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Effective Date: **02/09/07**		

Environment & Remediation Support Services

Standard Operating Procedure

for **DRILLING PLAN DEVELOPMENT**

APPROVAL SIGNATURES:

Subject Matter Expert:	**Organization**	**Signature**	**Date**
Mark Everett	ERSS	SIGNATURE ON FILE	12/5/06
Quality Assurance Specialist:	**Organization**	**Signature**	**Date**
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Responsible Line Manager:	**Organization**	**Signature**	**Date**
Craig Eberhart	ERSS	SIGNATURE ON FILE	12/6/06

1.0 PURPOSE AND SCOPE

The purpose of this procedure is to describe the process for development of drilling plans by the Los Alamos National Laboratory (LANL or Laboratory) Environment & Remediation Support Services (ERSS) Division to meet subsurface sampling requirements, as required by the New Mexico Environmental Department Consent Order. This procedure also describes the drilling plan requirements for radioactive contaminated sites regulated by the Department of Energy (DOE).

2.0 BACKGROUND AND PRECAUTIONS

2.1 Background

Detailed drilling plans are developed to accepted national standards and accompanied by other work documents resulting in a work package for the drilling operations. This preplanning activity ensures drilling on LANL environmental sites protects workers and the environment and results in acceptability samples.

2.2 Precautions

This procedure is only to be used in conjunction with an approved Site-Specific Health and Safety Plan (SSHASP) and an Integrated Work Document (IWD).

Refer to the applicable statement of work, the State of New Mexico Environmental Department Compliance Order, Chapter IX.B, Investigation, Sampling, and Analysis Methods and Chapter X, Monitoring Well Construction Requirements and/or the American Society for Testing and Materials (ASTM) Standards identified in Attachment 3 for all applicable drilling process requirements. ASTM documents are available at http://www.astm.org/cgi-bin/SoftCart.exe/index.shtml?E+mystore

3.0 EQUIPMENT AND TOOLS

None.

4.0 STEP-BY-STEP PROCESS DESCRIPTION

4.1 Develop a Drilling Plan

Project Leader	1.	Prepare a Drilling Plan in accordance with Attachment 1 for non-nuclear, or Attachment 2 for Nuclear Environmental Sites (NES).
	2.	Include monitoring well construction requirements and investigation, sampling and analysis methods in accordance with the New Mexico Environmental Department (NMED)/Los Alamos National Laboratory (LANL) Consent Order, and the applicable ASTM Standards, listed in Attachment 3.
	3.	If environmental drilling occurs upon or impacts a Nuclear Environment Site (NES), ensure the drilling plan addresses all Safety Program Management Plans (SMPs), Technical Safety Requirements (TSA), and other requirements contained in the Documented Safety Analysis (DSA).

Project Leader (Continued)	4.	Use the outline guidance for the Drilling Work Plan for NES provided in Attachment 2 when developing the drilling plan.
	5.	Ensure the plan addresses requirements for the use of an Open Flame Permit, and equipment maintenance and repairs on site.
	6.	If down hole geophysical logging is required, include a section within the Drilling Plan to address the applicable requirements and processes, in accordance with procedure EP-ERSS-SOP-5030, Contract Geophysical Logging; procedure EP-ERSS-SOP-5035, Operation of LANL-Owned Borehole Logging Trailer; and procedure EP-ERSS-SOP-5051, Field Logging, Handling, Documentation, and Storage of Borehole Materials.
	7.	Review and approve the Drilling Plan in accordance with procedure EP-ERSS-SOP-4002, Document Development, Review, and Production.
	8.	Prior to drilling operations, ensure that an Investigation Work Plan (formerly known as a Sample Analysis Plan) has been developed, reviewed and approved.
4.2	**Perform Pre-operation Drilling Activities**	
Project Leader	1.	Implement the requirements of procedure EP-ERSS-SOP-5055, General Instructions for Field Investigations, as part of the IWD.
	2.	Perform, document and verify pre-drilling location and setup. [NOTE: This action is specifically required at all NES location in accordance with DSA requirements.]
	3.	Complete all necessary work-site preparations (e.g., removing brush and minor obstructions, clearing access roads, properly staking the borehole location and locating utility transmission lines) in accordance with the IWD.
	4.	Schedule, perform and document an inspection, including the verification of decontamination process implementation of the drilling rig and associated equipment (e.g., augers, bits, cables etc.), with the Subcontractor and/or HSR-5, before mobilizing to the drill site.
4.3	**Mobilize Drilling Rig and Participants to the Drilling Site**	
Project Leader	1.	Mobilize the drilling rig and associated equipment, after successful completion of Step 4.2.4.
	2.	Mobilize all qualified participants to the drilling site.

