ENTERED

Maestas, Pamela T

From: Richard Knapp [richard.knapp@eberlineservices.com]
Sent: Monday, April 16, 2012 1:18 PM
To: Maestas, Pamela T
Cc: Sachdeva, Meena
Subject: RE: R-62 FIP

Pam,

On behalf of Eberline Services, you have permission to enter the R-62 FIP into the Records Processing Facility for the ER ID and to send to the state.

Regards,

Richard Knapp
Project Manager
Eberline Services, Inc.
183 Central Park Square
Los Alamos, NM 87544
(505) 661-6547
(505) 401-7648 Cell (preferred)
richard.knapp@eberlineservices.com

From: Maestas, Pamela T [mailto:pamela@lanl.gov]
Sent: Monday, April 16, 2012 1:15 PM
To: Richard Knapp
Cc: Sachdeva, Meena
Subject: R-62 FIP

See below. Please send us a similar email for the R-62 FIP. Thank you.

~~~~~~~~~~~~~~~~~~~~~~~~~~~~

Pamela T. Maestas
Neptune and Company, Inc.
(505) 665-9042 or
(505) 927-7882 cell
~~~~~~~~~~~~~~~~~~~~~~~~~~~~

From: Richard Knapp [mailto:richard.knapp@eberlineservices.com]
Sent: Monday, March 05, 2012 9:05 AM
To: Sachdeva, Meena
Cc: Maestas, Pamela T
Subject: RE: Copyright Permission for R-66 FIP

On behalf of Eberline Services, you have permission to enter the R-66 FIP into the Records Processing Facility for the ER ID and to send to the state.

Regards,

Richard Knapp
Eberline Services
richard.knapp@eberlineservices.com

35219

From: Sachdeva, Meena [sachdeva@lanl.gov]
Sent: Monday, March 05, 2012 8:56 AM
To: Richard Knapp
Cc: Maestas, Pamela T
Subject: Copyright Permission for R-66 FIP

The FIP that you cite in the R-66 and that we have to provide to the State of New Mexico is copyrighted. Please provide us with written permission to enter it into the Records Processing Facility for the ER ID and to send to the state. An email from you to us should suffice.
Thank you,
Meena Sachdeva and Pam Maestas

Los Alamos NATIONAL LABORATORY EST. 1943

SUBCONTRACTOR TRANSMITTAL / STATUS SHEET

Subcontract Number: 89795-000-11	**STR Name:** Robin Reynolds

SUBCONTRACTOR

Company Name: Eberline Services, Inc.	**Date Submitted:** July 13, 2011
Street Address: 7021 Pan American Fwy	☐ **Initial Submittal of a New Document**
City, State, Zip code: Albuquerque, NM 87109	☒ **Re-Submittal of Previous Document**
Subcontractor's Point of Contact: Veronica Ybarra	
Submittal Number:	89795-003
Submittal Title:	Field Implementation Plan for Well R-62
Revision Number:	0

Subcontractor's Representative's signature below indicates that submittal has been reviewed for accuracy and meets the requirements of the subcontract.

Subcontractor's Representative's signature:

Veronica Ybarra

CONTRACTOR

Date Received:	
Statused By:	
Date:	

Comments:

Status Code:

- ☐ 1 Reviewed- Work may proceed
- ☐ 2 Reviewed-Revise and resubmit. Work may proceed subject to incorporation of indicated comments.
- ☐ 3 Reviewed. Revise and resubmit. Work may not proceed.
- ☐ 4 Reject. Submittal does not meet requirements. Resubmit.
- ☐ 5 Permission to proceed not required.

Submit comments to:

Field Implementation Plan for Regional Aquifer Well R-62 at Los Alamos National Laboratory Technical Area-05

FIP-LANS89795-01

July 12, 2011

Eberline Services, Inc.
183 Central Park Square
Los Alamos, New Mexico 87544

EBERLINE SERVICES

Field Implementation Plan for Regional Aquifer Well R-62 at Los Alamos National Laboratory Technical Area-05

FIP-LANS89795-01

July 12, 2011

Authorization and Approval Statement

This Field Implementation Plan for Regional Aquifer Well R-62 at Los Alamos National Laboratory Technical Area-05, with all revisions, is authorized and approved in its entirety by:

Prepared by: Jon R. Marin — Date: 7/13/11
Jon Marin
Lead Field Geologist

Reviewed by: _____ Date: _____
Mark Everett
SME, LANS

Approved by: _____ Date: _____
Robin Reynolds
STR, LANS

Approved by: Veronica Ybarra — Date: 07/13/2011
Veronica Ybarra
Project Manager

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REVISION REVIEW RECORD

Page No.	Rev. No.	Rev. Date	Review Date	Reviewer
Initial issue	0	07-12-2011		

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ABBREVIATIONS AND ACRONYMS

ADESH&Q	Associate Director for Environment, Safety, Health, and Quality
AIT	array induction imager
APS	Accelerator Porosity Sonde
APV	access port valve
BGS, bgs	below ground surface
CAP	Corrective Actions Program
C-O-C	Chain-of-Custody
DS	Drilling Supervisor
CMR	Combined Magnetic Resonance
ECS	Elemental Capture Sonde
EMS	Environmental Management System
EP	Environmental Programs
ER	Environmental Restoration
EP-ERSS	Environmental Programs-Environment and Support Services Division
ES&H	Environment, Safety, and Health
ESH&Q	Environmental Safety Health and Quality
FG	Field Geologist
FM	Formation Microimager
ft	foot (feet)
gpm	gallon(s) per minute
Group EES-6	LANL Earth and Environmental Sciences Division
ID	inner diameter
IDW	Investigation-Derived Waste
IH	industrial hygiene
IWD	Integrated Work Document
LANL	Los Alamos National Laboratory
LOTO	Lockout and Tag-out
MSS	Maintenance and Site Services
MTOA	Master Task Ordering Agreement
NMED	New Mexico Environment Department
NMOSE	New Mexico Office of State Engineer
NOI	notice of intent
NTU	nephelometric units

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ABBREVIATIONS AND ACRONYMS (Concluded)

OD	outer diameter
PE	Professional Engineer
PL	Project Leader
PM	Project Manager
POC	point of contact
PVC	polyvinyl chloride
RCT	Radiological Control Technician
RP	Radiation Protection
SME	Subject-matter expert
SMO	Sample Management Office
SOM	Shift Operations Manager
SOP	Standard Operating Procedure
STR	Subcontract Technical Representative
SVOC	Semi-volatile Organic Compound
SWPPP	Storm Water Pollution Prevention Program
TA	Technical Area
TOC	total organic carbon
VOC	Volatile Organic Compound
WCSF	Waste Characterization Strategy Form
WI	Work Instruction
WMC	Waste Management Coordinator

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1.0 INTRODUCTION

1.1 Site Location and Description

Within Technical Area (TA)-05, regional aquifer well R-62 Site will be located approximately 1,000 feet north-northeast of R-15 in Mortandad Canyon, and 1,500 feet west-southwest from R-43 in Sandia Canyon (Figure 1-1). Regional aquifer well R-62 is being installed to monitor water quality in the regional aquifer and to help define the vertical and lateral extent of chromium contamination known to exist in the vicinity of wells R-42 and R-28, as required by the New Mexico Environment Department (NMED) Approval with Modification, Drilling Work Plan for Regional Aquifer Well R-62, Los Alamos National Laboratory (LANL), dated 12/8/2010.

