1.4 Excavations Made in Layered Soils

1. All excavations 20 feet or less in depth made in layered soils shall have a maximum allowable slope for each layer as set forth below.



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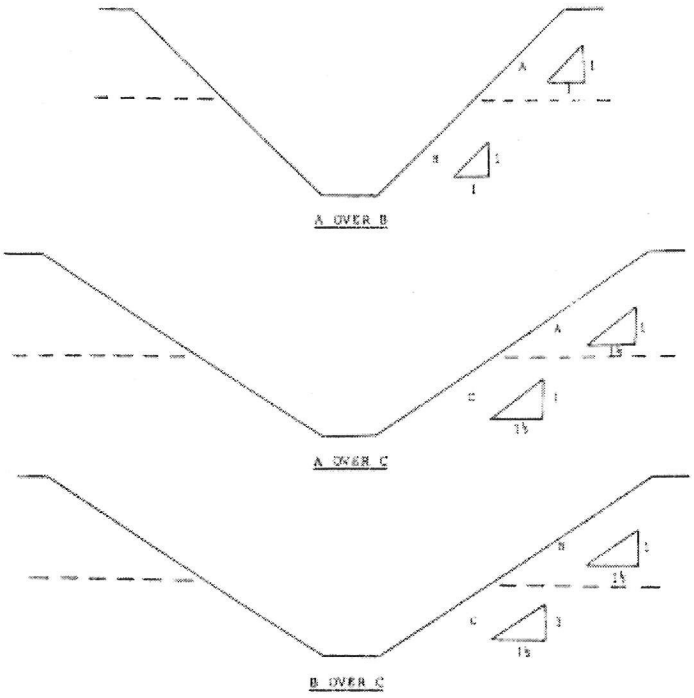

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2. All other sloped excavations shall be in accordance with the other options permitted in §1926.652(b).

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Attachment C
Job Loss Analyses (JLA)

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Job Loss Analysis

Job Task	Chain of Custody Preparation		
Publish Date:	November 18, 2010	Origination Date:	September 10, 2010
Group		Category	
Development Team:	Stacie Wissler, Jen Grippa	Latest Review Team:	Jenny Meyer, James Grippa, Russell Keenen, Dave Jenkins, Russ Erbes

Minimum Required Equipment (check all that apply)

	Reflective Vest		Goggles		Supplied Air Respirator	X	Other:	
	Hard Hat		Face Shield		Air Purifying Respirator		Form:	Chain of Custody Form
	Steel Toed Boots		Life/Harness		Protective Clothing		Material:	Indelible Ink (ballpoint pen)
	Safety Glasses		Hearing Protection		Gloves		Material:	
							Client Specific:	

Job Steps	Risks/Hazards	Quality/Safe Work Practices
Enter administrative project and contact information in appropriate location on COC form	Inappropriate or erroneous recordation of results of analysis, confusion by laboratory personnel and/or inability to question COC if the contact information is incomplete or incorrect.	Provide the office address, phone number, project point-of-contact, (POC) project number, and project name and address. Additionally, if not using lab-specific COCs, the analytical laboratory name, address, and POC must be included on the COC (receiving party).
Enter sampler's name and signature in appropriate location on COC form	Lack of proof of initial legal custody of samples invalidates COC and sample results.	Sampler shall provide name and signature in required fields when completing COC.
Enter unique sample identification (ID) and Location ID on COC form for every sampling event and for each sample collected, including field QC samples.	Indefensible sample results if there is no link with unique sample ID, location, and sampling event (if recurring).	The sample ID, including field QC, should be a unique, sometimes client- or database-specific format. The project data manager and PM should be consulted for this information prior to mobilizing for sampling. Note - for ExxonMobil samples, all samples IDs are required to be less than 16 characters in length and not include characters, like @, ', ",&, etc.
Enter sample collection date/time, matrix, and number of containers for each sample, including field QC, on COC form	Questionable and/or indefensible sample integrity without appropriate documentation concerning date, time, matrix, and number of sample containers.	Clearly record the sample collection date and time for each sample (including field QC), as well as the matrix type and number of containers submitted to the laboratory for processing.
Enter the analytical parameter and methods required to be performed for each sample recorded on the COC form	Inability of analytical laboratory to perform analyses without specific direction as to method(s) or analytical parameter(s) required.	Clearly identify the analytical parameter and method (with version #) to be performed on samples submitted for analysis. Note - for some analytical groups, there are several EPA-approved methods available with different analyte lists and reporting limits. The project chemist and/or PM should be consulted for this information prior to mobilizing for sampling.
Enter "relinquished" and "receive" names, signatures, and date/time on COC form	Indefensibility chain-of-custody and questionable sample integrity without fully completed relinquished/received documentation.	Both the person relinquishing and the person receiving the custody of the samples must sign and date the COC form, at every transfer of custody from field collection to laboratory receipt of samples. If transferring to a shipping company, put the name of the company.

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Job Loss Analysis

Job Task	Chain of Custody Preparation		
Publish Date:	**November 18, 2010**	**Origination Date:**	**September 10, 2010**
Enter instructions pertaining to project- or sample-specific requirements or shipping information in "Comments" field on COC form	Questionable or invalid analytical results due to inability of laboratory to perform sample- or project-specific requirements (e.g., MS/MSD samples, short holding times, etc.) if not appropriately documented on COC.	Sample- or project-specific information that does not have a designated field on the COC form should be recorded to clearly in the "Comments" field to direct the lab to perform the required analyses. Identify sample analyses that have a short or rush holding time. Additionally, the shipping information provided to allow for tracking of sample shipments.	
Clear, legible recordation of information on COC form	Inability of laboratory to read and/or requires laboratory to call sampler due to illegible writing on COC form or make errorenous assumptions of information.	Record information on COC form clearly and legibly, using a permanent ink pen. Single-line out and initial corrections.	
	Questionable sample integrity and/or indefensibility of sample results due to illegible writing on COC form.	Record information on COC form clearly and legibly, using a permanent ink pen. Single-line out and initial corrections.	
Clarification of empty and unused spaces on COC form	Confusion by laboratory personnel or third-party reviewers as to whether empty spaces are unused due to omission of information, or unused because they are not needed.	To avoid the potential for unapproved data entries or ambiguities concerning completeness, a single line "Z" in empty and unused spaces with initials and date of person addressing empty spaces.	
	Possibility of added entries, not by the sample custodian, if empty or unused spaces on COC form are not eliminated.	To avoid the potential for unapproved data entries, a single line "Z" in empty and unused spaces with initials and date of person addressing empty spaces.	
Addressing errors or corrections on COC form	Questionable integrity of sample collection and subsequent laboratory analysis if errors and/or corrections on COC form are not clearly and appropriately labeled.	This is for the purpose of tracking corrections, and who made the corrections. All corrections should be done using a single line cross out and the initials and date of person making correction.	
Final check and review of COC form for completeness prior to relinquishing COC and samples	Potential generation of ambiguities or errors that will be propagated through the analysis and reporting process that may raise validity issues concerning sampling, laboratory analysis, and reporting.	Prior to relinquishing COC and samples, the COC form should be reconciled with the actual sample containers to verify that the information on both the COC form and the samples match and are correct, as well as all information on the COC form is legible, complete, and correct.	

