



General

ENTERED  
300 Golden Ridge Road, Suite 200  
Golden, CO 80401  
(303) 763-7188  
(303) 763-8889 FAX  
www.techlawinc.com

May 24, 2004

Mr. David Cobrain  
State of New Mexico Environment Department  
Hazardous Waste Bureau  
2905 Rodeo Park Drive East  
Building One  
Santa Fe, New Mexico 87505-6303



Reference: Work Assignment No. Y513, 06110.150; State of New Mexico Environment Department, Santa Fe, New Mexico; General Permit Support Contract; Research and Permitting Support for the Los Alamos National Laboratory; Review of Selected LANL Environmental Restoration (ER) Project Standard Operating Procedures (SOPs); Task 4 Deliverable

Dear Mr. Cobrain:

Enclosed please find the deliverable for the above-referenced work assignment. This deliverable consists of review comments on selected Los Alamos National Laboratory (LANL) Environmental Restoration (ER) Project Standard Operating Procedures (SOPs). Mr. John Young of NMED sent a fax to me on April 30, 2004, which identified a total of 31 LANL SOPs for TechLaw to review. The fax identified specific SOPs that should be compared to the Corrective Action Order. Mr. Young also indicated that these SOPs should be divided into two groups: priority SOPs and non-priority SOPs. Priority SOPs were identified as those SOPs that had been previously commented on by TechLaw, during our 2001 LANL SOP review. A total of 15 SOPs were identified as priority.

As discussed via email between Mr. John Young (NMED) and Ms. Paige Walton (TechLaw) on May 21, 2004, three priority SOPs were noted as being heavily dependent upon Laboratory Implementation Requirements (LIRs) and Laboratory Implementation Guidance (LIG). Mr. Young indicated that NMED would like the review of the SOPs to also include review of the relevant LIRs and LIGs. These three priority SOPs include SOP-ER-01.06 (Management of Environmental Restoration Project Waste), SOP-ER-01.08 (Field Decontamination of Drilling and Sampling Equipment), and SOP-ER-07.05 (Subsurface Moisture Measurements Using a Neutron Probe). The review comments for these three SOPs have not been included in this deliverable but will be submitted as a separate deliverable by June 11, 2004.

The remaining 16 non-priority SOPs will be addressed in a subsequent deliverable, anticipated to be submitted the week of June 25, 2004. The review of these SOPs will also include review of LIRs and LIGs as appropriate. The following table lists the 16 non-priority SOPs that will be addressed in this second deliverable:

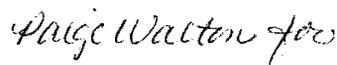


<u>ER SOP/Procedure Identification</u>	<u>SOP Title</u>	<u>Effective Date</u>
SOP-01.07, Rev.1	Operational Guidelines for Taking Soil and Water Samples in Explosive Areas	04/27/01
SOP-01.10, Rev.1	Waste Characterization	12/13/01
SOP-03.08, Rev.1	Geomorphic Characterization	12/10/01
SOP-03.11, Rev.1	Coordination and Evaluating Geodetic Surveys	12/13/01
SOP-06.02, Rev.2	Field Analytical Measurements of Groundwater	04/27/01
SOP-06.15, Rev.1	Coliwasa Sampler for Liquids and Slurries	12/13/01
SOP-06.19, Rev.1	Weighted Bottle Sampler for Liquids and Slurries in Tanks	12/13/01
SOP-06.29, Rev.2	Single-stage Sampling for Surface Water Run-off	03/30/04
SOP-06.32, Rev.1	Multi-level Groundwater Sampling of Monitoring Wells – Westbay MP Systems	07/12/02
SOP-07.01, Rev.1	Pressure Transducers	04/27/01
SOP-07.02, Rev.1	Water level measurements	04/27/01
SOP-07.03, Rev.1	Slug Tests	04/27/01
SOP-07.04, Rev.2	Aquifer Pumping Tests	04/27/01
SOP-10.01, Rev.1	Screening for PCBs in Soil	07/19/01
SOP-10.08, Rev.2	Operation of the Spectrace 9000 Field-portable X-ray Fluorescence Instrument	03/11/04
SOP-10.14, Rev.0	Performing and Documenting Gross Gamma Radiation Scoping Surveys	03/26/01

The deliverable consists of an individual review, including a general summary as well as any comments, for each SOP. The draft of the deliverable was e-mailed to you on Monday, May 24, 2004, at david\_cobrain@nmenv.state.nm.us. The deliverable is formatted in Microsoft Word 2000.