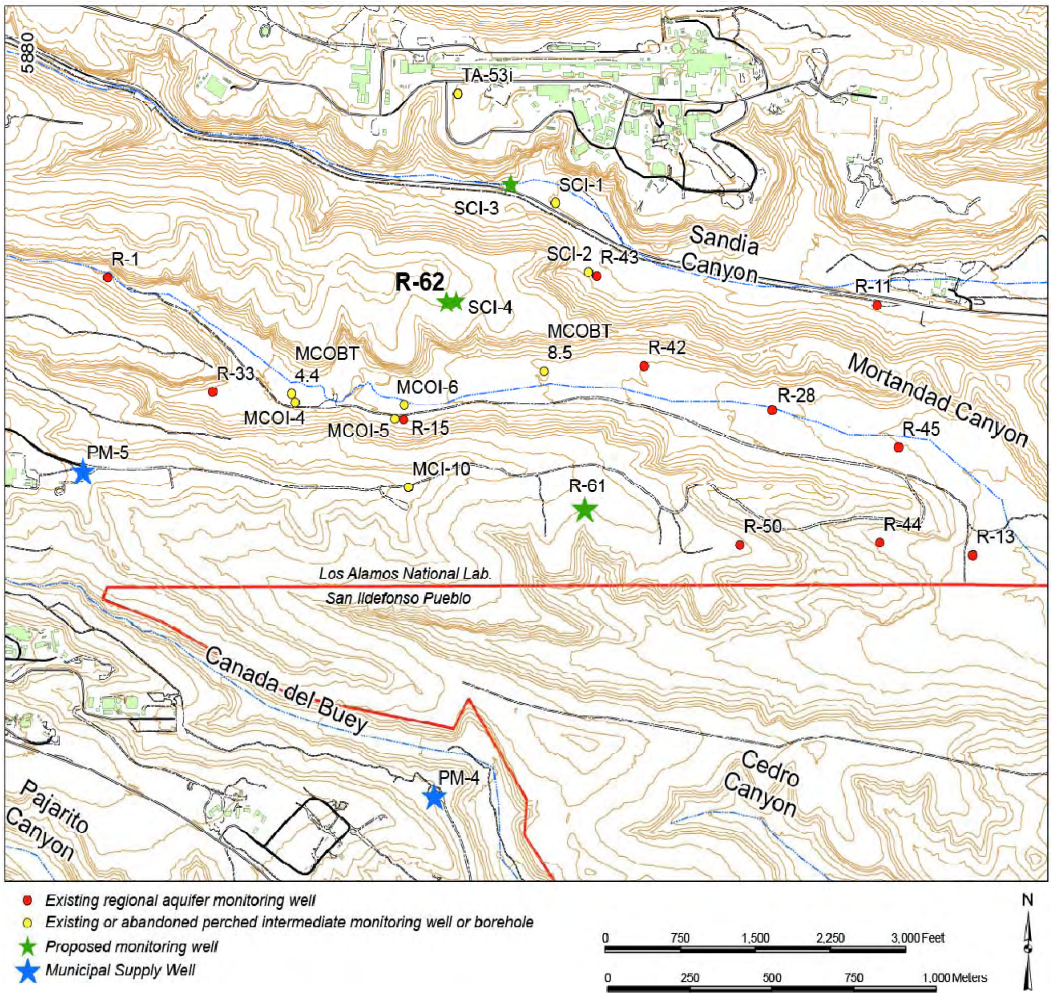

Figure 1-1. Well R-62 Site Location.

1.2 Access Control

Access to the R-62 drill site in TA-05 is located at the eastern termination of Eniwetok Road off Diamond Drive in TA-60. The site is located on DOE property; therefore, personnel working at R-62 shall wear a LANL badge.

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For R-62, all drilling, well installation, well development activities will occur at the drill site. Support activities will occur at the Pajarito lay-down yard located immediately north of the junction of Pajarito Road and State Route 4 just west of White Rock. Drilling, well installation, and lay-down yard support activities fall outside the Pajarito Road Security Corridor. The primary route between the site and the lay-down yard is the Truck Route (East Jemez Road to State Route 4) through White Rock. An alternate route is the Pajarito Corridor. Personnel traveling the Pajarito Corridor will need to have a current LANL badge.

All field activities will be coordinated through the LANS Subcontract Technical Representative (STR) and Eberline Services. Prior to onsite work, the STR will notify the plan-of-the-day. Weekend, after hour work, and canine unit security checks will also be coordinated through the STR. All field activities will be conducted using a 2 person, 2 methods of communications rule, and shall follow current Corrective Actions Program (CAP) communication policy.

During business hours, contact the TA-64 Operations Center (665-2824 or CAP radio).

- Upon arrival at the site;
- Every two hours during the shift;
- If any personnel leaves the site during the shift; and
- When all personnel depart the site at the end of the shift.

For weekend or after-hours work, the site representative will contact the STR, Shift Operations Manager (SOM), or designee.

1.3 Security Requirements

All personnel working at the R-62 site will receive a LANL badge through Eberline Services. Personnel will be trained on the computer-based initial and annual security refresher and Environmental Management System (EMS).

Pursuant to Notice 184.1, *Requirements for Photographic Activities at LANL*, or current direction, photography on site will only be performed by LANL personnel. Company cellular telephones and CAP radios will be the primary methods of communication. Personal cellular telephones are allowed for emergency use. See the Eberline Services Environment, Safety, and Health (ES&H) Plan for the approved security plan.

NOTE: LANL's Associate Director for Environment, Safety, Health, and Quality (ADESH&Q) issued a Standing Order, Personal Cell Phone Requirements, effective 03/01/2010, that states "Workers must ensure that Bluetooth and Wi-Fi capabilities are disabled when personal electronics are at LANL."

1.4 Roles and Responsibility

Table 1-1 presents the contact information for the project.

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Table 1-1. Roles, Responsibility, and Contact Information

Role	Responsibility	Personnel	Company	Contact Information
Shift Operations Manager (SOM)	Approve and Release Field Work	Steve Pearson Stephen Maze	LANS LANS	(505) 667-3005 (505) 500-6359
Project Leader (PL)	Program Management	Ted Ball	LANS	(505) 699-8403
Drilling Subject Matter Expert (SME)	Technical Support	Mark Everett	LANS	(505) 231-6002
Subcontract Technical Representative (STR)	Interface between LANS and Eberline Services	Robin Reynolds Dave Anderson Marvin Gard	LANS LANS LANS	(505) 699-1945 (505) 699-4020 (505) 412-9694
Project Manager (PM)	Eberline Services Project Management (Acting)	Barbara Everett	Kleinfelder	(505) 280-1079
Drilling Supervisor (DS)	Field Site Manager, Person in Charge (PIC)	Bernie Bockisch	Kleinfelder	(505) 401-1955
Yellow Jacket Operations Manager	Supervise drilling and well construction	Vern Christiansen	Yellow Jacket Drilling (YJD)	(602) 471-0796
ES&H Professional	Site Safety and Health	Jim Shiley	Eberline Services	(317) 506-1310
ES&H Representatives	Shift supervision: environmental safety and health (ES&H), onsite waste management and Quality Assurance (QA)	Elmer Alcon Paula Jaramillo Heather Smith	Eberline Services Navarro	(505) 412-1626 (303) 807-7704
Lead Field Geologists	Shift supervision: drilling and well construction, alternate PICs	Dave Mazzanti Courtney Vallejo David Neidigh Jon Marin	Kleinfelder Kleinfelder Kleinfelder Eberline Services	(602) 721-6895 (505)344-7373 (602) 763-9091 (505) 946-7771
Drill Operators	Operate drilling equipment	Arnold Lamon Marion Phillips	YJD YJD	(480) 766-3355 (602) 326-1521

2.0 CONDUCT OF OPERATIONS

The LANL (or Laboratory) *Conduct of Operations Manual* (ISD 315-1.1) will be followed during drilling and well construction for regional aquifer well R-62 at TA-05 to ensure that notification and investigation of abnormal event(s) proceed through clear lines of organization and communication. Conduct of Operations will be performed in accordance with Environmental Programs-Environment and Support Services Division (EP-ERSS)–Standard Operating Procedure (SOP) 5018, *Integrated Fieldwork and Planning*. Attachment 2 “Integrated Fieldwork and Planning Checklist,” item 4 “Conduct of Operations” requires that for non-nuclear facility or activity, chapters 1, 4, 6, 7, and 9, from LANL’s *Conduct of Operations Manual* (ISD 315-1.1) be addressed.

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2.1 Chapter 1—Operations Organization and Administration

Facility Operations Director (FOD)—The FOD provides organizational leadership for Maintenance, Operations, Environmental Safety Health and Quality (ESH&Q), Waste Services, and Engineering. The FOD has the role of coordinating the efforts of these managers to ensure that all facility and programmatic activities are performed in a safe and compliant manner.