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Job Loss Analysis

Job Task	Utility Clearance Before Drilling				
Publish Date:	**November 20, 2010**		**Origination Date:**	**January 15, 2007**	
Group	Drilling	**Category**	Hollow Stem Auger		
Development Team:	Marc Haes, Steve Coffee	**Latest Review Team:**	Holly Carter, James Grippa		

Minimum Required Equipment (check all that apply)

	Reflective Vest		Goggles		Supplied Air Respirator		Other:		
X	Hard Hat		Face Shield		Air Purifying Respirator		Cartridge:		
X	Steel Toed Boots		Life/Harness		Protective Clothing		Material:		
X	Safety Glasses		Hearing Protection	X	Gloves		Material:	Leather	
							Client Specific:		

Job Steps	Risks/Hazards	Quality/Safe Work Practices
Identify site location and boring location	Injury or property damage due to contact with an above ground or below ground utility.	Be knowledgeable of all aboveground and below ground utility locations and maintain a safe distance while locating the rig and drilling. Question the property owner or property user to help identify all utilities.
Contact the appropriate utility mark-out service for your area to identify and mark underground utilities.	Neck or back strain while talking on the telephone	Use proper sitting position.
Convey underground utility information to crew	Damage to utilities.	Recognize utility markings to identify the location and type of buried utility.
	Electrocution from contacting buried electric power lines.	Look for manholes, pedestals, junction boxes, etc. that may give indication of unmarked utility locations.
	Fire or explosion hazard from contacting a gas line.	Locate boring location at sufficient distance from utility markings to provide a safe buffer zone against contacting a buried utility.
Identify aboveground and overhead utilities upon arrival at the jobsite.	Slip, trip, fall hazards while touring the site to identity aboveground hazards.	Look for manholes, pedestals, junction boxes, etc. that may give indication of unmarked utility locations. Keep mast lowered whenever rig is in motion. Raise mast only after locating the rig away from any potential contact with overhead utilities.
Document Task Activity	Unable to prove through records that task performed as required	Complete task documentation legibly and in a timely manner
Personnel trained/certified/qualified to perform task	Work is invalid as performed by person not trained/certified/qualified to perform task	Ensure have the correct certification and training to perform the assigned task
Perform task according to approved plan/procedure	Perform wrong test/job function	Review work plan or other directing document before performing task
	Miss a step or make a mistake while performing activity	Have copy of procedure/standard available while performing task

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Job Loss Analysis

Job Task	Soil Sampling Using Hand Tools (Hand Auger/Slide Hammer)		
Publish Date:	August 8, 2010	Origination Date:	May 6, 2008
Group	Environmental	Category	Soils, Sampling
Development Team:	Alexis McCollum, Lindsey Dandridge-Perry, Harely Langford	Latest Review Team:	Russell Keenan, Virginia Moore, James Grippa

Minimum Required Equipment (check all that apply)

X	Reflective Vest		Goggles		Supplied Air Respirator		Other:	
X	Hard Hat		Face Shield		Air Purifying Respirator		Cartridge:	
X	Steel Toed Boots		Life/Harness		Protective Clothing		Material:	
X	Safety Glasses	X	Hearing Protection	X	Gloves		Material:	Leather, mechanics, nitrile, or cut resistant
							Client Specific:	

Job Steps	Risks/Hazards	Quality/Safe Work Practices
Equipment Set-up	Back injury due to improper lifting techniques and heavy loads	Do not lift object over 50 pounds without assistance
		Lift with object close to the body, knees bent and back straight
		Walk by pointing feet in the direction of movement instead of twisting at the waist.
		Use mechanical devices to aid or handle loads as much as possible.
	Hand or finger injury due to damaged equipment and pinch points.	Wear leather, cut resistant, or mechanics gloves when handling equipment.
	Slips, trips and falls due to miscellaneous equipment/debris in the area.	Perform LPSA to assess the site for changes since last site visit
		Pick up any debris or equipment that could cause a tripping hazard.
	Equipment failure	Inspect each auger flight and rod connector/assembly point prior to commencing work. If equipment is damaged, red tag and remove from service until repaired properly.
Hand Augering	Pinch points, hand abrasions, soil vapor exposure, and back injury	Wear leather or mechanics gloves when connecting extensions or auger onto hand auger.
	Hand abrasions	Wear leather or mechanics gloves to protect hands from cuts or abrasions while working with hand auger.
	Vapors from soil in breathing zone.	Monitor breathing zone for COCs. If concentrations exceed limits stated in HASP, leave work area and only return when concentrations are below limits.
	Back injury due to twisting and straining back	If refusal or snag occurs, do not continue to try to turn hand auger. This action could strain back.
		Maintain a strong stance (legs shoulder width apart) and do not twist at the waist.
	Equipment failure	Periodically inspect auger flights and connection/assembly points for damage. If damaged, red tag and remove from service until repaired properly.
Collecting samples via slide hammer	Back injury due to strain and improper bending techniques.	Bend at knees and not at waist when inserting slide hammer into augered hole.
		If slide hammer meets with resistance in hole when trying to remove, do not try to pull out using back and arms. Utilize a pipe wrench to provide leverage to remove slide hammer from hole.
	Hand injuries due to pinch points.	Wear mechanics or leather gloves to protect hands when lowering hammer and when connecting rods.

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Job Loss Analysis

Job Task	Soil Sampling Using Hand Tools (Hand Auger/Slide Hammer)		
Publish Date:	**August 8, 2010**	**Origination Date:**	**May 6, 2008**
	Hearing damage due to exposure to loud noises.	Hearing protection must be worn when slide hammer is in use.	
	Head injures due to top of slide hammer hitting head.	Wear hard hat to protect head from hammer.	
Collect soil samples from slide hammer sampler.	Skin contact with affected soil.	Wear nitrile gloves while handling soil. Change gloves as needed to prevent contact with skin and between sample collection to prevent cross-contamination.	
	Eye irritation from soil blowing into eyes.	Wear ANSI approved eye wear with side shields to protect eyes from soil and dust.	
	Hand abrasions or lacerations from sharp edges or tools.	Wear leather, mechanics, or cut resistant gloves when handling sampling containers that could break, have sharp sides, or pinch hands.	
Decontamination of sampling equipment	Skin or eye contact with affected soil or water	Gloves should be evaluated to be protective against breakthrough by chemicals being handled.	
		Wear ANSI approved eye wear with side shields to protect eyes from water.	
	Hand abrasions or lacerations from sharp edges or pinch points	Wear leather, mechanics, or cut resistant gloves beneath nitrile gloves to protect hands from sharp edges or pinch points.	
		Disassemble the drive shoe and decontaminate from the wider end, not from the drive end which could have sharp edges.	
	Cross contamination of samples	Utilize appropriate decontamination procedures; at a minimum the triple rinse procedure.	
Backfill	Back injury from improper bending techniques	Bend at knees and not at waist when backfilling boring locations	
	Slip, trip, or fall hazard from borehole that has settled or mounded and equipment in work area	Pick up equipment and move out of the work area.	
		Compact borehole completely to avoid borehole from collapsing or mounding creating additional trip hazards.	
	Skin or eye contact with affected soil	Wear nitrile gloves over leather, mechanics, or cut-resistant gloves to protect hands from contaminated soil.	
		Wear ANSI approved eye wear with side shields to protect eyes from soil.	
	Hand abrasions or lacerations from sharp edges or pinch points	Wear leather, mechanics, or cut resistant gloves beneath nitrile gloves to protect hands from sharp edges or pinch points.	
Document Task Activity	Unable to prove through records that task performed as required	Complete task documentation legibly and in a timely manner	
Personnel trained/certified/qualified to perform task	Work is invalid as performed by person not trained/certified/qualified to perform task	Ensure have the correct certification and training to perform the assigned task	
Perform task according to approved plan/procedure	Perform wrong test/job function	Review work plan or other directing document before performing task	
	Miss a step or make a mistake while performing activity	Have copy of procedure/standard available while performing task	