In general, the more recent SOPs (i.e., those with a more current effective date) tend to reflect the most current and acceptable practices and therefore have fewer comments than SOPs that have not been revised for several years. If you have any questions, please feel free to contact me at (303) 763-7188 or Ms. Paige Walton at (801) 451-2978.

Sincerely,



June K. Dreith  
Program Manager

Enclosure: Technical Review of Selected Los Alamos National Laboratory (LANL) Standard Operating Procedures (SOPs)

cc: Mr. John Young, NMED  
Mr. James Ashworth, TechLaw  
Ms. Paige Walton, TechLaw

**TASK 4 DELIVERABLE**

**TECHNICAL REVIEW OF SELECTED  
LOS ALAMOS NATIONAL LABORATORY (LANL) ENVIRONMENTAL RESTORATION (ER)  
PROJECT, STANDARD OPERATING PROCEDURES (SOPs)**

**Research and Permitting Support for the Los Alamos National Laboratory**

**Submitted by:**

**TechLaw, Inc.  
300 Union Boulevard, Suite 600  
Lakewood, CO 80228**

**Submitted to:**

**Mr. David Cobrain  
State of New Mexico Environment Department  
Hazardous Waste Bureau  
2905 Rodeo Park Drive East  
Building One  
Santa Fe, New Mexico 87505**

**In response to:**

**Work Assignment No. 06110.150**

**May 24, 2004**

**TECHNICAL REVIEW OF SELECTED  
LOS ALAMOS NATIONAL LABORATORY (LANL), ENVIRONMENTAL  
RESTORATION (ER) PROJECT STANDARD OPERATING PROCEDURES (SOPs)**

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**Standard Operating Procedure ER-SOP-04.01, Rev. 2**  
**Drilling Methods and Drill Site Management**

Description:

SOP ER-SOP-04.01, Rev. 2, describes several of the various methods available for drilling and completing groundwater and vapor monitoring wells, and discusses the pre-operational, operational, and post-operational procedures required to ensure a successful drilling program. The SOP consists of a narrative and three attachments. Attachment A contains an equipment and supplies checklist for drilling, Attachment B discusses the various applications and limitations of the different drilling methods, and Attachment C presents an example of a daily drilling summary form.

Comments:

The procedures described in the SOP appear adequate and consistent with EPA and industry monitoring well drilling methods. However, it should be noted that this SOP has not been updated since the previous review in 2001. During the previous review, TechLaw indicated that two additional well drilling methods could potentially be utilized in the LANL drilling program. These include resonant sonic and cryogenic drilling. Both of these drilling techniques have been tested and proven successful at various DOE facilities including INEL, Rocky Flats, Sandia, and Hanford. Since these drilling methods are listed in Section IX.B.2.b.i and are described in Sections X.B.5 and X.B.6 of the Order, LANL should revise the SOP to include these additional drilling methods.

**Standard Operating Procedure ER-SOP-04.04, Rev. 2**  
**Contract Geophysical Logging**

Description:

SOP ER-SOP-04.04, Rev. 2, describes the different down-hole geophysical logging techniques used to determine the physical, geological, and hydrologic conditions in an open borehole or cased monitoring well, and discusses the personnel responsibilities and operational procedures required to ensure a successful logging program. The SOP consists of a narrative and three attachments. Attachment A contains a listing of the typical wire-line geophysical logging tools, Attachment B presents a borehole status form, and Attachment C shows an example of a log header form.

Comments:

The procedures described in this SOP appear adequate and consistent with EPA and general industry practices. There are no additional comments at this time.

**Standard Operating Procedure ER-SOP-05.03, Rev. 2**  
**Monitor Well and RFI Borehole Abandonment**

*Description:*

SOP ER-SOP-05.03, Rev. 2, describes the procedures used to abandon RFI monitoring wells and boreholes. Specifically, the SOP discusses the different abandonment methods (e.g., sealing boreholes with or without the well components in place), the different types and properties of materials used in sealing mixtures (e.g., water, cement, bentonite), the different types of sealing mixtures (e.g., neat cement, bentonite slurries, cement/bentonite grouts, high-solids grouts), and the required hydration/curing times for the sealing mixtures. The SOP consists of a narrative and one attachment. Attachment A presents an example of a monitoring well and borehole abandonment information form.

