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Groundwater Protection Program Plan 2007 Update

Prepared by the Environmental Programs Directorate

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Groundwater Protection Program Plan
2007 Update

September 2007

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Acronyms and Abbreviations

AOC	area of concern
CFR	Code of Federal Regulations
CWA	Clean Water Act
CY	calendar year
DOE	Department of Energy (U.S.)
DQO	data-quality objective
EM	Environmental Management
EMS	Environmental Management System
ENV	Environmental Protection (Laboratory division)
EP	Environmental Programs Directorate
EPA	Environmental Protection Agency (U.S.)
ER	environmental restoration
ESH&Q	Environment Safety Health and Quality Directorate
FY	fiscal year
G&A	General and Administrative
GWPMP	Groundwater Protection and Management Plan
HWA	Hazardous Waste Act
HWMR	Hazardous Waste Management Regulations (New Mexico)
LANL	Los Alamos National Laboratory
LASO	Los Alamos Site Office
LWSP	LANL Water Stewardship Project
LLW	low-level radioactive waste
MCL	maximum contaminant levels
MDA	material disposal area
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMSA	New Mexico Statutes Annotated
NMWQCC	New Mexico Water Quality Control Commission

NOI	notice of intent
NPDES	National Pollutant Discharge Elimination System
PA/CA	performance assessment/composite analysis
PMR	periodic monitoring report
QAPP	quality assurance project plans
RCRA	Resource Conservation and Recovery Act
RLWTF	Radioactive Liquid Wastewater Treatment Facility
RTBF	Readiness in Technical Base and Facilities
SAP	sampling and analysis plan
SCC	Super Computing Complex
SERF	Sanitary Effluent Reclamation Facility
SWMU	solid waste management unit
SWWS	Sanitary Wastewater Systems
TA	technical area
TDS	total dissolved solids
WBS	work breakdown structure
WQDB	Water Quality Database

1.0 STATEMENT OF PURPOSE

This Groundwater Protection Program Plan (GWPPP) documents the implementation of Los Alamos National Laboratory (LANL or the Laboratory) activities for the protection of groundwater. This plan revision provides the 2007 update and has been prepared at the request of the U.S. Department of Energy (DOE) Los Alamos Site Office (LASO). The Groundwater Protection Program includes the following:

- New Mexico Water Quality Control Commission (NMWQCC) discharge permits
- Resource Conservation and Recovery Act (RCRA) operating unit monitoring plans
- Interim Facility-wide Groundwater Monitoring Plan (the Interim Plan)
- Construction and rehabilitation of groundwater wells
- Groundwater well drilling support
- Environmental surveillance monitoring of groundwater
- Pollution prevention related to liquid effluents and outfalls
- Groundwater investigations as a part of the environmental restoration (ER) canyons investigations
- Groundwater remediation as a part of the ER canyons investigations
- Geologic/groundwater transport model development/maintenance
- Groundwater monitoring for long-term environmental stewardship
- Environmental management system goals/targets/objectives, development, and reporting

2.0 GROUNDWATER PROTECTION MISSION/STRATEGY

The LANL Groundwater Protection Program Vision and Mission statements of the Environmental Programs (EP) Directorate–LANL Water Stewardship Project (LWSP) are as follows:

Vision

- To be a trusted steward of Northern New Mexico's water resources

Mission

- Demonstrate full and timely compliance with environmental requirements
- Reduce the risk to the public, workers, and the environment from current and historical operations
- Provide high-quality, clear information to demonstrate environmental performance
- Continuously improve environmental performance

The following sections document implementation of the Groundwater Protection Program and the role of the LWSP in that program.

2.1 The Groundwater Protection Program Demonstrates Full and Timely Compliance with Environmental Requirements

The Laboratory's groundwater resources are governed by the Clean Water Act (CWA); NMWQCC regulations; RCRA; New Mexico's Hazardous Waste Act (HWA); the March 1, 2005, Compliance Order on Consent (the Consent Order); and DOE Order 450.1, Environmental Protection Program.

Point-source discharges to surface waters and their nexus to groundwater are regulated under the CWA's National Pollutant Discharge Elimination System (NPDES) outfall permit program. The groundwater provisions of the New Mexico Water Quality Act (New Mexico Statutes Annotated [NMSA], 1978, Sections 4-1 through 74-6-17) are implemented through the NMWQCC discharge permits. The groundwater provisions of the HWA will be implemented through the Consent Order and through hazardous waste permits. Aspects of groundwater investigation and monitoring are documented in the Consent Order, which incorporates the requirements set forth at 40 Code of Federal Regulations (CFR) Part 264, Subpart F, and the New Mexico Hazardous Waste Management Regulations (HWMR). The groundwater provisions of DOE Order 450.1 are described in the Ground Water Protection Programs Implementation Guide for Use with DOE Order 450.1, Environmental Protection Program (DOE G 450.1-9).

2.2 The Groundwater Protection Program Reduces the Risk to the Public, Workers, and the Environment from Current and Historical Operations

Current Operations

The Laboratory reduces the risk to the public, workers, and environment through the groundwater pathway by decreasing the number of outfalls and the contaminant concentrations of effluents released by Laboratory operations. Section 2.3 describes the measure of current risk to the public, workers, and the environment.

The Laboratory assesses potential doses from radiological contaminants in the environment annually (or more frequently) in response to any nonroutine events and uses the assessment results to make operational changes, if appropriate. The Laboratory performs various risk assessments and supports independent risk assessment, the results of which are used to help determine appropriate mitigation actions.