Shift Operations Manager (SOM)—Person responsible for all aspects of facility operation, personnel and equipment safety, nuclear and industrial environmental protection, maintenance, quality assurance, radiation and contamination control, and employee training. The SOM reports to the FOD.

Subcontract Technical Representative (STR)—The Los Alamos National Security (LANS) person assigned to the project that has overall responsibility for the Subcontractor's execution of the project. The STR ensures controls are in place and that work is conducted safely. The STR receives work authorization from the SOM and provides direction to the Eberline Services Project Manager and Field Team.

Eberline Services Project Manager (PM)—The Eberline Services person assigned to the project that has overall responsibility for the execution and performance of the project. The PM ensures controls are in place and that work is conducted safely. The PM receives work authorization from the STR, provides direction to and compiles performance reports from the Eberline Services Field Team.

Eberline Services Field Team—Personnel that execute the work. The Field Team consists of Eberline Services or teaming partner Kleinfelder personnel in the following roles: Drilling Supervisor, Field Geologists, Environmental Safety, and Health (ES&H) Representatives, and Waste Technicians. The Field Team also includes lower-tier subcontractors including Yellow Jacket Drilling, Schlumberger, Inc., and David Schafer and Associates.

Drilling Supervisor (DS)—Person who has authority and responsibility for overall work including validation, coordination, pre-job briefings, execution, and closeout. The DS is not site-specific and will oversee work at multiple sites. The DS will take emergency action as necessary to prevent or mitigate the consequences of an abnormal event and place the facility in a safe, stable condition following the event. The DS is the primary onsite interface with the LANS STR and TA-64 operations personnel, receives direction from and reports to the PM, and coordinates team members including subcontractors to execute the work. The DS receives daily reports from the field site and finalizes daily reports, well fact sheets, and well completion reports for submittal to the STR.

ES&H Professional—Person who is responsible for task order health and safety and develops the Project-Specific ES&H Plan and Integrated Work Document (IWD). The ES&H Professional is not site-specific and will oversee work at multiple sites. The ES&H Professional is the primary Task Order interface with LANS Industrial Hygiene (IH) personnel, and receives direction from the PM.

ES&H Representatives—Person who is responsible for onsite health and safety and administers the Project-Specific ES&H Plan and IWD. The ES&H Representative oversees site health and safety including training documentation, daily/shift tailgate safety meetings, inspections, onsite briefing of new team members, and subcontractor health and safety performance. The ES&H Representative documents all health and safety-related issues, events, incidents, and accidents. The ES&H Representative is the

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primary onsite interface with LANS Industrial Hygiene (IH) personnel, and receives direction from the ES&H Professional.

Field Geologists (FGs)—Personnel who have authority and responsibility for site-specific work including compiling a daily report documenting operations, events, issues and discussions. The FGs are the onsite personnel responsible for compiling a field geologic log, collecting samples, and supervising well completion including installation, development, and surface completion. The FGs are the primary onsite interface with LANS groundwater technical personnel and are responsible for compiling t for well fact sheets and completion reports. The FGs receive direction from the PM and DS. The FGs provide copies of the field logbook and the driller's logs to the DS on a daily basis.

Waste Technician—Person who is responsible for onsite waste management and administers the LANS Waste Characterization Strategy Form (WCSF). The Waste Technician is not site-specific, documents waste-related events, issues, and spills, and performs container labeling, sampling, and management. The Waste Technician is the primary onsite interface with the CAP's Waste Management Coordinator (WMC) and receives direction from the PM and DS.

LANS Support Groups—LANS support groups include personnel to provide expertise in areas such as Radiological Controls (Radiation Protection [RP-1]), Industrial Hygiene (ESH&Q), and Engineering. These persons meet the training requirements for their respective organization. Members of the support group provide services as requested by the SOM and STR.

2.2 Chapter 4—Communications

The R-62 Project Organization Chart is shown on Figure 2-1; contact information is listed in Table 1-1. Both will be posted onsite.

The minimum required management oversight will be:

- SOM; and
- STR.

The minimum onsite Eberline Services field team for high hazard operations (drilling, well completion) will be:

- FG;
- ES&H Representative; and
- Task-specific subcontractor.

The minimum onsite Eberline Services field team for low-hazard activities (development, aquifer testing, surface completion) will be:

- FG; and
- Task-specific subcontractor.

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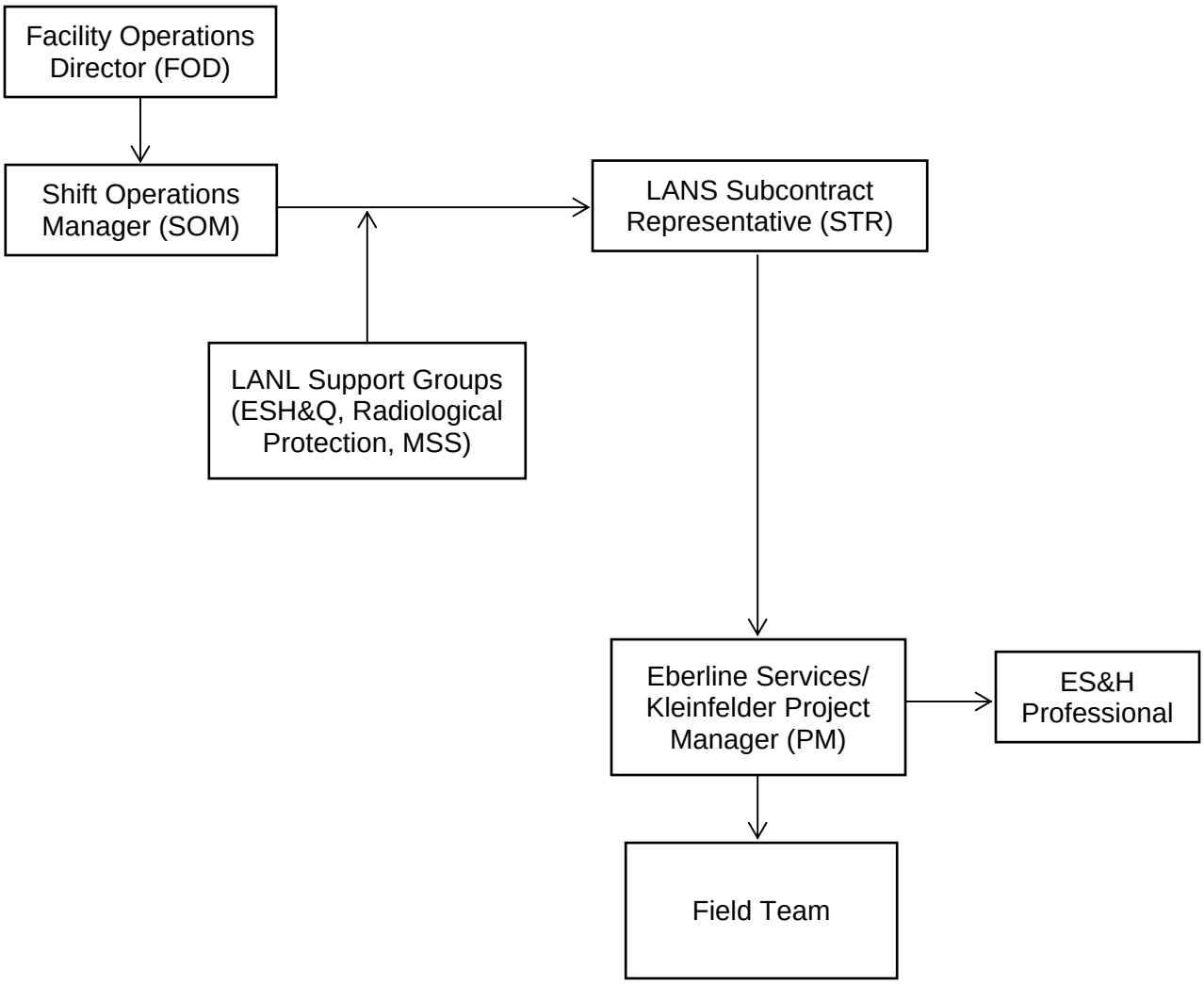

Figure 2-1. Project Organization Chart for Subcontract No. 89795-002-11

2.3 Chapter 6—Investigation of Abnormal Events

The investigation of abnormal events, if needed, will follow guidance provided in the *LANL Conduct of Operations Manual* (ISD 315-1.1).