*Comments:*

The procedures described in this SOP appear adequate and consistent with EPA and general industry practices. However, it should be noted that Section X.D. of the Order describes two additional well abandonment methods that are not discussed in this SOP. These methods include: (1) the use of a tapered wedge assembly or solid-stem auger for extracting large diameter casings and screens, and (2) drilling/grinding out damaged casings and screens with a roller cone bit, drag bit, or carbide tooth bit. LANL should revise the SOP to discuss these additional abandonment procedures.

**Standard Operating Procedure ER-SOP-06.01, Rev. 3**  
**Purging and Sampling Methods for Single Completion Wells**

Description:

SOP ER-SOP-06.01, Rev. 3, describes the procedures for purging and sampling single completion wells. The SOP discusses the different types of equipment available for evacuating groundwater (e.g., bailers and pumps), the different parameters monitored during the purging process (e.g., specific conductance, pH, turbidity), methods for calculating the well casing volume, and specific steps to be followed during the purging and sampling process. The SOP consists of a narrative and two attachments. Attachment A contains an equipment and supplies checklist for purging and sampling methods for single completion wells, and Attachment B presents an example of a water quality sampling record.

Comments:

Most of the procedures described in this SOP are consistent with EPA and general industry practices. However, the procedure for monitoring water quality parameters is not in compliance with the Order. SOP Section 8.5.5 discusses that field parameters will be measured at the start of purging and at least once per casing volume, but the SOP does not indicate that the water quality parameters will be measured via a flow-through cell. Section IX.B.2.i.i of the Order specifies that the groundwater quality parameters will be measured using a flow-through cell and instruments approved by the Department. As a result LANL should revise the SOP to ensure compliance with the Order.

**Standard Operating Procedure ER-SOP-06.03, Rev. 3**  
**Sampling for Volatile Organic Compounds in Groundwater**

Description:

SOP ER-SOP-6.03, Rev. 3, describes the collection of groundwater samples from monitoring or characterization wells for analysis of volatile organic compounds (VOCs), and the selection of equipment and materials to be used in this process, as performed by the LANL ER Project. The procedure consists of a narrative and one attachment. The narrative describes the equipment and procedures used to collect groundwater VOC samples, while the attachment (Attachment A) includes an equipment and supplies checklist.

Comments:

The procedures described in this SOP appear consistent with EPA sample collection guidance and general procedures practiced in collection of environmental samples. However, a few concerns are noted below.

The procedure does not provide guidance on sample vial preparation. Prior to collecting the groundwater sample, the groundwater should be tested for pH (as indicated in the referenced ER-SOP-06.02). A solution of 1:1 hydrochloric acid (HCL) should be added to each sample vial such that the resulting pH of the groundwater will be less than a pH of 2. While the checklist in Appendix A includes HCL as essential equipment, there is no procedure on how to apply it as a sample preservative. It is suggested that SOP ER-SOP-6.03, Rev. 3 be revised to include procedures for sample vial preparation and sample preservation. If the Sample Management Office (SMO) handles all selection of sample containers and preservation, the SOP should be revised to indicate that all sampling efforts should be coordinated with the SMO regarding sample containers and preservation.

The procedure (Section 6.9) indicates that the samples shall be adequately packed and cooled. However, the SOP does not address that once a sample has been collected, it needs to be immediately placed into a cooler and chilled. It is suggested that the SOP be modified to clearly indicate that upon collection of the samples, the vials will be immediately placed into a cooler that has been chilled to at least 4 degrees Celsius (4°C). It is also suggested that a reference to ER-SOP-01.02, Rev.1, Section 8.6.2, which addresses sample preservation and cooling, be included.

The procedure indicates that if the water is potentially chlorinated, the sample vial should be pre-treated with sodium thiosulfate or another appropriate material. While it is agreed that is unlikely that chlorinated groundwater will be encountered, the proper procedure for pre-treating the vial should be provided in the SOP. The SOP should be revised to either detail how much sodium thiosulfate should be used and detail what other preservatives may be used and in what quantity, or to provide a reference (SOP) for these procedures. It is noted that ER-SOP-01.02, Rev.2, does not address pre-treating sample vials when collecting potentially chlorinated water for analysis.