Historical Operations

The Laboratory program for reducing the risk to the public, workers, and environment from past releases potentially impacting the groundwater is governed by the Consent Order, which incorporates 40 CFR 264, Subpart F; and the New Mexico HWMRs. Investigations and monitoring are used to identify areas or sites that require remediation to address compliance or risk.

2.3 The Groundwater Protection Program Provides High-Quality, Clear Information to Demonstrate Environmental Performance

Data and data interpretations developed by the Groundwater Protection Program are published in accordance with DOE order guidance and Consent Order requirements and are available on the worldwide web. The types of reports include the following:

- the annual environmental surveillance report, prepared in accordance with DOE Order 231.1, which provides information on groundwater quality;

- periodic monitoring reports, prepared in accordance with the Interim Plan, which describe watershed-scale monitoring;
- Consent Order investigation reports, which present results of watershed-scale investigations; and
- groundwater data, which are posted on the web at http://wqdbworld.lanl.gov.

2.4 The Groundwater Protection Program Continuously Improves Our Environmental Performance

The Groundwater Protection Program implements continuous improvements using the Laboratory Environmental Management System (EMS), quality assurance project plans (QAPPs), and the Pollution Prevention Program. The Laboratory implemented its EMS in December 2005, and the EMS received independent Institutional Support Organization 14001 certification in March 2006. Goals, targets, and objectives are and will be established through the EMS. QAPPs are developed and maintained to govern the operation of groundwater protection activities; these plans include requirements for the continuous improvement of these activities. The Laboratory's Pollution Prevention Program identifies and funds opportunities to reduce liquid effluents. Progress is measured and reported on an annual basis.

3.0 PROGRAM ASSUMPTIONS, INCLUDING REGULATORY REQUIREMENTS

3.1 Groundwater Protection Program Goals

Groundwater protection is defined as maintaining groundwater quality that is adequate for its highest beneficial use. At the Laboratory, the current highest beneficial use of the regional aquifer groundwater is extraction of water supply for use as drinking water. The regional aquifer groundwater is extracted from several locations within and near the Laboratory by Los Alamos County, the City of Santa Fe, and San Ildefonso Pueblo for use as a public drinking-water supply. Thus, the highest-priority groundwater protection efforts are those that

- protect the drinking water extracted from the regional aquifer by wells on the Pajarito Plateau, at the Buckman well field, and at San Ildefonso Pueblo;
- protect the quality of groundwater moving beneath the Laboratory to Los Alamos County, San Ildefonso Pueblo, Santa Fe County, and other off-site land;
- protect the quality of surface water in springs and the Rio Grande, including downstream areas; and
- improve the quality of wastewater discharges that may impact the quality of the regional aquifer.

Furthermore, groundwater protection for corrective actions at the Laboratory will follow the requirements and processes established in the Consent Order and the HWA permit(s). Groundwater cleanup levels for human health will be based on existing standards (e.g., drinking water standards) when they are available and when using them is protective of current and reasonably expected exposures. If standards do not exist for particular compounds, risk-based cleanup levels will be developed pursuant to the Consent Order and/or HWA requirements and permit(s).

3.2 Technical Aspects

Specific operational aspects of the Groundwater Protection Program are described below.

Quality Management

The Groundwater Protection Program operates under the Integrated Management Plan for the EP Directorate. The specific regulatory and technical requirements for the Groundwater Protection Program and assigned roles and responsibilities for implementation are/will be written in project-specific QAPPs. These plans include

- groundwater level monitoring, EP-ERSS-WSP-1003, R2 (1/29/07),
- groundwater well drilling, EP-ERSS-WSP-1001, R0 (12/26/06),
- groundwater monitoring, EP-ERSS-QAPP-004 (in draft), and
- groundwater modeling, EP-ERSS-SOP-5138 (in draft).

Sampling and Analysis Plans

Sampling and analysis plans (SAPs) are written for specific monitoring programs: the Interim Plan, permit(s), environmental surveillance, and investigations of canyons. The SAPs define the objectives of the monitoring, locations, frequencies, and analytical suites. The Interim Plan is iterated and negotiated with the New Mexico Environment Department (NMED) annually, depending on the results of previous monitoring.

Drilling (All Aspects)

The Laboratory is responsible for establishing and documenting the requirements for groundwater well drilling to meet NMED requirements. The Laboratory assumed responsibility for contracting and implementation of well construction operations during fiscal year (FY) 2007, following the May 16, 2006, memorandum from Ed Wilmot to Carolyn Mangeng. The Laboratory provides oversight and drilling support activities for the drilling operations, such as internal Laboratory site permitting, well construction consulting, geophysical studies, water-screening sample analysis, and records management.

Sampling

Sampling includes groundwater in shallow alluvial wells, perched-intermediate and regional aquifer single-completion wells, multiple-completion wells, springs, surface baseflow stations, and water-supply production wells. Currently, LWSP staff and subcontractors perform water sampling. The sampling is conducted under the approved Interim Plan and other regulatory drivers, including DOE Order 450.1 and NMWQCC discharge permits.

Sample Analysis

Analytical chemistry evaluations of groundwater samples are performed by independent laboratories that are DOE-approved suppliers. Analytical results are received electronically and hard copy. Additional analytical chemistry is performed by an on-site laboratory for various screening purposes.

Data Management

Groundwater sampling data and groundwater well information are managed in the Water Quality Database (WQDB). Analytical results are verified and validated by the analytical laboratory, by a

Laboratory subcontractor, and by Laboratory staff and are documented in the WQDB. The data are available at http://wqdbworld.lanl.gov.