2.4 Chapter 7—Notifications

The incident notification flowchart (Figure 2-2) will also be posted on site. The LANS STR is the focal point of contact (POC) of all communication between the Contractor and Eberline Services Management and Team.

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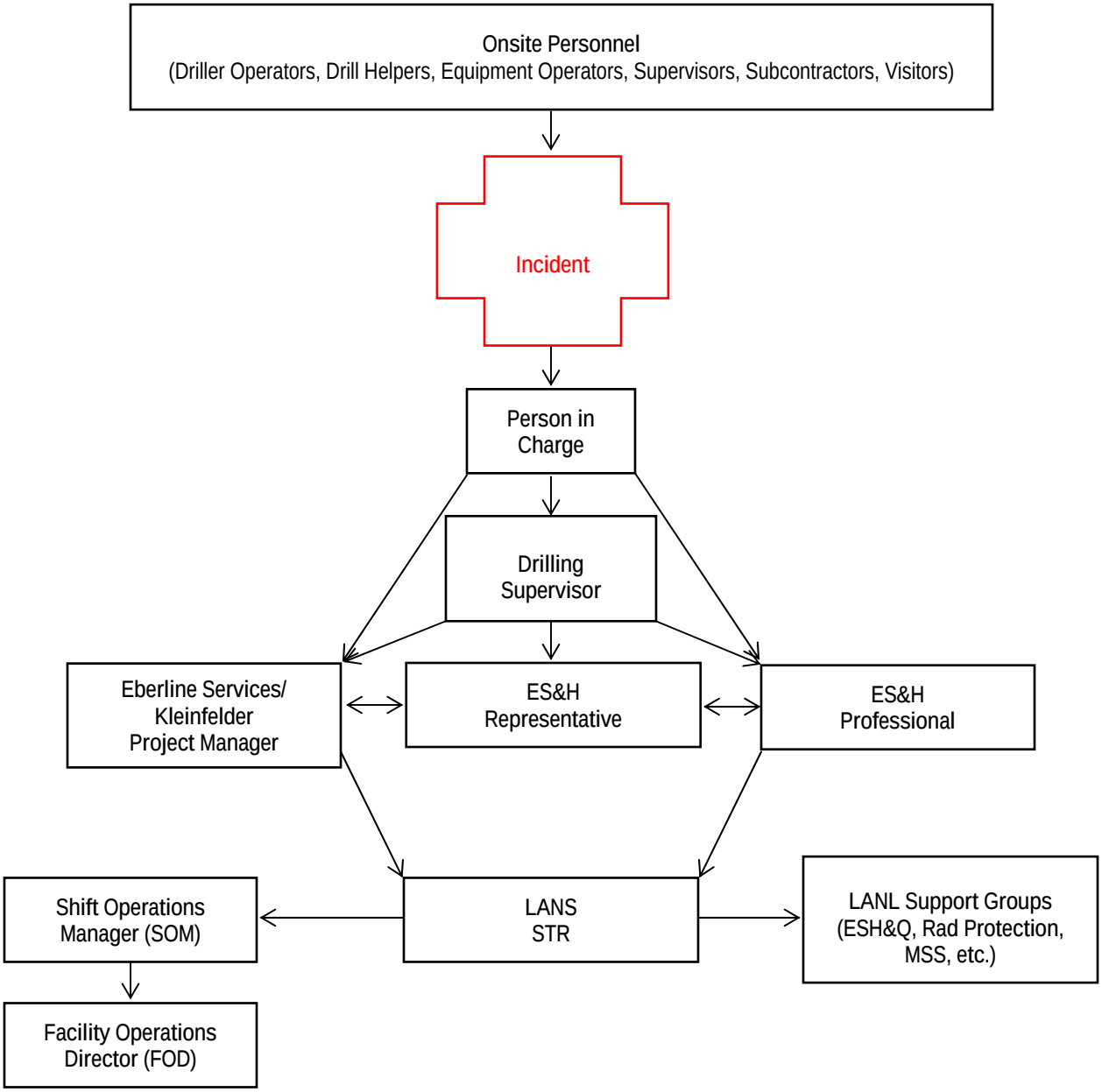

Figure 2-2. Incident Notification Flowchart for Subcontract No. 89795-002-11

2.5 Chapter 9—Lockout and Tag-out

Lockout and tag-out (LOTO) are not anticipated for the R-62 project. However, if needed, LOTO activities will adhere to Eberline Services' ES&H Plan.

3.0 SCOPE

Within TA-05, regional aquifer well R-62 will be located approximately 1000 feet north-northeast of R-15 in Mortandad Canyon, and 1000 feet west-southwest from R-43 in Sandia Canyon (Figure 1-1). The primary Data Quality Objective (DQO) of regional aquifer well R-62 is "to monitor water quality in the upper part of the regional aquifer and to define the western extent of chromium contamination known to exist in the vicinity of wells R-28, R-42 and R-50", Drilling

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Work Plan for Regional Aquifer Well R-62, Los Alamos National Laboratory (LANL), submitted to NMED, October 29, 2010 and approved with modification by NMED, 12/8/2010.

The R-62 borehole is expected to penetrate the top of regional saturation at a depth of approximately 1,138 ft within Miocene pumiceous sedimentary deposits. The target borehole depth is set at approximately 1,305 ft in Miocene riverine deposits. It is planned that the well will be completed with two well screens. The well is due to be NMED Complete (as described in the Consent Order) on August 19, 2011. The borehole will be drilled and the well installed on a 7 day per week/24 hour per day schedule.

3.1 Site Preparation

LANS has constructed the drill pad and a one-lane all-weather access road from the termination of Eniwetok Road. All personnel must contact the TA-64 Operations Center (665-2824 or CAP radio) prior to travelling on the R-62 access road.

The approximate layout of drilling, support equipment, and traffic plan at the R-62 well pad is illustrated on Figure 3-1.

3.2 Water Use and Water Storage

Water and foam (where necessary) will be used as a drilling fluid to a depth no greater than 100 feet above the regional aquifer water table anticipated to be 1,138 ft below ground surface (bgs). Drilling performed below this depth will use only potable water. Municipal water will be obtained from a hydrant located near the asphalt batch plant at the end of Eniwetok Road. A backflow preventer will be supplied by LANL.

Groundwater and drilling fluid mixed with drill cuttings will be contained in a lined retention pond constructed by LANS. Groundwater produced by well development and aquifer testing will be contained in 21,000-gallon portable “frac” tanks staged on the drill pad. It is estimated that two frac tanks will be required for containment.