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Job Loss Analysis

Job Task	Site Restoration				
Publish Date:	**April 3, 2007**		**Origination Date:**	**May 26, 2005**	
Group	Environmental	**Category**	Wells		
Development Team:	Jessica Hudson	**Latest Review Team:**	East Division H&S Dept, East Division PMs, East Division Oms		

Minimum Required Equipment (check all that apply)

X	Reflective Vest		Goggles		Supplied Air Respirator		Other:		
X	Hard Hat		Face Shield		Air Purifying Respirator		Cartridge:		
X	Steel Toed Boots		Life/Harness		Protective Clothing		Material:		
X	Safety Glasses		Hearing Protection	X	Gloves		Material:	Nitrile, leather	
							Client Specific:		

Job Steps	Risks/Hazards	Quality/Safe Work Practices
1. Pre-Construction Health & Safety Meeting/General Site Activities	See "General Site Activities" JSA	All employees assigned to this task will attend a pre-construction health and safety meeting, which will include the pertinent JSA, Site Safety Procedures manual, types of potential hazards, and actual hazards present and controls for those hazards. Pre--Con meeting will be conducted for all personnel and any sub-contractors.
2. Re-surface all concrete / paved areas including landscape / grass / dirt areas.	Potential tripping, slipping, vehicle damage, struck-by/roll-over damage.	Utilize protective devices such as: cones, barriers & caution tape. Properly plan traffic patterns and keep travel areas clear. Use spotters, seatbelts, back-up alarms and proper traffic control and personal PPE.
3. Remove any fencing & gates. Dispose of properly. Restore access roads and parking areas to original state.	Heavy equipment hazards & trip/slip hazards.	Plan travel paths, use hand and verbal signals, back-up alarms on vehicles & use a spotter as needed.
4. Decontaminate personnel and equipment. Remove all associated debris and facilities.	Cross- contamination/personnel exposure to hazardous liquids or vapors	Use proper level of PPE as specified in the HASP.
		Have spill containment materials available.
		Utilize proper decontamination method as specified in the HASP.
5. Disconnect/reconnect of utilities.	Electrical Hazards.	De-energize/re-energize in accordance with Lockout-Tagout procedures specified.
6. Remove all associated debris and facilities.	Trip/Slip hazards	Be alert for hazards; Wear leather gloves for general handling of debris, or Kevlar gloves for handling sharp materials/objects; remove all trip/slip hazards accordingly.
Document Task Activity	Unable to prove through records that task performed as required	Complete task documentation legibly and in a timely manner
Personnel trained/certified/qualified to perform task	Work is invalid as performed by person not trained/certified/qualified to perform task	Ensure have the correct certification and training to perform the assigned task
Perform task according to approved plan/procedure	Perform wrong test/job function	Review work plan or other directing document before performing task
	Miss a step or make a mistake while performing activity	Have copy of procedure/standard available while performing task

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Job Loss Analysis

Job Task	Site Preparation		
Publish Date:	April 3, 2007	Origination Date:	January 30, 2003
Group	Environmental, Materials, Laboratory, Drilling	Category	General
Development Team:	Simon Gillison, Russ Granfors, Ryan Eberle	Latest Review Team:	Gretchen Thach

Minimum Required Equipment (check all that apply)

X	Reflective Vest		Goggles		Supplied Air Respirator		Other:	
	Hard Hat		Face Shield		Air Purifying Respirator		Cartridge:	
X	Steel Toed Boots		Life/Harness		Protective Clothing		Material:	
X	Safety Glasses		Hearing Protection	X	Gloves		Material:	Leather, nitrile, kevlar
							Client Specific:	

Job Steps	Risks/Hazards	Quality/Safe Work Practices
1. Pre-Construction Health and Safety Briefing/General Site Activities	See "General Site Activities" JSA	All employees assigned to this task will attend a pre-construction health and safety meeting, which will include the pertinent JSA, Site Safety Procedures manual, types of potential hazards, and actual hazards present and controls for those hazards.
2. Carrying Equipment From Vehicle to Work Area.	Strained muscles/back from lifting equipment.	Always utilize correct lifting procedures; Use mechanical lifting devices and hand trucks whenever possible.
	Cuts/abrasions from sharp edges of equipment.	Wear proper hand protection/PPE--Leather work gloves for general activities, Kevlar gloves when cutting or handling sharp objects
	Contact with biological agents	Wear long pants and long sleeves. Do a complete body check for ticks, etc. after potential exposure. Wear insect repellant.
3. Set-up Work Zones	On-site traffic hazard.	Delineate work zones according to Site H&S Procedure Manual Section 6.2
		Utilize Traffic Control Devises and Traffic Flow Diagram as listed in Site H&S Procedure Manual Section 7.3.
	Trip/Physical hazards	Keep work zone clear of trip hazards-- following Housekeeping Procedure listed in Section 7.6 of the Site H&S Procedures Manual.
	Pedestrian traffic	Establish work zones and restrict entry through signage, and/or barriers such as caution tape, fencing, or pennant strings.
4. Equipment Set-up	Inspection requirements	All employees must be trained on the piece of equipment they are about to use prior to working. Each piece of equipment must be inspected as demonstrated during training. Including walk around for large /heavy equipment.
5. Set-up Decontamination Stations	Splash hazards	Wear appropriate PPE as specified in the HASP; safety glasses or goggles are required at all times.