Reporting

Groundwater data are routinely reported in the annual "Environmental Surveillance at Los Alamos" report and in canyons investigations reports. Data are also reported to NMED according to an established schedule in periodic monitoring reports as part of the Interim Plan and as established by hazardous waste permit(s). Data from the sampling of Los Alamos County and City of Santa Fe water-supply wells are routinely reported to each municipality's water department manager.

Since late 2005, groundwater data have been reported to DOE in monthly reports. Beginning in FY07, monthly reports of data meeting specified criteria have been reported to NMED. In FY07, the Laboratory completed a historical review of data that summarized the detections and exceedances of standards or screening levels for many sampling events from the year 2000 to the present (LANL 2006, 098436).

In April 2007, the Laboratory began additional informal reporting to NMED of the data that met the reporting criteria under the chromium settlement that generated a modification of the Consent Order (see section 3.5). Formal reporting in accordance with this modification will begin in October 2007.

Risk Assessments

Assessments to determine the risk to human and ecological health from groundwater are developed as part of investigation reports and corrective measures evaluations under the Consent Order and may also be performed pursuant to RCRA closure and postclosure requirements and permit(s).

Network Evaluations

Pursuant to a letter from NMED dated April 5, 2007 (NMED 2007, 095394), the Laboratory is conducting area-specific groundwater monitoring well network evaluations to determine if changes to the monitoring network need to be made. Key considerations include hydrologic, physical, and geochemical performance of individual wells when evaluated in the context of specific contaminant issues at each of the areas under consideration. The overall network performance is also evaluated from the perspective of its ability to detect contaminants at a 95% confidence level before the unexpected arrival of a contaminant at a water-supply well or the Laboratory boundary. Areas that are being evaluated include Technical Area (TA) 16, Mortandad Canyon, TA-54, Sandia Canyon, and Los Alamos/Pueblo Canyon (including TA-21).

Well Rehabilitation

In August 2007, NMED approved the "Work Plan for R-well Rehabilitation and Replacement" (LANL 2007, 098119). The plan establishes methods for rehabilitation of wells impacted by drilling fluids, an accounting of wells to be converted from multiple- to single- or dual-screen wells, screens to be rehabilitated, sampling systems to be used, and a schedule for the work. The work began in 2007 and will continue through 2008.

Well Maintenance

Well maintenance activities include wellhead protection, security, pad maintenance, instrumentation maintenance, and plugging and abandonment.

Geologic Modeling

The site-scale Geologic Framework Model is used to conceptualize the hydrogeology of the site, to provide predictions when siting and drilling new wells, and to supply the basic hydrogeologic framework upon which groundwater contaminant transport models are based.

Groundwater Transport Modeling

The Finite Element, Heat, and Mass Transfer code is used to model contaminant transport though the vadose zone and the regional aquifer. Modeling is performed to assess site and regional groundwater pathways as well as to predict transport of contaminants to receptors and protection of human health and the environment. Modeling is also used in support of corrective measures evaluations.

Outreach

The EP Directorate works with the Environment Safety Health and Quality (ESH&Q) Directorate to support an integrated outreach program, including public meetings, routine communication between stakeholders and the Laboratory, and periodic public tours of some Laboratory sites. Aspects of groundwater protection are discussed in these various forums.

3.3 Funding Structure

The Groundwater Protection Program work is managed through the use of the ER baseline. The operation of the baseline is documented in the "Project Control System Description for the Environmental Restoration Project, Revision 1.3," submitted to DOE in July 2004.

Environmental Management

DOE Environmental Management (EM) direct funding at the Laboratory supports the majority of the Groundwater Protection Program. From 1997 to 2006, a portion of Readiness in Technical Base and Facilities (RTBF) funding was allocated to the groundwater monitoring well construction program as part of the Hydrogeologic Workplan (LANL 1998, 059599). RTBF funding ended in FY06.

General and Administrative

During FY08, funding for NMWQCC discharge permits will be allocated from Laboratory General and Administrative (G&A) funding.

3.4 Prioritization of Work

Compliance with federal and New Mexico regulations and agreements are the highest priority for the Groundwater Protection Program. These regulations include the Consent Order, RCRA-facility groundwater monitoring, and NMWQCC discharge permits. Fulfilling agreements made with Los Alamos County, the City of Santa Fe, and San Ildefonso Pueblo for drinking water sampling is also of high importance. The data-quality objectives (DQOs) process is used, where possible, to determine the optimal monitoring systems required to meet the regulations.

The scope of work to be executed each year is based predominantly on compliance requirements for the specific year. As the work is performed, opportunities for the more efficient execution of work are considered, and baseline changes are implemented to incorporate the changes in scope.

3.5 Regulatory Requirements

Environmental Statutory and Regulatory Framework

The Groundwater Protection Program is implemented to comply with the requirements of DOE orders, the Consent Order, federal and state hazardous waste regulations, and state groundwater regulations. In 1995, pursuant to DOE Order 5400.1, a Laboratory Groundwater Protection and Management Plan (GWPMP) was developed that identified the need for sitewide hydrogeologic characterization. In identifying this need, the GWPMP cited concerns by Laboratory scientists as well as DOE Tiger Team findings. Module VIII of the Laboratory's Hazardous Waste Facility Permit, which was first issued in 1990, includes a requirement in Task III, Section A.1, to evaluate hydrogeologic conditions at the Laboratory. In 1995, the NMED denied the groundwater monitoring waiver demonstrations submitted by the Laboratory and required the development of a hydrogeologic workplan. In response to these multiple requirements, the Laboratory began developing the Hydrogeologic Workplan in 1996 that would require data collection on the hydrogeologic setting that would in turn enable decision-making regarding monitoring. The Hydrogeologic Workplan (LANL 1998, 059599) was developed using the U.S. Environmental Protection Agency (EPA) DQO process. In March 1998, NMED approved the Hydrogeologic Workplan. The hydrogeologic characterization requirements of the Hydrogeologic Workplan and Module VIII were superseded by the Consent Order.