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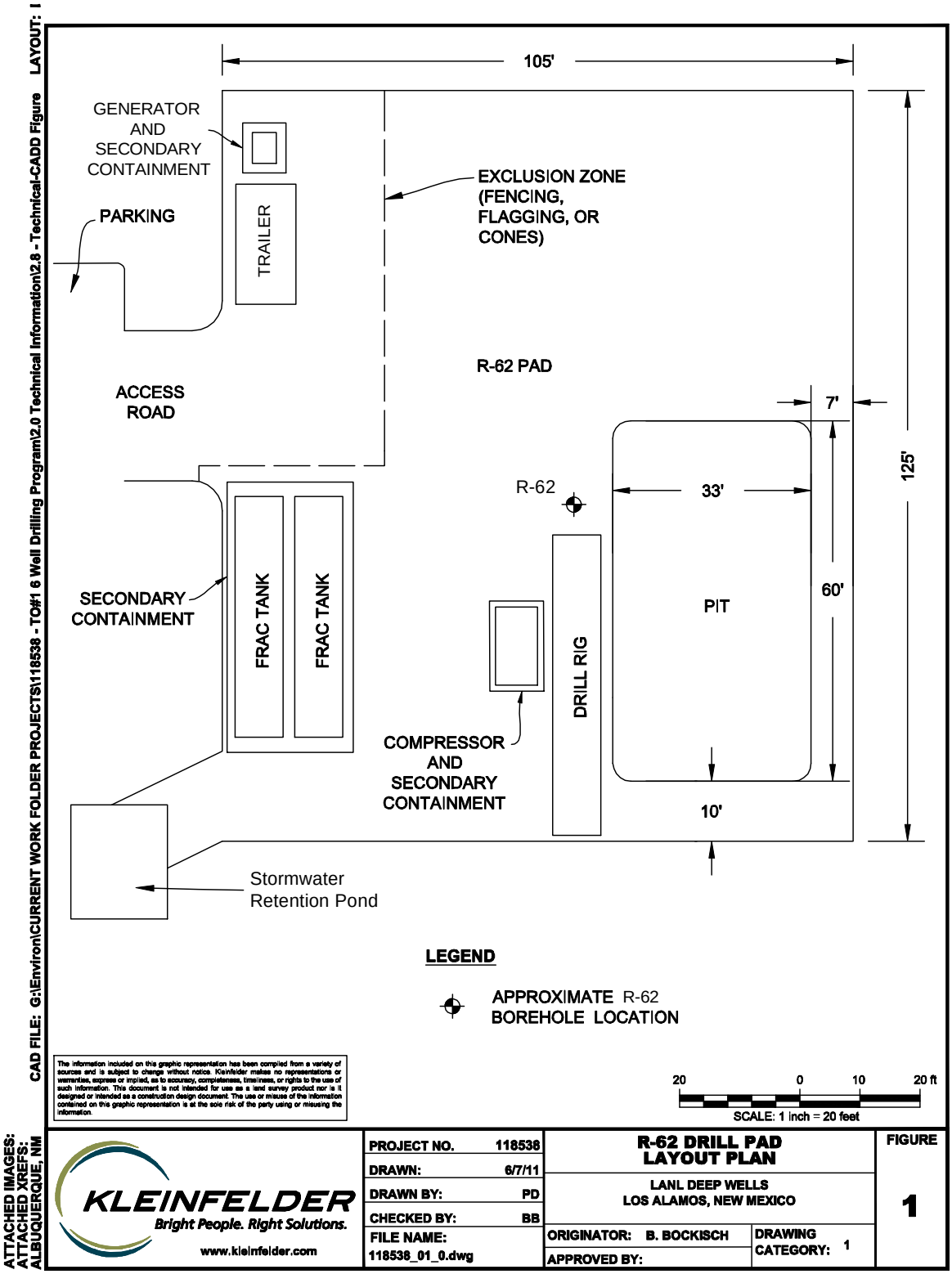

Figure 3-1. Well R-62 Site Layout.

3.3 Drilling Methods

The primary drilling equipment to be used will be a Model Year 2011 Foremost™ DR24HD drill rig and reverse circulation drill pipe. Depending on borehole stability, the primary drilling methods will be fluid assist open borehole or dual rotary casing advance.

Using the open borehole drilling method, if possible, a 20-inch diameter steel surface conductor casing will be installed to approximately 40 ft bgs. Following well construction, the surface casing will either be removed or cemented in place pursuant to the NM Office of State Engineer (NMOSE) requirement.

Below the surface casing, fluid assisted open borehole drilling using reverse circulation drill pipe will be used as deep as possible. The best case scenario would be to drill the borehole open to the projected total depth (TD) of 1305 ft bgs. However, drilling to install wells in the regional aquifer on the Pajarito Plateau typically requires the use of retractable steel casing to ensure that borehole stability does not compromise the well. Also, steel casing may be used to seal off perched intermediate water zones, if required. Within the 20-inch surface casing, telescoped casing strings may be 16-inch, 12-inch, or 10-inch diameter, if required.

When required by borehole conditions, welded steel casing will be installed to hold back formation subunits prone to sloughing or seal off perched intermediate groundwater, if encountered in sufficient quantity or hydro-geologic characteristics. In particular, two depth intervals above the Cerros del Rio Basalt, predicted to be encountered at 644 ft bgs, may require switching from open borehole to casing advance drilling. 1.) The Tsankawi Pumice Bed and underlying volcaniclastic sedimentary deposits of the Cerro Toledo Interval (approximately 177 ft to 231 ft bgs), and 2.) The Guaje Pumice Bed and underlying sedimentary deposits of the Puye Formation (approximately 589 to 644 ft bgs). The predicted stratigraphy for well R-62 is shown in Figure 3-2 (Drilling Work Plan for Regional Aquifer Well R-62, Los Alamos National Laboratory (LANL), submitted to NMED, October 29, 2010 and approved with modification by NMED, 12/8/2010).

Perched intermediate groundwater occurs within the Puye Formation atop the Cerros del Rio volcanic series at wells SCI-1 and TA-53i in and north of Sandia Canyon and at wells MCOI-4 and MCOBT-4.4 in Mortandad Canyon (Figure 1-1.) The saturated thickness of these perched zones ranged from a few feet to approximately 25 feet. Perched-intermediate groundwater also occurs within fractured lavas and interflow breccias in the lower part of the Cerros del Rio volcanic series at well SCI-2 in Sandia Canyon and at wells MCOI-5. MCOI-6, and R-15 in Mortandad Canyon (Figure 1-1). The saturated thicknesses of these perched groundwater occurrences ranged between 20 feet and 110 feet (Drilling Work Plan for Regional Aquifer Well R-62, Los Alamos National Laboratory (LANL), submitted to NMED, October 29, 2010 and approved with modification by NMED, 12/8/2010).

For previous drilling on the Pajarito Plateau using traditional circulation drill pipe, significant fluid loss has occurred within the porous Guaje Pumice Bed and fractured intervals of the Cerros del Rio Basalt. However, using reverse circulation drill pipe will potentially mitigate circulation loss and may allow open borehole drilling through these intervals.

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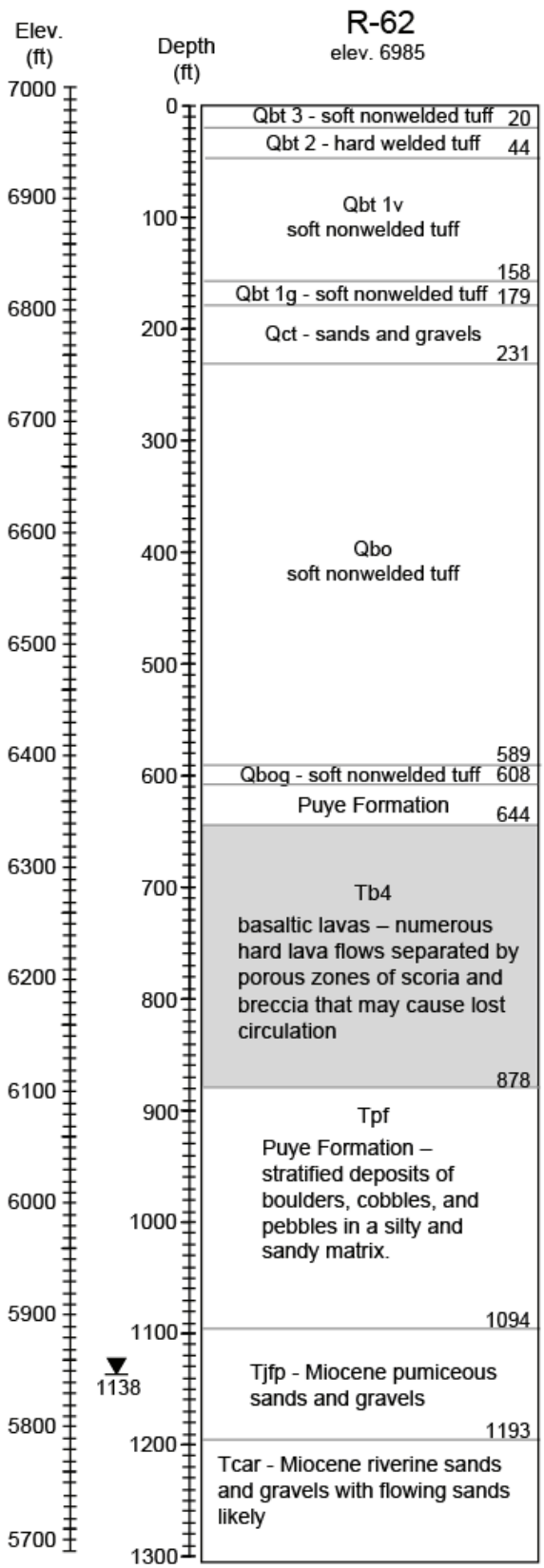

Figure 3-2. Predicted Stratigraphy for Regional Well R-62.