Review comments on SOP ER-SOP-6.03, Rev. 2 indicated that the SOP should be revised to address peristaltic pumps and submersible electric pumps. Peristaltic pumps are good only to depths of a nominal 50 feet. Given that the depth to groundwater at LANL is significantly deeper than 50 feet below ground surface (bgs), it is not anticipated that peristaltic pumps would be applicable for use at LANL. Submersible electric pumps would fall into the discussion of gear-driven submersible pumps (Section 7.2 of the SOP). Therefore, it is determined that the previous comments have been adequately incorporated in

SOP ER-SOP-6.03, Rev. 3.

**Standard Operating Procedure ER-SOP-06.09, Rev. 2**  
**Spade and Scoop Method for the Collection of Soil Samples**

Description:

SOP ER-SOP-06.09, Rev. 2, describes the process for spade-and-scoop collection of shallow soil samples. Shallow was defined as zero (0) to twelve (12) inches below ground surface. The spade-and-scoop collection method is consistent with collection of a grab sample using hand trowels, hand auger, or other manual digging implements. One attachment was provided with the SOP, Attachment A, which is an equipment and supplies checklist for spade-and-scoop collection.

Comments:

The procedures described in this SOP appear adequate and consistent with EPA and general industry practices. There are no additional comments at this time.

**Standard Operating Procedure ER-SOP-06.10, Rev. 3  
Hand Auger and Thin-Wall Tube Sampler**

Description:

SOP ER-SOP-06.10, Rev. 3, describes the equipment and procedures required for the collection of surface and subsurface (to a depth of approximately 15 feet below ground surface) soil samples with a hand auger and thin-wall tube sampler. The SOP consists of a narrative and two attachments. Attachment A presents an equipment and supplies checklist for sampling soil with hand augers and thin-wall tube samplers, and Attachment B contains a diagram showing examples of a hand auger and thin-wall tube sampler.

Comments:

The procedures described in this SOP appear adequate and consistent with EPA and general industry practices. There are no additional comments at this time.

**Standard Operating Procedure ER-SOP-06.13, Rev. 2**  
**Surface Water Sampling**

Description:

SOP ER-SOP-6.13, Rev. 2, describes equipment used in the collection of surface water samples as well as methods of sampling surface water bodies employed by the LANL ER Project. The procedure includes a narrative and two attachments. The narrative provides a discussion on methods of documenting surface water sample collection. Attached to this procedure are a checklist of equipment and supplies used in the collection of surface water samples (Attachment A) and a water chemistry checklist (Attachment B).

Comments:

The procedures described in this SOP appear adequate and consistent with EPA sample collection guidance and general procedures practiced in collection of certain types of environmental (i.e., surface water) samples.

It should be noted that the SOP is somewhat limited in scope and the recommended procedure for the collection of surface water samples uses a peristaltic pump, which is convenient when filtered metal samples are required. However, while the SOP does briefly present other methods (i.e., direct fill and use of a dipper), the recommendation that a peristaltic pump be used runs counter to good practice when collecting samples for VOCs and/or some semi-volatile organic compound (SVOC) analyses. LANL may wish to revise this SOP to include additional language regarding when a peristaltic pump is/is not appropriate, and to propose additional options, as appropriate.

Also, the SOP indicates that if a water sample is collected directly into a sample container, preservatives should be added as appropriate. However, the SOP does not provide a reference to SOP-ER-01.02, Rev.1, which discusses the appropriate preservatives to be used. It is suggested that this reference be added to the SOP to Section 8.8.1, ninth bullet.

**Standard Operating Procedure ER-SOP-06.24, Rev. 2**  
**Sample Collection from Split-Spoon Samplers and Shelby Tube Samplers**

Note: As requested by NMED, this SOP was review for its technical adequacy as well as compared against the Administrative Order.

Description:

SOP ER-SOP-6.24, Rev. 2, describes the process for collecting soil and sediment samples using either split-spoon samplers or Shelby tube samplers at the LANL ER Project. The procedure consists of a narrative and one attachment. The narrative provides a discussion on the equipment and procedures that should be employed when using these types of samplers, and the attachment (Attachment A) presents an equipment and supplies checklist.