Consent Order Requirements

The Consent Order is of primary importance to the regulatory environment of the Groundwater Protection Program. The Consent Order sets forth groundwater requirements for the institution in terms of well drilling, groundwater investigations, groundwater monitoring, reporting of monitoring data, and reporting of groundwater analyses and impacts. The Consent Order subsumes the Hydrogeologic Workplan, although work performed under the Hydrogeologic Workplan may be used to satisfy some Consent Order requirements, subject to approval by NMED.

The Consent Order required the Laboratory to prepare and submit to NMED an Interim Plan. The Interim Plan specifies monitoring locations and frequencies, as well as specific analytical suites. The Interim Plan was submitted to NMED in June 2005 and was approved in June 2006. An update to the Interim Plan, approved in August 2007 (LANL 2007, 096665), states that the monitoring results performed under the Interim Plan will be reported in quarterly periodic monitoring reports.

Following completion of the Consent Order-required investigations described below, long-term groundwater monitoring plans will be prepared for individual watersheds to replace the Interim Plan.

The Consent Order also requires the Laboratory to conduct environmental investigations of each of the major canyons on or adjacent to Laboratory property. The scope of these investigations will be specified in work plans prepared by the Laboratory and approved by NMED and may include the installation and sampling of alluvial, intermediate, and regional wells. At present, work plans, including groundwater investigation requirements, have been approved for Los Alamos/Pueblo Canyons, Mortandad Canyon, North Canyons (Barrancas, Bayo, Guaje, and Rendija Canyons), Pajarito Canyon, Sandia Canyon/Cañada del Buey, and the South Canyons (Water Canyon/Cañon de Valle and Ancho, Chaquehui, Indio, Fence, and Portrillo Canyons).

In December 2005, NMED required LANL to prepare an interim measures work plan in response to the detection of chromium above drinking water standards in regional well R-28 in Mortandad Canyon. Since then, investigations have included drilling of characterization coreholes, new alluvial wells, and one regional groundwater monitoring well (with an additional well pending), a modeling report, and a phase I

sediment investigation report that focused on estimates of a chromium inventory. All of these ongoing investigations lead to the Sandia Canyon investigation report due in December 2008. In November 2006, an interim measures report was submitted to NMED that lead to an addendum to the Sandia/Cañada del Buey work plan, which was also approved.

The Consent Order may also require groundwater investigations for individual solid waste management units (SWMUs) and areas of concern (AOCs). For example, characterization of alluvial, intermediate, and regional groundwater is required as part of the investigation and corrective measures study for SWMU 16-021(c)-99 (the TA-16-260 Outfall) and a groundwater investigation was required for SWMU 03-010(a).

After completing the investigations required by the Consent Order, NMED will review the investigation results to determine whether a release of contaminants has occurred that requires corrective actions to protect human health and the environment. If so, corrective measures, including cleanup of groundwater, may be required. If groundwater corrective measures are required, they will need to meet the groundwater cleanup levels specified in the Consent Order. These cleanup levels include NMWQCC groundwater standards and drinking water maximum contaminant levels (MCLs) established by EPA or the New Mexico Environmental Improvement Board. If no NMWQCC standard or MCL exists, groundwater must be cleaned up to risk-based cleanup levels.

RCRA Groundwater Monitoring Requirements

Several waste management units at the Laboratory received hazardous wastes after the effective date of the RCRA regulations and were subject to RCRA groundwater monitoring requirements for surface impoundments and landfills. Some of these units were subsequently closed by the Laboratory in accordance with RCRA “clean closure” requirements and are no longer subject to groundwater monitoring requirements. The remaining RCRA-regulated units consist of disposal shafts and trenches at Material Disposal Areas (MDAs) G, H, and L at TA-54. As described above, the Laboratory applied for a waiver from these groundwater monitoring requirements. NMED denied the waiver and required the Laboratory to implement the Hydrogeologic Workplan (LANL 1998, 059599) to characterize the hydrogeology at the Laboratory. The requirements of the Hydrogeologic Workplan were then superseded by the Consent Order, implementation of which fulfills requirements for the regulated units under Subpart F and for miscellaneous units under Subpart A of 40 CFR Part 264 (C.O. 111.A).

At present, groundwater monitoring requirements for RCRA-regulated units are addressed by the Interim Plan prepared pursuant to the Consent Order. Consistent with the Consent Order, post-closure care requirements (including groundwater monitoring) for the regulated unit at MDA H will be addressed as part of the corrective measure for MDA H under the Consent Order. Closure and postclosure care requirements for regulated units at MDAs G and L fall under specific requirements and a permit, issued as a draft for public comment in August 2007. The permit could establish additional groundwater monitoring requirements for regulated units at MDAs G and L.

State Groundwater Regulations

The NMWQCC has established regulations (20.6.2 New Mexico Administrative Code [NMAC]) to protect all groundwater that has an existing concentration of 10,000 mg/L or less total dissolved solids (TDS) for present and potential future use as domestic and agricultural water supply, and for those segments of surface waters which are gaining volume because of groundwater inflow are protected for uses designated in the New Mexico Standards for Interstate and Intrastate Surface Waters (20.6.4 NMAC). Furthermore, the regulations require that vadose-zone contamination shall be abated so that water

contaminants in the vadose zone shall not be capable of contaminating groundwater in excess of the standards through leaching, percolation, or water table fluctuation.