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Job Loss Analysis

Job Task	Sample Collection				
Publish Date:	**January 15, 2012**		**Origination Date:**	**February 8, 2007**	
Group	Environmental	**Category**	Sampling		
Development Team:	Simon Gillison, Russ Granfors, Ryan Eberle	**Latest Review Team:**	Fouad Nasraddine & Jenny Meyer		

Minimum Required Equipment (check all that apply)

X	Reflective Vest		Goggles		Supplied Air Respirator		Other:		
X	Hard Hat	X	Face Shield (if needed)		Air Purifying Respirator		Cartridge:		
X	Steel Toed Boots		Life/Harness		Protective Clothing		Material:		
X	Safety Glasses		Hearing Protection	X	Gloves		Material:	Nitrile, leather, cut resistant	
							Client Specific:		

Job Steps	Risks/Hazards	Quality/Safe Work Practices
Collect samples	Slips, trips, falls	Pick-up any debris, equipment, or tools in the work area.
		Step around site with caution, mark trip hazards that cannot be removed.
	Contact with overhead hazards	Wear hardhat where overhead obstructions are present.
	Pinch points and lacerations	Watch placement of hands and fingers when collecting samples. Wear leather gloves with nitrile over them
		Use hand tools when collecting samples. Use only self retracting safety knives as cutting tools.
	Heavy lifting and muscle strains	Get assistance when moving heavy objects greater than 50 pounds (two or more people). Use mechanical lifting devices and hand trucks whenever possible. Face the load, bend knees, keep load close to main body while lifting. Awkward loads of less than 50 pounds may require more than one person to lift and carry.
Document Sample Collection	Lose track of physical sample	Write the sample number and project number on the sample or sample container immediately before collection of sample.
	Incomplete sample record	Complete the sample custody document legibly at time of sample collection (refer to Chain of Custody JLA)
Document Task Activity	Unable to prove through records that task performed as required	Complete task documentation legibly and in a timely manner
Personnel trained/certified/qualified to perform task	Work is invalid as performed by person not trained/certified/qualified to perform task	Ensure have the correct certification and training to perform the assigned task
Perform task according to approved plan/procedure	Perform wrong test/job function	Review work plan or other directing document before performing task. Double check COC for correct analyses.
	Miss a step or make a mistake while performing activity	Have copy of procedure/standard available while performing task

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Job Loss Analysis

Job Task	Moving and Loading Equipment (by hand)				
Publish Date:	**April 6, 2007**		**Origination Date:**	**July 31, 2006**	
Group	Laboratory	**Category**	General		
Development Team:	Simon Gillison, Russ Granfors, Ryan Eberle	**Latest Review Team:**	Ted Tyler		

Minimum Required Equipment (check all that apply)								
X	Reflective Vest	Goggles		Supplied Air Respirator		Other:		
X	Hard Hat	Face Shield		Air Purifying Respirator		Cartridge:		
X	Steel Toed Boots	Life/Harness		Protective Clothing		Material:		
X	Safety Glasses	Hearing Protection	X	Gloves		Material:	Leather	
						Client Specific:		

Job Steps	Risks/Hazards	Quality/Safe Work Practices
Moving/loading equipment by hand	Slips, trips, falls	Pick-up any debris/equipment/tools in the work area.
		Establish clean walk path from equipment origin to destination.
	Contact with overhead objects	Wear hardhat when overhead obstructions area present on equipment to be moved.
	Pinch points	Place hands on parts of equipment that are stable (i.e. non-rotating or immovable) and away from areas that may contact other objects when the equipment is moved.
	Back injury or muscle strain	Lift equipment using legs with a firm grip and straight back.
		Check equipment prior to moving to ensure it is free to move and not tied down or connected.
		Carry equipment with load centered over feet. Do not twist back when carrying load.
		Get additional assistance (one more person) for each 50 pounds of object weight, or for objects that are located in confined/semi-confined spaces.
	Personal contact with equipment	Verify equipment is stable/secure before removing grip.

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Job Loss Analysis

Job Task	Observation of Heavy Equipment Loading and Unloading		
Publish Date:	**January 29, 2010**	**Origination Date:**	**September 26, 2005**
Group	Environmental	**Category**	Excavation
Development Team:	Chris Brown, Greg Sherman, Danielle Chirco	**Latest Review Team:**	Russell Keenan

Minimum Required Equipment (check all that apply)

X	Reflective Vest		Goggles		Supplied Air Respirator		Other:	
X	Hard Hat		Face Shield		Air Purifying Respirator		Cartridge:	
X	Steel Toed Boots		Life/Harness		Protective Clothing		Material:	
X	Safety Glasses	X	Hearing Protection	X	Gloves		Material:	Leather and/or cut-resistant
							Client Specific:	

Job Steps	Risks/Hazards	Quality/Safe Work Practices
Set-up Work Zone	Potential vehicle or property damage from equipment	Utilize protective devices such as: cones, barriers, and caution tape. Plan traffic patterns and keep travel areas clear.
Observe heavy equipment loading and unloading	Injury due to contact with heavy equipment operation	Review contractor JLA prior to starting task and discuss "Plan of Action" for loading or unloading equipment to verify that all workers are aware of how the equipment will be unloaded/loaded and where it will be placed onsite.
		Workers are to wear PPE as directed by the corresponding HASP and JLA.
		Verify that the tires are chocked on the delivery vehicle prior to contractor unloading/loading equipment.
		Remain outside the exclusion zone while equipment is being loaded/unloaded.
		If it is necessary to enter exclusion zone, establish eye contact with operator and verify that the operator's hands are off the controls. "Show Me Your Hands".
		Stay out of the "Line of Fire" by asking the subcontractor where the best place to stand is to avoid potential hazards.
		Verify that unnecessary personnel are clear of area prior to
		Continually assess the site for limited or hazardous clearances between personnel, equipment, and structures.
		Verify that contractor has an assigned spotter for each piece of equipment being loaded/unloaded.
		Verify that trailer is properly hitched to vehicle by inspecting hitch and chains prior to loading equipment.

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Job Loss Analysis

Job Task	Observation of Heavy Equipment Loading and Unloading		
Publish Date:	**January 29, 2010**	**Origination Date:**	**September 26, 2005**
Observe heavy equipment loading and unloading (cont.)	Hearing damage due to noise from equipment	Wear hearing protection if normal conversation between two people cannot be maintained at a distance of three (3) feet.	
	Cross contamination from soil on tires or tracks that have been transported from another site.	Inspect tire treads and track mounts for cleanliness. If there is soil build-up, request equipment be cleaned prior to allowing it onsite or leaving the site.	

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Job Loss Analysis

Job Task	General Site Activities				
Publish Date:	**September 16, 2011**		**Origination Date:**	**June 30, 2006**	
Group	Environmental; Materials	**Category**	General		
Development Team:	Jessica Hudson-Scientist, Danielle Digironimo-H&S Manager	**Latest Review Team:**	Chadd Fry-Scientist, Jenny Meyer-Senior H&S Manager		

Minimum Required Equipment (check all that apply)

X	Reflective Vest		Goggles		Supplied Air Respirator		Other:		
X	Hard Hat		Face Shield		Air Purifying Respirator		Cartridge:		
X	Steel Toed Boots		Life/Harness		Protective Clothing		Material:		
X	Safety Glasses		Hearing Protection	X	Gloves		Material:	Leather	
							Client Specific:		

Job Steps	Risks/Hazards	Quality/Safe Work Practices
1. Working in or around Noisy Equipment	Noise induced hearing loss/communication loss	Hearing protection must be donned when working around operating equipment if levels are greater than 85dBA. Typically when normal communication cannot be carried on at a distance of 3 feet, hearing protection is required. Establish hand signals for major activities (e.g., stop, dump, caution, go, etc.) Evaluate the need for dual hearing protection based upon equipment ratings and environmental conditions.
2. Working in Hot/Cold Environments	Heat/Cold stress	Implement a Heat/Cold Stress Program applicable to environmental conditions and use of PPE. Program should include; taking frequent breaks, buddy system, condition appropriate food/beverage consumption and getting wok done earlier or later in the day to avoid hottest/coldest parts of the day.
3. Working outdoors	Insect bites	Use insect repellants containing DEET for maximum protection.
	Poisonous Snake bites	Be alert, avoid approaching; wear snake chaps if high probability of poisonous snake inhabitation
	Encountering other wildlife	Be alert; do not approach; stay safe distance away; do not startle
	Contact with poisonous/irritating vegetation	Learn to recognize hazardous plants and avoid contact. If identified warn others of location.
	Sunburn	Use sunscreen with a minimum of 15 SPF
4. Working in Traffic Areas	On-Site traffic hazard, being hit by vehicles or equipment run over	Follow Traffic Control Devises and Traffic Flow Diagram. Set up work zones and direct traffic around areas where work will be performed.
	Pedestrian/unauthorized visitor entry to work area.	Notify all pedestrians that this is a work zone by delineating work zone and keeping watch. Delineate work area with snow fence or ridged barrier and/or caution tape to restrict access.