4.4	**Perform Drilling Operation**	
Project Leader	1.	Ensure all drilling operations are carried out as specified in the Drilling Plan and the IWD and SSHASP.
	2.	Ensure any field changes or modifications of well and/or borehole construction are reviewed and approved in accordance with procedure EP-ERSS-SOP-4002, Document Development, Review, and Production.
	3.	Ensure procedure EP-ERSS-SOP-5071, Collection of Soil, Sediment, and Chip Samples, is specified for use in the IWD if coring is required.
	4.	Ensure all samples are taken and processed as specified in the Investigation Work Plan.
	5.	Ensure borehole materials are processed in accordance with procedure EP-ERSS-SOP-5051, Field Logging, Handling, Documentation, and Storage of Borehole Materials.
	6.	Monitor the collection and storage of all excess cuttings, waste materials, and decontamination solutions for proper disposal as described in procedure EP-ERSS-SOP-5022, Management of ER Project Wastes.
4.5	**Perform Post-operation Activities**	
Project Leader	1.	Ensure all drill-site equipment is accounted for, decontaminated, and ready for shipment to the next site.
	2.	Ensure all borehole locations are properly marked and recorded and the location identification is readily visible on the location stake.
	3.	Ensure the well and/or borehole identification and survey location is recorded on the protective casing. [NOTE: The Drilling Plan contains specific details for recording this information.]
	4.	Restore the site to pre-drilling conditions as specified in the Drilling Plan.
	5.	Develop and submit well construction and/or borehole abandonment information in accordance with procedure EP-ERSS-SOP-5034, Monitor Well and Borehole Abandonment.

4.6 Records

Project Leader	1.	Submit the following records generated by this procedure to the Records Processing Facility: • Completed Daily Activity Log forms (Attachment 6 in procedure EP-ERSS-SOP-5058, Sample Control and Field Documentation); • Completed Records from procedure EP-ERSS-SOP-5051, Field Logging, Handling, Documentation, and Storage of Borehole Materials, (Attachments 1 - 11, as necessary); • Completed Monitoring and Borehole Abandonment Information from procedure EP-ERSS-SOP-5034, Monitor Well and Borehole Abandonment; • Design Documents (e.g., redline drawings, design field changes, well construction diagrams and as-built drawings, and borehole as-built drawings, etc.); • Approved Drilling Plan; and • Any other documentation important to the work (i.e., notebooks and Integrated Work Documents) unless they are included as records under another procedure.

5.0 PROCESS FLOW CHART

Flow chart is to be included at a later date.

6.0 ATTACHMENTS

Attachment 1: 5029-1 Non-Nuclear Drilling Plan Outline (Example) (2 pages)

Attachment 2: 5029-2 NES Drilling Plan Outline (Example) (2 pages)

Attachment 3: 5029-3 ASTM Standards (1 page)

7.0 REVISION HISTORY

Author: Andy Gallegos

Revision No. *[Enter current revision number, beginning with Rev.0]*	Effective Date *[DCC inserts effective date for revision]*	Description of Changes *[List specific changes made since the previous revision]*	Type of Change *[Technical (T) or Editorial (E)]*
0.0	02/09/07	Reformatted and renumbered, supersedes SOP-04.01	E

Using a CRYPTOCard, click here to record "self-study" training to this procedure.

If you do not possess a CRYPTOCard or encounter problems, contact the ERSS training specialist.

ATTACHMENT 1: NON-NUCLEAR DRILLING PLAN OUTLINE (EXAMPLE)

5029-1

Non-Nuclear Drilling Plan Outline (Example)

Records Use only

Los Alamos NATIONAL LABORATORY EST.1943

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- 3.1 TA-XX, system title (e.g., Waste Water Treatment Plant)
- 3.2 Location (e.g., Pratt Canyon)

4.0 DESIGN REQUIREMENTS

5.0 SAMPLING REQUIREMENTS (to include down hole geophysical)

6.0 OPERATIONS
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- 6.2 Drilling Tasks
  - 6.2.1 Location Evaluation During Angle Drilling
  - 6.2.2 Monitoring and Measurements of Work Environment and Vicinity During Drilling
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  - 6.2.5 Dust Control
  - 6.2.6 Equipment maintenance and repairs including the need for open flame permits
- 6.3 Post Drilling Tasks

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- 7.2 SMP 2 – Unreviewed Safety Question (USQ) Program
- 7.3 SMP 3 – Quality Assurance Program
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- 7.6 SMP 6 – Record Keeping Program
- 7.7 SMP 7 – Configuration Management Program
- 7.8 SMP 8 – Vehicle and Equipment Maintenance
- 7.9 SMP 9 – Emergency Preparedness
- 7.10 SMP 10 – Fire Protection

ATTACHMENT 1: NON-NUCLEAR DRILLING PLAN OUTLINE (EXAMPLE)

5029-1

Non-Nuclear Drilling Plan Outline (Example)

Records Use only

7.11 SMP 11– Calibration Program
7.12 SMP 12 – Hazardous-Materials Protection Program
7.13 SMP 13 – Radioactive and Hazardous Waste Management Program