The New Mexico groundwater regulations control discharges to groundwater through a discharge permit program, similar to the NPDES surface water discharge program under the CWA. Under the program, discharges to groundwater must have a permit, which is granted after NMED approval of the applicant's discharge plan. Three discharge plans are in effect for the Laboratory: an approved plan for the Sanitary Wastewater Systems (SWWS) Plant at TA-46, a pending plan for the TA-50-1 Radioactive Liquid Wastewater Treatment Facility (RLWTF), and a pending plan for the 21 sanitary septic systems currently in operation at the Laboratory as of August 2007.

Sanitary wastewater generated at the Laboratory is treated at the TA-46 SWWS Plant. As shown in Figure 3.5-1, treated effluent from the SWWS Plant may be discharged through NPDES Outfall 13S by gravity to Cañada del Buey or pumped by way of a force main to a reuse system at TA-03. Since the SWWS Plant became operational in 1992, all treated effluent has been pumped by way of the force main for discharge to Sandia Canyon. In 2006, all of the treated effluent generated by the SWWS Plant (approximately 98.5 million gal.) was pumped to TA-03. All (100%) SWWS Plant effluent was discharged to Sandia Canyon through NPDES Outfall 001. No treated effluent was used by the Super Computing Complex (SCC) cooling towers during 2006 because the Sanitary Effluent Reclamation Facility (SERF) was out of service the entire year. It is the Laboratory's intent to fully reuse all treated effluent in TA-03 cooling towers once SERF is fully operational.

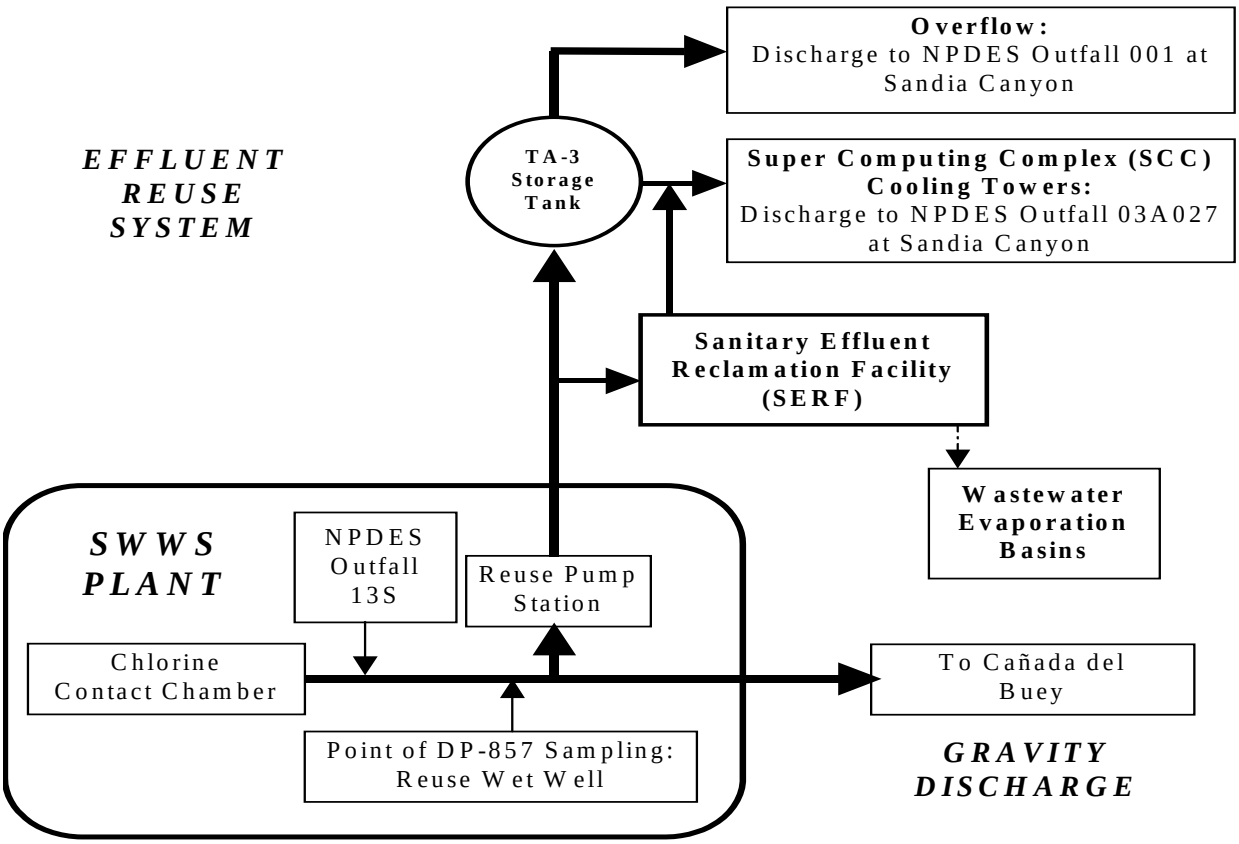


Figure 3.5-1 Effluent reuse system schematic

The SWWS Plant's effluent is sampled at the reuse pond, the SCC's cooling tower outfall (03A027), and the power plant's outfall (001). Under the discharge permit (DP-857), an alluvial well in Cañada del Buey (CDBO-6), downgradient of the SWWS Plant, is routinely sampled. Although this well is generally dry, any water collected is analyzed for constituents with groundwater standards. In upper Sandia Canyon where the cooling tower and power plant outfalls discharge, a discharge permit is required to install a monitoring well if any regulated parameters in the cooling water discharge exceed the groundwater standards in two consecutive quarters. To date, the TDS concentration has exceeded the standard in one quarter and has approached the standard other quarters.