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Job Loss Analysis

Job Task	General Site Activities		
Publish Date:	**September 16, 2011**	**Origination Date:**	**June 30, 2006**
5. Moving vehicles and equipment	Hit by/striking another vehicle, property, or person	Use spotters when backing up vehicles and equipment. Spotters are required when backing, but they may be necessary for forward moving vehicles too. Inspect the work area by walking around the vehicle and equipment to identify any potential striking hazards. Insure back up alarms are functioning properly if vehicle or equipment is so equipped	
6. Working With Hand Tools	Misuse of hand tools could result in slips, trips, falls, abrasions, eye injuries and other common injuries.	Ensure proper training has been conducted prior to using a piece of equipment. Ensure proper inspection of said equipment prior to use. Mark all faulty equipment with red tag and remove from use until fixed. Wear appropriate PPE as required for the type of tool used.	
		Follow all housekeeping procedures and work zone delineation.	
	Hand abrasions, lacerations	Wear gloves appropriate to task--leather work gloves for general tasks, Nitrile gloves when handling contaminated materials, and cut resistant gloves when dealing with cut hazards associated with sharp/jagged objects.	
7. Working With and Sampling For Hazardous Chemicals/Materials	Cross-contamination of vehicles, persons, or belongings.	Follow the decontamination procedure listed in Section 12.0 in the Site H&S Procedure Manual.	
		Wear appropriate PPE at all times (listed above). Level D is the standard, upgrade when necessary to Level C. Contact H&S Officer before going to Level C.	
8. Working with Direct Reading Instruments.	Faulty readings/equipment	Ensure proper training has been conducted prior to using any DR Instruments. Such training includes proper equipment inspections and calibration.	
9. Walking/working surfaces	Slips/falls	Keep walking paths clear of debris/materials/equipment; ensure walking surfaces clear of ice, snow, or other slippery materials (i.e. oils, greases)	
	Trip hazards	Cover open holes/openings immediately; install well covers after sampling; level ruts or uneven ground as soon as possible	
	Being struck by sharp objects	If walking through undeveloped or highly developed areas of a Site with limited line of sight of the ground, move slowly and continuously check where you are stepping.	
10. Lifting/Carrying/Moving materials or objects	Hand abrasions, lacerations	Wear gloves appropriate to task--leather work gloves for general tasks, Nitrile gloves when handling contaminated materials, and Kevlar gloves when handling sharp/jagged objects.	
	Back Injuries	Do not lift objects >50 lbs. without assistance; use safe lifting/back safety techniques; use mechanical devices to aid or handle loads as much as possible	
11. Document Task Activity	Unable to prove through records that task performed as required	Complete task documentation legibly and in a timely manner	
12. Personnel trained/certified/qualified to perform task	Work is invalid as performed by person not trained/certified/qualified to perform task	Ensure have the correct certification and training to perform the assigned task	
13. Perform task according to approved plan/procedure	Perform wrong test/job function	Review work plan or other directing document before performing task	
	Miss a step or make a mistake while performing activity	Have copy of procedure/standard available while performing task	

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Job Loss Analysis

Job Task	General Site Activities		
Publish Date:	September 16, 2011	Origination Date:	June 30, 2006

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Job Loss Analysis

Job Task	Fieldwork in Areas with Biological Hazards		
Publish Date:	February 4, 2008	Origination Date:	February 4, 2008
Group		Category	
Development Team:	Steve Siegel, Phil Tousignant, Melissa Sherman	Latest Review Team:	

Minimum Required Equipment (check all that apply)

	Reflective Vest		Goggles		Supplied Air Respirator	X	Other:	high ankle boots w/good traction
	Hard Hat		Face Shield		Air Purifying Respirator	X	Other:	bug net, snake gators
	Steel Toed Boots		Life/Harness	X	Protective Clothing		Material:	Long Sleeve shirt, pants
X	Safety Glasses		Hearing Protection	X	Gloves		Material:	leather, canvas
							Client Specific:	

Job Steps	Risks/Hazards	Quality/Safe Work Practices
Working at a site with the potential presence for:		
INJURIOUS INSECTS/SPIDERS (i.e. ticks, mosquitos, chiggars, bees, wasps, spiders, lice, fleas, scopions, fire ants)	Bites, stings, allergic reactions, viruses, diseases, infections	PPE - long sleeve shirt, pants, gloves, insect repellent, bug nets 1. Become familiar with insects/arachnids present in area 2. Avoid high concentration areas, hives, nests 3. Use insect repellents containing DEET 4. Look before sitting or placing hands to avoid contact 5. Perform self-check when leaving field to detect insects
VENOMOUS SNAKES/REPTILES	Bites, bodily injury, loss of limb, shock, circulatory and respiratory problems, infection	PPE - long sleeve shirt, thick material pants or snake gators, gloves 1. Use buddy system 2. Become familiar with snakes and reptiles present in area 3. Be able to ID snake or repile 4. Avoid high grasses, debris piles, rock outcrops, burrows if possible 5. Have HASP with Emergency Action Plan, means of communication 6. Don't provoke snake, don't handle, stay body distance away
WILD ANIMALS	Bites, viruses, diseases, infections, serious bodily injury	PPE - protective clothing, gloves 1. Avoid handling and contact with dead or alive wild animals 2. Do not provoke animals 3. Do not place hands where you cannot see 4. Do not leave food around work site 5. Use buddy system 6. Avoid closed areas/dust with fecal mater and urine from rodents
POISONOUS/SPINED PLANTS (i.e. poison oak, water hemlock, poison hemlock, poison ivy, poison sumac, stinging nettle, spined plants)	Rash, skin irritation , eruptions, allergic reaction, vision impairment, punctures, spines implanted	PPE - long sleeve shirt, pants, gloves, Tecnu protectant, face shield or goggles, ankle high boots with good traction 1. Become familiar with poisonous plants present in area 2. Be Alert - Avoid contact with all parts of suspect plants 3. Avoid contact with contaminated clothing - wash in detergent 4. Don't touch eyes, nose or mouth if suspect contact 5. Wash skin with Tecnu wash or soap and cold water after fieldwork 6. Don't eat any plant in the wild