8.0 TECHNICAL SAFETY REQUIREMENTS (e.g., drilling controls)

9.0 CONDUCT OF OPERATIONS

10.0 OTHER REQUIREMENTS

11.0 REFERENCE

ATTACHMENT 2: NES DRILLING PLAN OUTLINE (EXAMPLE)

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NES Drilling Plan Outline (Example)

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- 6.1 Pre-drilling Tasks
- 6.2 Post-drilling Tasks

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- 7.1 SMP 1 – Integrated Work Management (IWM) Program
- 7.2 SMP 2 – Unreviewed Safety Question (USQ) Program
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- 7.10 SMP 10– Vehicle and Equipment Maintenance
- 7.11 SMP 11– Emergency Preparedness
- 7.12 SMP 12 – Fire Protection
- 7.13 SMP 13– Calibration Program
- 7.14 SMP 14 – Hazardous-Materials Protection Program
- 7.15 SMP 15 – Radioactive and Hazardous Waste Management Program

8.0 TECHNICAL SAFETY REQUIREMENTS (e.g., drilling controls)

ATTACHMENT 2: NES DRILLING PLAN OUTLINE (EXAMPLE)

5029-2

NES Drilling Plan Outline (Example)

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8.1 TSR 1
8.2 TSR 2
8.3 TSR 3
8.4 TSR 4
8.5 TSR 5
- 8.5.1 Pre-drilling Location Evaluation
- 8.5.2 Location Evaluation During Angle Drilling
- 8.5.3 Monitoring and Measurements of Work Environment and Vicinity During Drilling
- 8.5.4 Evaluating Exhumed Material and Prevention and Contamination
- 8.5.5 Control the Rate of Material
- 8.5.6 Dust Control
- 8.5.7 Equipment maintenance and repairs including the need for open flame permits

8.6 TSR 6
8.7 TSR 7
8.8 TSR 8

9.0 CONDUCT OF OPERATIONS

10.0 OTHER REQUIREMENTS (e.g., miscellaneous nuclear environmental site surveillance and maintenance requirements)

11.0 REFERENCES

ATTACHMENT 3: ASTM STANDARDS

5029-3

ASTM Standards

Records Use only

The following industry standards provide drilling process standards acceptable to work controlled by this procedure:

- ASTM D 1586-99, Standard Guide for Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils;
- ASTM D 1587-00, Standard Practice for Thin-Walled Tube Sampling of Soils for Geotechnical Purposes;
- ASTM D 3550-01, Standard Practice for Thick Wall Ring-Lined, Split-Barrel Drive Sampling of Soils;
- ASTM D 5092-90, Standard Practice for Design and Installation of Ground Water Monitoring Wells in Aquifers;
- ASTM D 5753-95, Standard Guide for Planning and Conducting Borehole Geophysical Logging;
- ASTM D 5782-95, Standard Guide for Use of Direct Air-Rotary Drilling for Geo-environmental Exploration and the Installation of Subsurface Water-Quality Monitoring Devices;
- ASTM D 5783-95, Standard Guide for Use of Direct Rotary Drilling with Water-Based Drilling Fluid for Geo-environmental Exploration and the Installation of Subsurface Water-Quality Monitoring Devices;
- ASTM D 5784-95, Standard Guide for Use of Hollow-Stem Augers for Geo-environmental Exploration and the Installation of Subsurface Water-Quality Monitoring Devices;
- ASTM D 5787-95, Standard Guide for Monitoring Well Protection;
- ASTM D 5872-95, Standard Guide for Use of Casing Advancement Drilling Methods for Geo-environmental Exploration and Installation of Subsurface Water-Quality Monitoring Devices;
- ASTM D 5875-95, Standard Guide for Use of Cable-Tool Drilling and Sampling Methods for Geo-environmental Exploration and Installation of Subsurface Water-Quality Monitoring Devices;
- ASTM D 5876-95, Standard Guide for Use of Direct Rotary Wire-line Casing Advancement Drilling Methods for Geo-environmental Exploration and Installation of Subsurface Water-Quality Monitoring Devices;
- ASTM D 6089-97, Standard Guide for Documenting a Ground-Water Sampling Event;
- ASTM D 6167-97, Standard Guide for Conducting Borehole Geophysical Logging: Mechanical Caliper;
- ASTM D 6169-98, Standard Guide for Selection of Soil and Rock Sampling Devices Used With Drill Rigs for Environmental Investigations;
- ASTM D 6232-03, Standard Guide for Selection of Sampling Equipment for Waste and Contaminated Media Data Collection Activities;
- ASTM D 6286-98, Standard Guide for Selection of Drilling Methods for Environmental Site Characterization; and
- ASTM D 6914-04, Standard Practice for Sonic Drilling for Site Characterization and the Installation of Subsurface Monitoring Devices.