The groundwater monitoring in the discharge plan (DP-1132) for the TA-50 RLWTF consists of quarterly samples from four alluvial wells in Mortandad Canyon (MCA-5 [a new, replacement well for MCO-3], MCO-4B, MCO-6, and MCO-7), analyzed for nitrate+nitrite (as N), total Kjeldahl nitrogen, ammonia, TDS, perchlorate, and fluoride. Additionally, the Interim Plan requires sampling from the regional aquifer wells in Mortandad Canyon (R-13, R-14, and R-15) and analysis of the groundwater for the same list of parameters.

The Laboratory has ongoing programs to drill, develop, rehabilitate, and purge alluvial, intermediate, and regional aquifer groundwater wells to meet Consent Order requirements. From 2002 until 2006, the Laboratory managed and disposed of groundwater produced during these activities by land application under an NMED-approved work plan Notice of Intent (NOI) decision tree. However, in March 2006, NMED informed the Laboratory that the existing decision tree was not sufficiently protective of groundwater and that modification of the decision tree was necessary.

Before the March 2006 directive from NMED, sampling purge water was land-applied at the well site while purging was in process. After March 2006, it became necessary to store and manage sampling purge water at over 100 well sites until a new, modified NOI decision tree was approved by NMED. The long-term implication of not being able to land-apply sampling purge water at the drill site, a volume estimated at nearly 100,000 gal./yr, is significant because the only other disposal option is trucking and treatment.

From April to November 2006, staff from the Laboratory's Environmental Protection (ENV) Division Water Quality and RCRA Group (ENV-RCRA) worked closely with the Ground Water and Hazardous Waste bureaus of NMED to craft a modified NOI decision tree that would be acceptable to both entities. On November 21, 2006, NMED approved for use the new NOI decision tree, which establishes a decision matrix to determine if the produced groundwater is of sufficient quality to land-apply. Water not suitable for land application will be disposed of at one of the Laboratory's wastewater treatment facilities.

DOE Standards and Orders

DOE Order 5400.1, General Environmental Protection Program, required the implementation of a Groundwater Protection Management Program and Groundwater Monitoring Program, including the development of a groundwater monitoring plan. DOE Order 5400.1 was superseded by DOE Order 450.1, Environmental Protection Program, in 2003. DOE Order 450.1 requires DOE sites to implement an EMS that includes a sitewide approach for groundwater protection. DOE Order 450.1 also requires DOE sites to implement effluent and surveillance monitoring to ensure early identification of potential adverse environmental impacts. This groundwater protection plan was developed to satisfy the requirements of DOE Order 450.1.

DOE Order 435.1, Radioactive Waste Management, requires a performance assessment and composite analysis (PA/CA) for low-level radioactive waste (LLW) disposal facilities. The PA/CA evaluates the current and expected future radiological dose associated with waste management activities to ensure that the radiological performance objectives of DOE Order 435.1 will be met. The PA/CA must include an assessment of impacts to water resources, including groundwater. Groundwater monitoring data are needed to support the process of maintaining and updating the PA/CA. The PA/CA requirements currently apply to the LLW disposal facility at Area G in TA-54.

DOE 5400.5, Radiation Protection of the Public and the Environment, also contains requirements for the protection of groundwater. These requirements generally relate to impacts from discharge of liquid wastes and effluent and include requirements for waste treatment to protect groundwater quality.

3.6 Regulatory Compliance Assumptions

The following regulatory compliance assumptions were used in developing the Groundwater Protection Program.

- Postclosure groundwater monitoring requirements for RCRA-regulated units at MDAs G and L will be substantially equivalent to any groundwater monitoring requirements for units under the Consent Order. No groundwater monitoring will likely be required for Subpart X units.
- Groundwater monitoring to comply with discharge plan requirements under NMWQCC groundwater regulations for TA-50-1 RLWTF, TA-46-333 SWWS Plant, and the 21 active sanitary septic systems at the Laboratory will be required. The Laboratory assumes that the current Interim Plan will fulfill these requirements.
- Investigation of nature and extent of releases to groundwater from SWMUs or AOCs will require additional wells. The number of wells will be determined as work plans are developed, pursuant to the requirements of the Consent Order.
- Monitored natural attenuation will be used as a remedy where its effectiveness can be demonstrated.
- Groundwater corrective measures will be required at sites where groundwater has been contaminated above cleanup levels specified in the Consent Order. These sites may include groundwater beneath Los Alamos Canyon, Sandia Canyon, Mortandad Canyon, and the TA-16-260 Outfall (Cañon de Valle).
- Groundwater monitoring as part of long-term environmental stewardship may be required for sites where wastes are left in place. The number of sites requiring monitoring will be determined by the corrective measure selected by NMED pursuant to the Consent Order.
- Groundwater monitoring performed under the Interim Plan will meet the requirements of the Consent Order and DOE Order 450.1. Additional annual monitoring will be conducted on Los Alamos County and Santa Fe County drinking water supplies as part of DOE Order 450.1 compliance.
- Annual monitoring will be conducted on San Ildefonso Pueblo lands in accordance with the DOE/Bureau of Indian Affairs Agreement in Principle, which is updated annually based on discussions between DOE, the Laboratory, and San Ildefonso Pueblo.