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Job Loss Analysis

Job Task	Fieldwork in Areas with Biological Hazards		
Publish Date:	**February 4, 2008**	**Origination Date:**	**February 4, 2008**
STREAMS, RIVERS, SURFACE WATER	Waterborn diseases, parasidic diseases, serious illness	1. Always bring fresh potable water for fieldwork 2. Don't drink untreated water from surface water sources 3. Always treat cuts and other wounds, avoid contact with water	
Document Task Activity	Unable to prove through records that task performed as required	Complete task documentation legibly and in a timely manner	
Personnel trained/certified/qualified to perform task	Work is invalid as performed by person not trained/certified/qualified to perform task	Ensure have the correct certification and training to perform the assigned task	
Perform task according to approved plan/procedure	Perform wrong test/job function	Review work plan or other directing document before performing task	
	Miss a step or make a mistake while performing activity	Have copy of procedure/standard available while performing task	

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Job Loss Analysis

Job Task	Drum Removal and Transport, Non-Hazardous				
Publish Date:	**April 13, 2007**			**Origination Date:**	**August 11, 2005**
Group	Environmental		**Category**	General	
Development Team:	Robert Smith, Tom Parks, David Wager		**Latest Review Team:**	Eric Lasker	

Minimum Required Equipment (check all that apply)

	Reflective Vest		Goggles		Supplied Air Respirator		Other:	
X	Hard Hat		Face Shield		Air Purifying Respirator		Cartridge:	
X	Steel Toed Boots		Life/Harness		Protective Clothing		Material:	
X	Safety Glasses		Hearing Protection	X	Gloves		Material:	Padded work gloves
							Client Specific:	

Job Steps	Risks/Hazards	Quality/Safe Work Practices
Traffic and site control	Unathorized pedestrian/vehicle access	Proper PPE (safety/reflective vest), safety cone deployment including caution tape if appropriate, proper positioning of stakebody truck, wheel chocking as needed, flashers, beacon light at night, constant area observation, coordinate with other contractors and store personnel for overall awareness of task being performed.
Load drums on truck	Slips/trips/falls, crushing injuries, cuts, back injuries.	Ensure unobstructed and well illuminated work area, ensure that drums are in a transportable condition with properly attached lids, utilize only those personnel formally trained in proper drum moving/handling, utilize appropriate and properly maintained drum dolly, utilize proper lifting /leverage techniques, steel-toed boots, and padded gloves.
Transport drum	Overweight load, uneven weight distribution, unsecured load	Driver must be aware of empty and gross vehicle weights to prevent overloading, driver must be trained in proper load distribution (axel load), all drums must be properly strapped and secured to prevent load shifting.
Remove drums from truck	Slips/trips/falls, crushing injuries, cuts, back injuries.	Ensure unobstructed and well illuminated work area, utilize only those personnel formly trained in drum moving/handling, utilize appropriate and properly maintained drum dolly (if needed), utilize proper lifting/leverage techniques, steel-toed boots, and padded gloves.

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Job Loss Analysis

Job Task	Soil Sampling		
Publish Date:	April 20, 2007	Origination Date:	February 27, 2006
Group	Environmental	Category	
Development Team:	Daniel Raines	Latest Review Team:	Ann Harris, Jesse Vollick, Danielle DiGironimo, Sarah Burke

Minimum Required Equipment (check all that apply)

X	Reflective Vest		Goggles		Supplied Air Respirator		Other:	
X	Hard Hat		Face Shield		Air Purifying Respirator		Cartridge:	
X	Steel Toed Boots		Life/Harness		Protective Clothing		Material:	
X	Safety Glasses	X	Hearing Protection	X	Gloves		Material:	Nitrile, leather, kevlar
							Client Specific:	

Job Steps	Risks/Hazards	Quality/Safe Work Practices
1. Preparing for soil sampling activity	Work-zone safety	Traffic flow/Work area positioning, signs, flags, cones and caution tape to define Work area. Barricades as needed.
		Leather gloves to protect against sign/equipment pinch-points.
		Hard Hat required if potential for overhead hazard exists
	Bottle ware safety (glass and preservatives)	Kevlar gloves when handling any Bottle ware
		Safety glasses to be worn at all times to protect against preservatives and debris. Nitrile gloves to prevent dermal contact.
	Excavation/trench hazards	Keep safe distances from Excavation/trench edges
	Heavy equipment locations	Keep safe distance from Heavy equipment pinch-points
		Make sure Heavy equipment operators are aware of activities at all times
2. Bottle ware Preparation	Cuts/Lacerations (glass Bottle ware)	Don Kevlar gloves under chemical resistant gloves
	Dermal/Eye burns (preservatives)	Nitrile gloves
		safety glasses
		Face shield (as necessary)
3. Observation of activities **(If activities are ongoing)	Noise	Hearing protection as required
	Debris	Safety glasses
		Face shield (as necessary)
	Pinch-Points (Machinery movement)	Make sure heavy equipment operators are aware of activities at ALL times
		**Refer to appropriate/alternate JSA for each separate ongoing activity!
4. Accessing soil sampling equipment (Split-Spoon or Stock-pile sample – Utilize applicable practices)	Dermal/Eye chemical exposure	Nitrile gloves (change as required/handling new material or sample)
		Safety glasses
		Face shield (as necessary)

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Job Loss Analysis

Job Task	Soil Sampling		
Publish Date:	**April 20, 2007**	**Origination Date:**	**February 27, 2006**
	Cross-contamination	Leather gloves; Kevlar gloves	
		Notify ALL personnel in work area of intended movements within work area	
		Coordinate specific process for sample collection with heavy equipment operator	
	Movement within work area; Back-strain (Lifting/bending)	Utilize proper bending/lifting practices	
		Heavy objects require multiple personnel to lift	
	**Macrocore® opening	**Approved Macrocore® opening-tool only! (Internal blades with guard) Do not pull tool toward your body!	
	Pinch-points	Awareness of hand placement at all times	
5. Collection of Soil Sample	Abrasion/Laceration	Nitrile gloves (frequent changes) over top of Kevlar gloves	
	dermal/Eye chemical exposure	Safety glasses	
		Face shields (as necessary)	
	Cross-contamination	Notify ALL personnel in work area of intended movements within work area	
6. Securing Site/Departure (**If applicable to job)	pinch-points	Leather gloves	
	Traffic	Collection of traffic control equipment should be collected using caution while moving around the site	
	Back-strain	Proper lifting techniques	
	Equipment security	**All equipment is secured appropriately and at proper distances form excavations/trenches	
	Excavation/trench security	**Safe work-area delineation surrounding remaining excavations/trenches	
Document Task Activity	Unable to prove through records that task performed as required	Complete task documentation legibly and in a timely manner	
Personnel trained/certified/qualified to perform task	Work is invalid as performed by person not trained/certified/qualified to perform task	Ensure have the correct certification and training to perform the assigned task	
Perform task according to approved plan/procedure	Perform wrong test/job function	Review work plan or other directing document before performing task	
	Miss a step or make a mistake while performing activity	Have copy of procedure/standard available while performing task	

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Job Loss Analysis

Job Task	Shoveling, Spreading, and Tamping Fill Material		
Publish Date:	April 9, 2007	Origination Date:	April 4, 2006
Group	Materials/Geotech	Category	Excavation
Development Team:	Russ Granfors, Ryan Eberle, Simon Gillison	Latest Review Team:	Gretchen Thach