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Based on the Drilling Work Plan for Regional Aquifer Well R-62, Los Alamos National Laboratory (LANL), October 2010, the following drilling fluids and additives are allowed, if needed:

- Potable water
- QUIK-FOAM, a blend of alcohol ethoxy sulfates; and
- AQF-2, an anionic surfactant

If used, the quantities of additive and water will be logged and reported to the LANS STR.

3.4 Dust Control

The access road and pad will be covered with base course gravel so vehicle traffic should generate minimal dust. If dry conditions persist, however, municipal water will be used to suppress any dust emissions.

3.5 Waste Management

Onsite waste management for well R-62 will comply with CAP's Waste Characterization Strategy Form (WCSF) under guidance from CAP's WMC.

3.6 Logging, Sampling, Geophysics

3.6.1 Logging and Cuttings Sampling

Drill cuttings will be collected on five-foot intervals from the cyclone before being discharged into the lined cuttings pit. Approximately two liters of cuttings will be collected from each interval. Splits of the cuttings sample will be washed and separated into the following portions:

- Whole rock (unseived)
- >10 mesh (2.0 mm)
- >35 mesh (0.5 mm)

The unseived portion (approximately ½ of the original amount) will be transferred directly into a labeled eight-inch poly bag and stored in core boxes. A small aliquot from the unseived portion of the cuttings will be composited as a waste characterization sample. The sieved portions will be collected in labeled plastic chips trays. The washed cuttings will be examined for lithologic characteristics to prepare a lithologic log. Cuttings samples (bulk and sieved) will be archived at LANL's Sample Management Office (SMO) by integrating ALB-WI-2.4, *Collection and Preparation of Drill Cuttings,* with EP-ERSS-SOP-12.01, *Field Logging, Handling & Documentation of Borehole Material*, and 12.02, and *Transportation and Admittance of Borehole Materials to the Field Support Facility*. Intervals of no recovery will be represented by empty labeled chip tray slots. Table 3-1 lists planned sampling activities at R-62.

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Table 3-1. R-62 Planned Sampling Activities

Sampling/ Rationale	Method/ Analysis	Container	Frequency	Subsequent Preservation/ Processing
Drill Cuttings				
Logging	Grab/Visual	1 L labeled plastic bag	Every 5 ft depth	Washed/sieved/ whole rock; > 10 mesh; > 35 mesh
Waste	Grab/see WCSF	0.5 L aliquot composited in lined 55-gallon drum	Every 5 ft depth	Waste characterization sampling
Groundwater Screening				
Perched groundwater	Airlift/ Metals/ cations (dissolved), Metals/ cations (total), Anions (including perchlorate)	3-1 L polyethylene bottles	Each occurrence with sufficient volume to sample	Ice/chain-of-custody (C-O-C) to SMO and EES-14
Regional groundwater	Airlift/ Metals/ cations (dissolved), Metals/ cations (total), Anions (including perchlorate)	3-1 L polyethylene bottles	Upon encountering regional aquifer saturation	Ice/C-O-C to SMO and EES-14
Well Development				
Each screen	Pumped/water quality parameters in flow through cell	250 ml beaker	Every 30 minutes during development	Added to development water waste stream # 4
	Pumped/Total Organic Carbon (TOC)	1-40 ml glass vial, 1-250 ml polyethylene bottle	End of each development pumping shift	C-O-C to SMO and EES-14
Rinsate				
Permanent well installation materials (see Section 3.8 below)	Volatile Organic Compounds (VOCs) and Semi-volatile Organic Compounds (SVOCs)	2-40 ml glass vials w/ HCL and 2-1 L amber glass bottles.	Prior to well construction and sampling system installation	Ice/C-O-C to SMO
Waste	See WCSF			

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3.6.2 Groundwater Screening Sampling

The Drilling Work Plan for Regional Aquifer Well R-62, LANL, submitted to NMED, October 29, 2010 states "Groundwater screening samples will not be collected because well SCI-4 will be installed on the same drill pad if perched-intermediate groundwater is encountered at well R-62."

However, the NMED's approval with modification states: "If perched intermediate water is encountered during drilling of well R-62 in volume sufficient for sample collection, the Permittees (LANL) must collect a groundwater screening sample and analyze it for metals and major ions. The preliminary results of the analyses must be provided to NMED within two business days after they become available", NMED Approval with Modification, Drilling Work Plan for Regional Aquifer Well R-62, LANL, 12/8/2010.

The occurrence of perched intermediate groundwater in wells surrounding R-62 is discussed above in Section 3.3. Planned groundwater sampling activities at R-62 are listed in Table 3-1

Methods for groundwater detection may include driller's observations, water-level measurements, borehole video, and borehole geophysics. Whenever perched groundwater is encountered and enough volume is present to sample (approximately 1 gallon), drilling will be suspended and a screening sample will be collected by air lifting through the deployed drill string. If requested by LANL, an alternative method of collecting the screening sample may involve withdrawing the drill string and using a bottom-filling stainless steel bailer.

Groundwater screening samples will be filtered and analyzed at LANL's Earth and Environmental Sciences Division (Group EES-14) wet chemistry laboratory for cations/metals (dissolved and total) and anions including perchlorate (dissolved). For each screening sample collected, the following containers will be submitted to the SMO:

- Metals/cations (dissolved)—1-L poly – unfiltered—not preserved
- Metals/cations (total)—1-L poly – unfiltered—not preserved
- Anions (including perchlorate)—1-L poly—unfiltered—not preserved.

"If perched water is encountered, it may be necessary to seal off the zone before drilling ahead in order to prevent potentially contaminated perched groundwater from entering the regional aquifer," Drilling Work Plan for Regional Aquifer Well R-62, Los Alamos National Laboratory (LANL), submitted to NMED, October 29, 2010 and approved with modification by NMED, 12/8/2010. The method of sealing a perched water zone (e.g., casing, grout, or both) will depend on the amount and head of the water encountered.

3.6.3 Down-hole Geophysics

If significant perched water is encountered, the water will be sampled and the borehole will be advanced to locate the perching horizon. Once the perching horizon has been determined, the drive casing may be retracted to above the water and open borehole geophysical logging may be performed. This may consist of LANS personnel performing down-hole video, gamma, and induction logging. If warranted,

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Schlumberger, Inc. (Schlumberger) may be mobilized to perform the following open borehole logging suite:

- Array Induction Imager (AIT);
- Combined Magnetic Resonance (CMR);
- Natural Gamma;
- Natural Gamma-Ray Spectrometer;
- Accelerator Porosity Sonde (APS);
- Caliper; and
- Formation Microimager (FMI).

Once the borehole reaches total depth (TD), Schlumberger may be mobilized to perform the following geophysical suite through the drive casing:

- Triple Litho-Density;
- Natural Gamma;
- Natural Gamma-Ray Spectrometer;
- Elemental Capture Sonde (ECS);
- Accelerator Porosity Sonde (APS); and
- Thermal and Epithermal Neutrons.

If borehole conditions permit, the drive casing may be retracted to above the regional aquifer water table and Schlumberger may perform the open-borehole geophysical suite listed above. For Schlumberger mobilization to LANL, regardless of whether they bring radioactive logging sources on-site, LANS personnel from Radiation Protection Group (RP) -3 must be notified. If down-hole radioactive source tools are used, RP-1 will perform radiological screening and documentation upon arrival and departure.

Schlumberger will process the geophysical logs and provide a preliminary geophysical-log montage electronically within 24 hours of geophysical logging to aid in well design. Eberline Services will submit three hard copies and one electronic copy of all geophysical logs to the STR within thirty (30) days of logging. A final report from Schlumberger will be included as an attachment in the R-62 well completion report.

3.7 Well Design

The NMED Approval with Modification Drilling Work Plan for Regional Aquifer Well R-62, LANL, 12/8/2010, states that “the Permittees must install well R-62 as a double-screen well, in conformance with the Sandia Canyon Phase II Investigation Work Plan (EP2010-0290), with the upper screen located just below the water table and the lower screen located approximately 100 feet below the upper screen.”