3.7 Program Assumptions Associated with Native-American Issues

The Pueblo de San Ildefonso is downgradient of the Laboratory and is potentially affected by groundwater moving from beneath the Laboratory. Other pueblos (e.g., Cochiti) may be affected by regional aquifer groundwater that discharges to the Rio Grande. Representatives of the pueblos have routinely participated in the discussion of issues and activities that affect the pueblos.

4.0 LABORATORY ORGANIZATIONAL STRUCTURE FOR IMPLEMENTATION

The EP Directorate's LWSP has the overall responsibility for the Laboratory's Groundwater Protection Program. An organization chart for the LWSP is presented in Appendix A.

4.1 Individual Facility Operations

The ENV-RCRA Group is responsible for developing permits and performing outfall monitoring for individual facility operations. The division that operates the individual facility is responsible for performing operations in such a manner that compliance with permit conditions is achieved. EP-Radioactive Liquid Waste manages the TA-50-1 RLWTF. Maintenance and Site Services Division, Utilities and Infrastructure Group, operates the TA-46-333, SWWS Plant. The Weapons Technology Division manages the High Explosive Waste Water Treatment Plant, TA-16-1507. Other outfalls are the responsibility of several other Laboratory divisions.

4.2 Laboratory-wide Groundwater Program

The Laboratory-wide aspects of the Groundwater Protection Program are divided between the ENV Division of ESH&Q Directorate and EP-LWSP. The development and operation of the Clean Water Act and NMWQCC programs are the responsibility of the ENV division leader and the ENV-RCRA group leader. The development and operation of the Laboratory environmental surveillance program for groundwater and the groundwater monitoring aspects of the Consent Order programs are the responsibility of the EP-LWSP director and the EP-Environmental Remediation Support Services Division leader.

The ENV-RCRA group leader and staff are responsible for Laboratory compliance with federal and state hazardous waste requirements and the Laboratory's Pollution Prevention Program. ENV-RCRA assists in each groundwater protection activity with RCRA requirements. ENV-RCRA assists Laboratory groups in reducing and/or eliminating effluents from operations.

Quality management staff is provided to each task through the Quality Management Division of the ESH&Q Directorate. Project controls support is provided through Project Management Directorate staff. Financial/budget tracking support is provided through the Chief Financial Office. Groundwater data management is provided by the EP Directorate.

Current EP Directorate personnel assignments to the Groundwater Protection Program are as follows.

- Project Director for Water Stewardship—Paul Huber, EP-LWSP, Acting
- Deputy Project Director for Water Stewardship—Christina Behr-Andres, EP-LWSP, Acting
- Program Manager for Conceptual Models and Data Assessment—Ardyth Simmons, EP-LWSP
- Program Manager for Regulatory Integration/Regulatory Strategy—Danny Katzman, EP-LWSP

- Program Manager for Operations—Matt Riggs, EP-LWSP

Specific Groundwater Protection Program responsibilities are presented in Table 4.2-1.

Table 4.2-1
FY08 Groundwater Protection Program Assignments

Groundwater Protection Program Tasks	Directorate	Division/Project
NMWQCC discharge monitoring permits	ESH&Q	ENV
RCRA operating unit monitoring plans/postclosure permit(s)	ESH&Q	ENV
Interim Facility-wide Groundwater Monitoring Plan	EP	LWSP
Groundwater well drilling and rehabilitation	EP	LWSP
Environmental Surveillance Program for Groundwater	EP	LWSP
Pollution prevention related to liquid effluents and outfalls	ESH&Q	ENV
Groundwater investigations as a part of the ER canyons investigations	EP	LWSP
Groundwater remediation as a part of the ER canyons investigations	EP	LWSP
Geologic/groundwater transport model development/ maintenance	EP	LWSP
Groundwater monitoring as part of long-term environmental stewardship	EP	LWSP
Environmental Management System goals/targets/objectives, development, and reporting	ESH&Q	ENV

5.0 WORK BREAKDOWN ELEMENTS

Table 5.0-1
EM Funding Work Breakdown Structure (WBS) for Watershed Integration

WBS Code	Reports to	Title
1	self	DOE/HQ
1.4	1	EM
1.4.2	1.4	DOE/LASO
1.4.2.6	1.4.2	LANL - PBS 0030 ENVIRONMENTAL RESTORATION
1.4.2.6.01	1.4.2.6	REMEDIAL ACTIONS
1.4.2.6.01.01	1.4.2.6.01	WATERSHED INTEGRATION
1.4.2.6.01.01.10	1.4.2.6.01.01	MORTANDAD CANYONS
1.4.2.6.01.01.10.38	1.4.2.6.01.01.10	SCIENCE BASED MONITORING & STEWARDSHIP
1.4.2.6.01.01.10.4D	1.4.2.6.01.01.10	MORT CYN - IM WELL I-5 QUARTERLY SAMPLING
1.4.2.6.01.01.10.4E	1.4.2.6.01.01.10	MORT CYN - IM WELL I-6 QUARTERLY SAMPLING
1.4.2.6.01.01.10.4F	1.4.2.6.01.01.10	MORT CYN - IM WELL I-1 QUARTERLY SAMPLING
1.4.2.6.01.01.10.4G	1.4.2.6.01.01.10	MORT CYN - IM WELL I-8 QUARTERLY SAMPLING