Comments:

Section 6.2.1.2 provides a discussion of the standard spilt spoon sampler. In addition, the text states that in some designs of the split spoon, the split spoon sampler is threaded onto a drill stem and placed inside a hollow-stem auger. The auger is then turned and advanced and the split spoon is advanced along with the drill bit using the drill rig's drive weight. This alternative is appropriate only for unconsolidated sediments. It is not clear with the alternative sampler if the sampler (tube) is rotating. The concern is that if the entire apparatus is rotating, the fabric of the sediments being sampled will be destroyed. If the actual fabric of the sediment is not of value, then the approach is acceptable. The SOP should be revised to provide a more clear definition of how the alternative split spool sampling device operates.

Section 6.2.1.4 states that a split spoon sampler may be used with a hand auger. A split spoon sampling device is typically used on a drill rig, while a hand auger is rotated by hand into the ground to collect a sample instead of being driven/pushed. We are not aware of equipment which would allow the use of a split spoon sampler in a similar manner as a hand auger, nor do we feel that the resulting sample would be similar to that collected using procedures specific to a split spoon sampler. Also, this type of sampling can actually be accomplished using a device known as a "slide-hammer", which works similar to that of the weighted hammer on a drill rig, but is a hand held and hand operated device.

Section IX.B.2.b.ii of the Order states that a split barrel sampler lined with brass sleeves or a coring device is the preferred methods for borehole soil, rock and sediment sampling. While the name of the sampling method may differ between the Order (split barrel sampler) and the SOP (standard spilt spoon sampler) the procedures are the same. Therefore, the SOP appears to adequately meet the requirements outlined in the Order.

**Standard Operating Procedure ER-SOP-06.26, Rev. 2  
Core Barrel Sampling for Subsurface Earth Materials**

*Description:*

SOP ER-SOP-06.26, Rev. 2, describes the procedures for collecting core barrel samples of subsurface earth materials via hollow-stem auger drilling systems. {Note: this SOP only discusses the collection of core samples in unconsolidated formations. No information is presented on the collection of core samples in consolidated formations, such as wire-line coring of bedrock.} The SOP discusses the techniques for decontaminating core barrels, collecting core samples through hollow-stem augers, and handling and sampling cores once retrieved. The SOP consists of a narrative with no attachments.

*Comments:*

The procedures described in this SOP appear adequate and consistent with EPA and general industry practices. There are no additional comments at this time.

**Standard Operating Procedure ER-SOP-06.31, Rev. 1**  
**Sampling of Subatmospheric Air**

Description:

SOP ER-SOP-06.31, Rev. 1, describes the different procedures for sampling subatmospheric (subsurface) air from vapor ports in monitoring wells and boreholes. The different methods of sample collection include the B&K photoacoustic multigas analyzer, SUMMA gas canisters, and adsorbent columns. Procedures are also presented for the use of packer systems in open boreholes (i.e., proper procedures for inflation and deflation of packer systems). The SOP consists of a narrative and one attachment. Attachment A presents a packer system diagram.

Comments:

The procedures described in this SOP appear adequate and consistent with EPA and industry standard practices. There are no additional comments at this time.

**Standard Operating Procedure ER-SOP-12.01, Rev. 4**  
**Field Logging, Handling, and Documentation of Borehole Materials**

Description:

SOP ER-SOP-12.01, Rev. 4, describes the process for field logging, handling, and documentation of borehole materials at the LANL ER Project. This procedure consists of a narrative and Attachments A through H. The narrative provides a general description of procedures used to log, handle, and document those materials recovered from the borehole during drilling operations. These materials may include soil, core, cuttings, rubble, rock chips, groundwater, and drilling fluids. Examples of checklists and forms that might be used during this procedure are provided in Attachments A through H:

- Attachment A – Equipment and Supplies Checklist for Field Logging, Handling, and Documentation of Borehole Samples
- Attachment B – Field Borehole Analytical Sample Removal Checklist
- Attachment C – Run Markers
- Attachment D – Borehole Log
- Attachment E - Marking and Boxing Core
- Attachment F – Field Photographic Log
- Attachment G – Filed Screening Log
- Attachment H - Curation/Disposal Strategy

Comments:

The procedures described in this SOP appear adequate and consistent with EPA sample collection guidance and general procedures practiced in collection of environmental samples. There are no additional comments at this time.