Minimum Required Equipment (check all that apply)

X	Reflective Vest		Goggles		Supplied Air Respirator	X	Other:	Dust Mask
	Hard Hat		Face Shield		Air Purifying Respirator		Cartridge:	
X	Steel Toed Boots		Life/Harness		Protective Clothing		Material:	
X	Safety Glasses		Hearing Protection	X	Gloves		Material:	Leather
							Client Specific:	

Job Steps	Risks/Hazards	Quality/Safe Work Practices
Arrive on site. Open gates, gather personnel for safety meeting.	Hand lacerations from gate.	Wear work gloves when opening the gates.
	Slip, trip, fall on obstructions.	Perform an SPSA on the site to assess conditions that may have changed overnight.
Shovel fill material from back of pickup	Injury to back	Keep back straight when shoveling. Do not twist back to unload shovel - pivot using legs/feet. Use legs/arms to lift shovel load.
	Slip, trip, fall	Clear work area of slip and trip hazards before starting task. Perform SPSA when site conditions are changing due to work being conducted.
	Inhalation of dust	Wear dust mask if material is dry and generates dust.
Spread fill material on ground	Injury to back	Hold shovel/rake firmly in place against side and "walk" shovel/rake to spread material.
	Slip, trip, fall	Clear work area of slip and trip hazards before starting task. Perform SPSA when site conditions are changing due to work being conducted.
	Inhalation of dust	Wear dust mask if material is dry and generates dust.
Hand tamping (compaction) of fill material	Injury to back	Keep back straight. Use legs and arms to lift tamp.
	Pinch points (Tamp lands on top of foot)	Keep a wide stance when using tamp. Place feet and then tamp a small area between the feet. Do not walk and tamp at the same time.
Leave the site	Hand laceration from the gate.	Wear work gloves when closing the gates.
	Property damage to vehicle when leaving the site.	Look in all directions when driving away from the site.

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Job Loss Analysis

Job Task	Excavation				
Publish Date:	**December 4, 2009**		**Origination Date:**	**February 27, 2006**	
Group	Environmental	**Category**	UST Removal/ESA Phase II/Sampling		
Development Team:	Jessica Dudson	**Latest Review Team:**	Justin Moses, Jenny Meyer		

Minimum Required Equipment (check all that apply)

X	Reflective Vest		Goggles		Supplied Air Respirator		Other:	
	Hard Hat		Face Shield		Air Purifying Respirator		Cartridge:	
X	Steel Toed Boots		Life/Harness		Protective Clothing		Material:	
X	Safety Glasses		Hearing Protection	X	Gloves		Material:	Nitrile; Leather
							Client Specific:	

Job Steps	Risks/Hazards	Quality/Safe Work Practices
Pre-construction Health & Safety Meeting/General Site Activities	See "General Site Activities" JLA	All employees assigned to this task will attend a pre-construction health and safety meeting, which will include the pertinent JLA, Site Safety Procedures manual, types of potential hazards, and actual hazards present and controls for those hazards.
Remove soil using heavy equipment.	On-site workers may be injured/killed by the heavy equipment.	Heavy equipment should be equipped with back up alarm.
		When approaching operating equipment, the approach should be made from the front and within view of the operator. Make sure there is eye contact with operator prior to approach.
		Level D Personal Protection Equipment (PPE) with the addition of a hard hat and reflective vest must be worn at all times.
	Fire/Explosion	Keep fire extinguisher within 25' of operation; Monitor area with PID or LEL meter to ensure vapor concentrations <10% LEL, or 1400 ppm (gasoline LEL); No smoking signs posted; smoking on site prohibited.
	Excessive noise may be generated by heavy equipment.	Hearing protection should be worn when working around operating equipment if levels are greater than 85dBA.
	The creation of dust and/or inhalation and particulate matter contaminated with hazardous materials.	Measure/record ambient air concentrations. If ambient air concentrations exceed Action Levels, stop work until condition subsides. Vapor suppressant or water may be used to control dust or vapors from leaving the work zone. Refer to HASP for dust control measures.
	Soil concentrations sufficient to sustain combustion of vapors ignited by sparks created when equipment comes in contact with rocks or other buried objects.	Equip earth moving equipment with non-sparking bucket or blade.
		Periodically wet or foam the work area with vapor suppressant water or fire suppressant. Note: To avoid slip hazard, workers should not walk in areas to which foam was applied.

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Job Loss Analysis

Job Task	Excavation		
Publish Date:	**December 4, 2009**	**Origination Date:**	**February 27, 2006**
Remove soil using heavy equipment. (Co	Soil concentrations sufficient to sustain combustion of vapors ignited by sparks created when equipment comes in contact with rocks or other buried objects. (Cont.)	Conduct periodic/continuous air monitoring of work zone using an LEL/O2 meter. Ensure vapor concentrations <10% LEL and below action level. See HASP for specific direction on action levels.	
		Ensure a fire extinguisher is present on-site and easily accessible.	
		No smoking allowed on-site; No smoking signs posted.	
	Underground utilities may be ruptured during soil removal in excavation/trenching activities; potential fire, explosion or electrocution	Underground utilities, piping, and other services must be marked out prior to excavation activities. (Ensure One-Call/Dig Safe service notified and cleared; conduct private utility locating for site services as practicable) ;Review latest recorded drawings for the site and conduct utility inspection.	
	Operating heavy equipment over unstable ground.	Where unstable soil exists, the soil should be assessed by a qualified professional engineer to ensure safe site conditions. Implement design control measures.	
	Pedestrian/unauthorized visitor injury.	Prevent unauthorized access; delineate work area properly--Utilize physical barriers (caution tape, fencing, barricades) to prevent inadvertent entry; ensure proper signage visible to indicate work area.	
Stockpile soil or place soil in 55-gallon drums .	On-site workers may be injured/killed by the heavy equipment being used to move soil.	Stay clear of the equipment and ensure that your approach is made from the front and with in view of the operator.	
	Inhalation of particulates.	Apply dust control measures. If dust control is insufficient, a properly fitted respirator with HEPA filters, or, depending on dust levels, an appropriate dust mask must be donned. See HASP for specific direction on action levels.	
	Hand abrasions, crushed toes while moving drums.	Wear leather gloves when handling drums, and ensure steel-toe boots are worn.	
	Back Strain/Injury	Utilize proper back safety techniques; Use powered lift truck, drum cart, or other mechanical means to move drums.	
	Material falling into excavation	Stockpile material more than 2' from edge of excavation.	
Covering soil stock pile.	There is the potential that stockpiled soil could experience erosion where rainfall could possibly wash the soil from it's location.	To prevent erosion or prevent migration of contaminants, use a underlayment of medium or high density polyethylene with a thickness of 30 mils. All stockpiles should be covered with 10 mil polyethylene sheeting at all times when stockpile is not being actively worked. Ensure that the contaminated materials stockpile is not located near any sensitive receptors like dry wells, etc. Refer for HASP.	
		Stockpile should be barricaded to secure the soil covering.	
	Contamination/exposure to hazardous materials	Wear appropriate PPE as specified in HASP	
		Do not walk on/climb up stockpiles. Work from ground-surface only.	