The R-62 well will be a dual screen well constructed of 5.0 in. inside diameter (ID)/5.5625 in. outside diameter (OD), passivated A304 stainless steel casing, well screens, and centralizers. The casing joints and screens are connected using external threaded couplings also made of type A304 stainless steel. Each screen will be 0.020-in. slot, rod-based, wire-wrapped stainless steel in two, 10-foot lengths.

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3.8 Decontamination and Rinsate Sampling

- Using a steam pressure washer, thoroughly decontaminate all well screens, casings, couplers, and centralizers before use. Wrap in plastic if not immediately used to construct the well.
- In accordance with LANS' WCSF for R-62, segregate decontamination water from drilling fluids and development water in different containers.
- Decontaminate the following components and collect a rinsate sample:
  - Pump;
  - Pump shroud;
  - Pump cable;
  - Bennett pump assembly;
  - Discharge pipe;
  - Transducers and cable;
  - PVC transducer tubes;
  - Tube from transducer tube to lower zone;
  - Pressure washer discharge sample;
  - Access port valve (APV) upper;
  - APV lower;
  - Packer; and
  - Liquid inflation chamber.
- Identify analyses to be conducted (often volatile and semi-volatile organic compounds), obtain sample bottles and chain of custody paperwork. Obtain field, equipment, and trip blank containers in accordance with ALB-WI-2.7, *Field Quality Control Samples*. At a minimum assume that one of each blank sample type (field, equipment, and trip) will be collected during each sampling system rinsate sample collection event.
- Decontaminate materials by hot water/steam pressure washing with LiquiNox® detergent and potable water in accordance with ALB-WI-2.6, *Field Decontamination of Equipment*.
- Collect rinsate samples following decontamination. If rinsate samples are not collected during the same shift, after decontamination wrap components in plastic and place on wood cribbing.
- If rinsate samples are collected immediately following decontamination, place components on wood cribbing. If the components were wrapped in plastic following decontamination, collect rinsate samples either after the components are unwrapped, or after the components are unwrapped and placed onto wood cribbing

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- Collect rinsate samples by pouring deionized water over component and collect in Pyrex or stainless steel bowl that has been pre-cleaned. Continue to pour water over sampling system component until sufficient water is collected in the bowl to fill two 1-liter and two 40-ml containers.
- Transfer homogenized sample into appropriate sample containers
- Document collection process. For example:
  - Rinsates were collected from the drop pipe by pouring deionized water over the drop pipe and threads, and by pouring deionized water through the drop pipe. As the water was being poured over the drop pipe, the rinsate was collected in the bottle/vial by the sampler as the water washed over the component. As the water was being poured through one end of the drop pipe, the rinsate was collected in the bottle/vial by the sampler as the water poured out the opposite end.
- Submit samples, notes, and sample paper work to the SMO.

3.9 Well Installation

3.9.1 Well Construction

The R-62 well will be documented by a Well Fact Sheet (Master Task Ordering Agreement (MTOA) Exhibit D Section 3.21.1) and in the Well Completion Report (Exhibit D, Section 3.21.2). Well screen and casing will be continuously suspended from the borehole collar and not allowed to rest on the bottom of the borehole during well construction and casing withdrawal.

Each component of the well will be documented. A 10-foot stainless steel sump, including a threaded end cap, will be positioned below the lower well screen. Centralizers will be positioned on the well casing below and above each well screen so that the placement of the filter pack, overlying bentonite seal, and annular grout will not be hindered.

If possible, 20-foot of drive casing and each joint of tremie pipe will be retracted prior to installing the annular fill for that section of the borehole. However, due to special conditions, (e.g., borehole slough or installing annular fill near a screen), shorter intervals of casing and tremie pipe may be removed. This is to minimize the introduction of suspended bentonite into the screens. All annular fill materials will be installed through a tremie pipe using potable water. For a specific depth interval, the actual amount of annular fill materials installed will be compared to calculated volumes. Two methods of measuring annular fill depths may be used; a plastic wire tape with a heavy sounding rod at the end, or the tremie pipe. Each measurement will be recorded and any discrepancies will be resolved prior to adding additional fill material.

From the borehole TD to five ft below the lower screen, the borehole will be backfilled with a bentonite seal consisting of 100 percent bentonite chips transported down-hole by the tremie pipe and potable water. The seal will be allowed to cure for a minimum of 4 hours. A similar bentonite seal will also be installed from 5 to 10 feet below the upper screen. Prior to installing the filter pack around each screen, the depth of the cured bentonite seal will be measured and documented to ensure that the top of the seal is at least five feet below the screen. The well screen filter pack will consist of 10/20 sand from five feet below to five feet above each well screen.

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A two-foot interval of finer 20/40 sand will be used to provide a transition zone between the 10/20 sand and bentonite seals positioned above the screens. Prior to installing the transition sand, the depth to top of the filter pack will be measured and the screen will be swabbed for 30 minutes to settle the filter pack material. After swabbing, the measurement will be repeated and more filter pack material added, if necessary. The 10/20 sand filter pack will extend a minimum of five feet above each screen and the 20/40 transition sand will be installed.

The bentonite seal above the transition sand will be 5 feet in length and consist of 100 percent bentonite chips transported downhole by the tremie pipe and potable water. The 5-foot seal will be allowed to cure for a minimum of one hour.

Based on the final well design approved by NMED, the remainder of the well annular space will be backfilled with bentonite chips, grout slurry, or cement. The final well design will contain the type and depths of annular material. If borehole stability permits, lifts greater than 20 feet may be used to accelerate backfilling using bulk materials (e.g., supersacks). The completion of well backfilling constitutes NMED Complete in accordance with the NMED Consent Order.

3.9.2 Well Development

Development of the R-62 well screens will begin no sooner than 24 hours after NMED Complete. The primary objectives of well development are to remove a volume of water equivalent to that introduced during drilling and well construction, and remove suspended sediment or drilling additives, if used, until turbidity is less than five nephelometric units (NTUs) and total organic carbon (TOC) is less than 2.0 parts per million (ppm). Additional water quality parameters to be measured during development include pH, specific conductance, dissolved oxygen, temperature, turbidity, and oxidation-reduction potential (ORP). All water quality parameters will be measured using a flow-through cell. For each screen, the rate of development pumping will be adjusted to ensure that drawdown within the filter pack is prevented, or that maximum saturation of the filter pack is maintained. Water will be collected daily in 40-ml septum vials and 250-ml poly bottles and submitted to the SMO with chain-of custody. Samples will be submitted unfiltered and without preservative. The SMO will enter the samples into LANL's sampling database and prepare the required documentation for analysis at LANL's EES-14 wet-chemistry laboratory. Eberline Services will assist the SMO to facilitate expedited delivery of the samples to EES-14. If practicable, the EES-14 chemist will provide TOC results to the STR within 24 hours.

The development will begin by bailing and swabbing the screened intervals and sump to remove any bentonite, drilling additives (if used), formation sands and fines introduced into the well during drilling and well construction. Bailing will continue until water clarity visibly improves. Bailed water and suspended sediment will be added to the cuttings pit.

After bailing, the screened intervals will be swabbed using a surge block to enhance filter pack development. The surge block consists of a 5-in.-OD, 1-in. thick rubber disc attached to static rods. The swabbing tool will be lowered into the well and drawn repeatedly across each screened interval for approximately one hour. Water turbidity will not be measured during the bailing and swabbing process.

A four-inch-diameter Grundfos™ submersible pump, with an appropriately sized pump motor, will be used for the final stage of developing each screen. Wiring

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connections that will be submerged must be water-proof and a representative example inspected by the LANS-provided electrician. All hard-wire connections to the development pump generator must be performed by the LANS electrician. The submersible pump used during development will be a larger unit capable of moving larger volumes (15 to 20+ gallons per minute [gpm]) than the pump installed for the dedicated sampling system. However, the development pumping must not dewater the screen. During pumping development of the upper screen, draw-down in the well will be monitored using a depth to water meter and the flow rate will be adjusted to prevent the filter pack from exposure to air.

For developing the lower screen, the pump will have an inflatable packer installed above it to separate the two screened intervals. For developing the upper screen, a TAM™ packer or inflatable packer will be deployed between the screens.

3.9.3 Aquifer Testing

Once all development activities are complete, a constant-rate pumping test will be performed on each screen in accordance with ALB-WI-2.21, *Pump Testing*. Aquifer testing will be conducted by David Schafer and Associates under the direct observation of an Eberline Services team geologist. Results of the aquifer testing will influence sampling system design and be included in the well completion report.

Prior to performing the pumping test on each screen, two days of pre-test background data (water level and barometric pressure) will be collected using non-vented pressure transducers, and one day will be required to optimize the pumping rate for adequate draw-down, collect additional pre-test background data, and fill the discharge pipe. A four-inch-diameter Grundfos™ or comparable submersible pump with appropriately sized motor and appropriate non-vented transducers will be used for the pumping tests. The discharge pipe will have check valves every 200 feet.

For testing the lower screen, the pump will have an inflatable packer installed above it to separate the two screened intervals. For testing the upper screen, a TAM™ packer will be deployed between the screens and an inflatable packer will be positioned above the pump to reduce casing storage effects. Each screen in the R-62 well will be pumped at a constant rate for 24 hours followed by the collection of 24 hours of water level recovery data.

The well completion report will contain an evaluation of the data collected during the pumping tests. The results will include estimates of aquifer transmissivity, storativity, and any data suggesting vertical anisotropy or the potential for vertical mixing.

3.9.4 Sampling System

The sampling system for the R-62 well will be designed based on data collected from the pumping tests. Installation of the sampling system will be in accordance with ALB-WI-2.20, *Baski Dual-Screen Pump Sample System*. Generally, the sampling system will contain an appropriately sized Grundfos™ submersible pump retrofitted with Teflon™ and Vitron fitted Franklin™ submersible motor. Eberline Services will submit the sampling system design to LANL personnel for approval. The design will be stamped by a licensed New Mexico Professional Engineer (PE).

If possible, the sampling system will provide approximately one to three gpm of water flow from each screen at the ground surface. All components of the pump column will be new and decontaminated prior to installation. Rinsate samples of decontamination

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water will be collected. The discharge pipe will consist of one-inch-diameter schedule 80 stainless steel, pickled and passivated. To measure potentiometric head in each screen, one-inch ID schedule 80 polyvinyl chloride (PVC) pipe access tubes will be installed to deploy dedicated transducers to appropriate depths. The bottom of the PVC pipes will be capped and the bottom six inches of the PVC pipes will be slotted.

Specifications of the dedicated transducers are the following:

- Model: *in situ* LevelTroll® 500
- Pressure Rating: 15 psi or 30 psi
- Memory Capacity: 1MB, 100,000 data points
- Accuracy: 0.1% Full Scale or better
- Vented versus Non-Vented: Vented/compensated
- Temperature Sensor: Required, included with LT 500, accuracy of 0.1ºC or better
- Cable type: Vented Tefzel
- Extra cable length: 8 to 10 feet
- Cable Connector: Twist lock at both ends
- Transducer tube diameter: One-inch inside diameter minimum

3.9.5 Surface Completion

The wellhead completion will be in accordance with ALB-WI-2.12, *Surface Completion*. The completed well will include a steel outer protective casing to protect the stainless steel monitoring well. The wellhead completion will be a stick-up configuration with an overall height including the riser cap of approximately 3 ft 6 in. A weep hole will be installed to prevent water buildup inside the protective casing. The top of the protective casing will be fitted with a tamper-proof well cover plate provided by LANL, and will be set in a 10’ × 10’ x 6-in.-thick, reinforced, 2,500-psi concrete pad. A brass survey monument, imprinted with well identification information, will be placed in the northwest corner of the pad. A total of four bollards, painted yellow for visibility, will be set at the outside corners of the pad to protect the well from traffic. All four bollards will be designed for easy removal to allow access to the well. A permanent weather-resistant pump control box, provided by Eberline Services according to LANL design, will be installed by LANS on the well pad.

A New Mexico licensed Professional Land Surveyor will survey the well location and elevation. Survey points will include: ground surface elevation, a reference point on the sample discharge tubing (pump column), the top of the well casing, and the top of the protective casing. The accuracy of the survey data will be in accordance with the NMED Regulations and LANL procedure. Survey data will be submitted to the LANS STR and included in the R-62 well completion report.

3.10 Site Restoration

Site restoration will conform to the requirements of the LANS Storm Water Pollution Prevention Plan (SWPPP) and be performed by LANS. The access road and central drilling pad will be left in place to facilitate well sampling and maintenance. The drill pad will be reduced by approximately 60 percent during site restoration. The cuttings pit will be backfilled and ground surface re-contoured. If drill cuttings are determined to be

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applicable for land disposal, cuttings in the pit will be compacted and covered by reclaimed base course gravel. In addition, excess cuttings for land disposal will be spread and compacted on the road and also covered by reclaimed base course gravel.

3.11 Elevated Fire Restrictions

Working at the R-62 well within elevated fire restriction shall comply with the Eberline Services Fire Hazard Protection Plan approved by LANS.

3.12 NPDES Storm Water Permit and Compliance

LANS has permitted the drill-pad and access-road construction under a Common Plan of Development for ER Projects. Stand alone drilling activities are not required to be permitted under LANS's Construction General Permit. Eberline Services will be provided a copy of the approved Storm Water Pollution Prevention Plan (SWPPP) for field implementation and on-site management.

3.13 Equipment Decontamination

Prior to setting up on the well site, the drill rig and down-hole tools will be surveyed by LANS Radiological Control Technicians (RCTs) to document that no radioactive materials are introduced onto LANL property. Fantastik™ and paper towels may be used to remove any soils or detected contamination. Prior to use, bailers for groundwater sampling will be decontaminated using LiquiNox™ or equivalent mixed with potable water and rinsed with deionized water. Decontamination liquids will be managed as Investigation-Derived Waste (IDW).

Prior to demobilizing from LANL property, equipment will be re-surveyed by a LANS RCT to document that no radioactive materials are leaving LANL property.

4.0 SCHEDULE

The project schedule is provided in Table 4-1.

Table 4-1. Schedule

Activity	Start Date	End Date
Readiness Review	7/14/2011	7/21/2011
Mobilization	7/21/2011	7/24/2011
Drilling	7/25/2011	8/7/2011
Geophysical Logging	8/7/2011	8/9/2011
Well Installation	8/10/2011	8/19/2011
Well Development	8/20/2011	8/27/2011
Aquifer Testing	8/28/2011	9/11/2011
Install Pump/Sampling System	10/12/2011	10/15/2011

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Activity	Start Date	End Date
Test Sampling System	10/15/2011	10/23/2011
Well Acceptance	10/24/2011	10/24/2011

5.0 REFERENCES

ALB-WI-2.4, *Collection and Preparation of Drill Cuttings.*

ALB-WI-2.6, *Field Decontamination of Equipment.*

ALB-WI-2.7, *Field Quality Control Samples.*

ALB-WI-2.12, *Surface Completion.*

ALB-WI-2.14, *Well Development.*

ALB-WI-2.20, *Baski Dual-Screen Pump Sample System.*

ALB-WI-2.21, *Pump Testing.*

Eberline Services, Inc. *Health and Safety Plan for Field Operations*, HSP-FO-01, Draft 1, Rev. 3, May 2011.

EP-ERSS-SOP-5018, *Integrated Fieldwork and Planning*.

EP-ERSS-SOP-12.01, *Field Logging, Handling & Documentation of Borehole Material.*

EP-ERSS-SOP-12.02, and *Transportation and Admittance of Borehole Materials to the Field Support Facility*.

Environmental Programs (EP), Waste Characterization Strategy Form (WCSF), *R-62, TA-05, East End of Sigma Mesa Installation of Regional Aquifer Well*, EP-2011-0178, May 6, 2011.

IMP 313.4—Roles*, Responsibilities, Authorities, and Accountability*.

ISD 315-1.1—*Conduct of Operations Manual*.

Notice 184.1—*Requirements for Photographic Activities at LANL*.

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