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Job Loss Analysis

Job Task	Excavation		
Publish Date:	**December 4, 2009**	**Origination Date:**	**February 27, 2006**
Removal of stockpile onto roll-off or dump truck.	Dust inhalation may occur while equipment is used to transfer stockpile to roll-off dumpster.	Apply dust suppression techniques. If dust control is insufficient, a properly fitted respirator with HEPA filters, or, depending on dust levels, an appropriate dust mask must be donned. See HASP for specific direction on action levels.	
	Tip over of unevenly laden vehicles	Ensure materials evenly loaded into containers/dump trucks.	
Secure, Clean-Up and depart site.	Secure open-excavated area	Install orange construction fence or temporary chain link fencing around excavated area.	
	On-site traffic hazards.	Exit site in a safe manner.	

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Job Loss Analysis

Job Task	Observation of Backfill and Compaction		
Publish Date:	**January 29, 2010**	**Origination Date:**	**February 21, 2006**
Group	Environmental	**Category**	Excavation
Development Team:	Chris Brown, Derrick Jones, Greg Sherman, Danielle Chirco	**Latest Review Team:**	Russell Keenan

Minimum Required Equipment (check all that apply)

X	Reflective Vest		Goggles		Supplied Air Respirator		Other:		
X	Hard Hat		Face Shield		Air Purifying Respirator		Cartridge:		
X	Steel Toed Boots		Life/Harness		Protective Clothing		Material:		
X	Safety Glasses	X	Hearing Protection	X	Gloves		Material:	Leather and/or cut-resistant	
							Client Specific:		

Job Steps	Risks/Hazards	Quality/Safe Work Practices
Observe backfill and compaction	Injury due to contact with heavy equipment operation	Review contractor JLA prior to starting task.
		Workers are to wear PPE as directed by the corresponding HASP and JLA.
		Remain outside the exclusion zone while equipment is being operated.
		If it is necessary to enter exclusion zone, establish eye contact with operator and verify that the operator's hands are off the controls. "Show Me Your Hands".
		Identify swing radius and tip over distance of any equipment booms/arms and maintain at least that distance away, if possible.
		Stay out of the "Line of Fire" by asking the subcontractor where the best place to stand is to avoid potential hazards associated with hydraulic lines, shoring, load failure, etc.
		Do not walk under raised loads.
	Slips, trips, and falls due to uneven ground surfaces.	Conduct LPSAs on foot placement and housekeeping to aid in the prevention of slips, trips, and falls. If a potential hazard is identified, remember to ACT and mitigate the potential hazard.
	Property damage from equipment contacting aboveground structures.	Verify that contractor has an assigned spotter for each piece of equipment moving onsite.
		Continually assess site for limited or hazardous clearances between personnel, equipment, and structures.
	Hearing damage due to noise from equipment	Wear hearing protection if normal conversation between two people cannot be maintained at a distance of three (3) feet.

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Job Loss Analysis

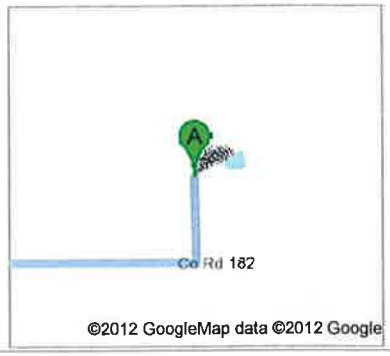
Job Task	Observation of Backfill and Compaction		
Publish Date:	**January 29, 2010**	**Origination Date:**	**February 21, 2006**
Observe backfill and compaction (cont.)	Failed compaction tests	Verify (through measurement of lifts and tests) that established compaction testing guidelines and permits for project are being followed (if applicable).	
	Dust spreading outside work area	Verify that dust is being controlled through mitigating measures (water, etc.) and in compliance with permits.	
Document Task Activity	Unable to prove through records that task performed as required	Complete task documentation legibly and in a timely manner	
Personnel trained/certified/qualified to perform task	Work is invalid as performed by person not trained/certified/qualified to perform task	Verify that correct training and certification is provided for individuals performing tasks.	
Perform task according to approved plan/procedure	Perform wrong test/job function	Review work plan or other directing document before performing task.	
	Miss a step or make a mistake while performing activity	Have copy of procedure/standard available while performing task.	

Attachment D
Emergency Contacts
Map to Hospital

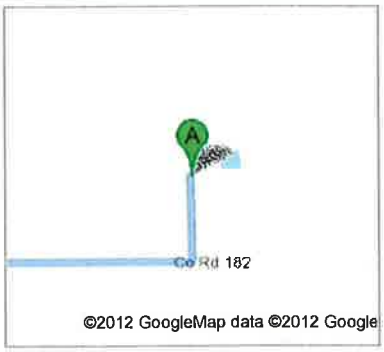
Google

Directions to 1600 N Main Ave, Lovington, NM 88260
42.8 mi – about **51 mins**

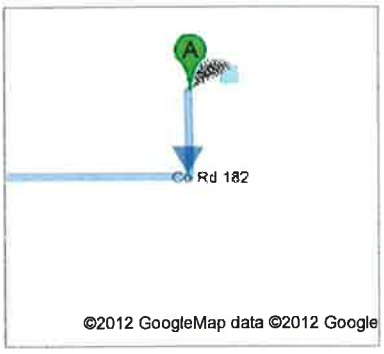
Unknown road



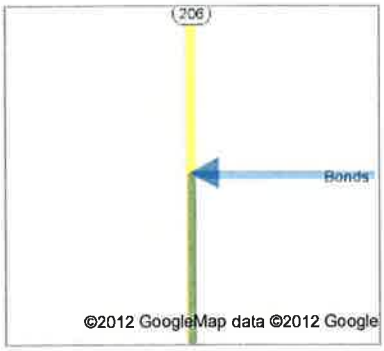
1. Head **south** toward **Bonds Rd/Co Rd 182** — go 0.1 mi, total 0.1 mi



2. Turn right onto **Bonds Rd/Co Rd 182**
About 5 mins — go 1.2 mi, total 1.4 mi



3. Turn left onto **NM-206 S**
About 42 mins — go 39.2 mi, total 40.6 mi



4. Keep right at the fork, follow signs for **US-82 W/ Lovington** and merge onto **US-82 W/Tatum Hwy**
About 3 mins — go 2.2 mi, total 42.8 mi

5. Turn right onto **N Main Ave**
Destination will be on the right

go 203 ft
total 42.8 mi

1600 N Main Ave, Lovington, NM 88260

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Map data ©2012 Google

Directions weren't right? Please find your route on maps.google.com and click "Report a problem" at the bottom left.

EMERGENCY CONTACTS

EMERGENCY NUMBERS	
Police	911
Fire	911
Ambulance	911
National Poison Center	800-222-1212
Hospital – Nor-Lea General Hospital	575-396-6611
UTILITIES	
Gas	NM One Call Locate: 800-321-2537 Emergency Locate: 866-344-6662 Client ID: 2234 Emergency After-Hours: Continental Divide Electric Co-op 800-727-1881
Electric	
Water	
Telephone	
One Call/Equivalent	