WBS Code	Reports to	Title
1.4.2.6.01.01.10.4H	1.4.2.6.01.01.10	MORT CYN - IM WELL I-3 QUARTERLY SAMPLING
1.4.2.6.01.01.10.4J	1.4.2.6.01.01.10	MORT CYN- IM WELL I-10 QUARTERLY SAMPLING

Table 5.0-1 (continued)

WBS Code	Reports to	Title
1.4.2.6.01.01.10.5D	1.4.2.6.01.01.10	MORTANDAD CANYON - IM WELL I-4
1.4.2.6.01.01.10.5E	1.4.2.6.01.01.10	IM WELL I-4 QUARTERLY SAMPLING
1.4.2.6.01.01.10.6H	1.4.2.6.01.01.10	MORTANDAD CANYON - IM WELL I-5
1.4.2.6.01.01.10.6R	1.4.2.6.01.01.10	MORTANDAD CANYON - IM WELL I-6
1.4.2.6.01.01.10.6T	1.4.2.6.01.01.10	MORTANDAD CANYON - IM WELL I-1
1.4.2.6.01.01.10.6U	1.4.2.6.01.01.10	MORTANDAD CANYON - IM WELL I-8
1.4.2.6.01.01.10.6W	1.4.2.6.01.01.10	MORTANDAD CANYON - IM WELL I-10
1.4.2.6.01.01.10.A6	1.4.2.6.01.01.10	CHROMIUM INVESTIGATION FIELDWORK
1.4.2.6.01.01.10.A7	1.4.2.6.01.01.10	CHROMIUM INVESTIGATION REPORT
1.4.2.6.01.01.10.AA	1.4.2.6.01.01.10	MORTANDAD-CANYONS SEDIMENT INVESTIGATION
1.4.2.6.01.01.10.AB	1.4.2.6.01.01.10	MORTANDAD-CANYONS INVESTIGATION REPORT
1.4.2.6.01.01.10.AC	1.4.2.6.01.01.10	MORTANDAD-CANYONS REACTIVE BARRIER SAMPLING
1.4.2.6.01.01.10.AD	1.4.2.6.01.01.10	CDB-CYNS SURFACE WATER & ALLUVIAL GW INVEST.
1.4.2.6.01.01.10.AE	1.4.2.6.01.01.10	CAÑADA DEL BUEY-CANYONS INVESTIGATION REPORT
1.4.2.6.01.01.10.AM	1.4.2.6.01.01.10	CAÑADA DEL BUEY-CANYONS SEDIMENT INVESTIGATION
1.4.2.6.01.01.10.AR	1.4.2.6.01.01.10	INTERIM MEASURES WORKPLAN - CHROMIUM
1.4.2.6.01.01.10.CJ	1.4.2.6.01.01.10	PHASE 2 CHROMIUM WORK PLAN
1.4.2.6.01.01.10.CK	1.4.2.6.01.01.10	PHASE 2 CHROMIUM FIELDWORK
1.4.2.6.01.01.10.CL	1.4.2.6.01.01.10	PHASE 2 CHROMIUM REPORT
1.4.2.6.01.01.10.DR	1.4.2.6.01.01.10	MORTANDAD-CANYONS SURFACE & ALLUVIAL GW INVEST
1.4.2.6.01.01.10.DW	1.4.2.6.01.01.10	MORTANDAD-CANYONS BIOTA INVESTIGATION
1.4.2.6.01.01.10.HU	1.4.2.6.01.01.10	MORTANDAD - CANYONS INFILTRATION INVESTIGATION
1.4.2.6.01.01.10.HV	1.4.2.6.01.01.10	MORTANDAD - CANYONS CHARACTERIZATION BOREHOLES
1.4.2.6.01.01.10.HW	1.4.2.6.01.01.10	MORTANDAD - CANYONS DC RESISTIVITY INVESTIGATION
1.4.2.6.01.01.10.HX	1.4.2.6.01.01.10	MORTANDAD - CANYONS COLLOID INVESTIGATION
1.4.2.6.01.01.10.NR	1.4.2.6.01.01.10	R-34 DEEP WELL - MORTANDAD CANYON
1.4.2.6.01.01.10.RD	1.4.2.6.01.01.10	WELL R-33 QUARTERLY SAMPLING
1.4.2.6.01.01.10.RE	1.4.2.6.01.01.10	WELL R-34 QUARTERLY SAMPLING
1.4.2.6.01.01.10.RH	1.4.2.6.01.01.10	PROJECT SUPPORT - WATERSHED INTEGRATION
1.4.2.6.01.01.10.RJ	1.4.2.6.01.01.10	TECHNICAL SUPPORT - WATERSHED STEWARDSHIP
1.4.2.6.01.01.10.XF	1.4.2.6.01.01.10	FY07 G&A ADJUSTMENT
1.4.2.6.01.01.1A	1.4.2.6.01.01	MORTANDAD CANYONS REMEDIATION
1.4.2.6.01.01.1A.5G	1.4.2.6.01.01.1A	GW REMEDIATION MORTANDAD CANYON
1.4.2.6.01.01.1A.5H	1.4.2.6.01.01.1A	MORTANDAD CANYON - CME REPORT
1.4.2.6.01.01.20	1.4.2.6.01.01	LA/PUEBLO/SANDIA CANYONS

Table 5.0-1 (continued)

WBS Code	Reports to	Title
1.4.2.6.01.01.20.11	1.4.2.6.01.01.20	GROUNDWATER MODELING
1.4.2.6.01.01.20.17	1.4.2.6.01.01.20	HYDROLOGIC TESTING
1.4.2.6.01.01.20.1U	1.4.2.6.01.01.20	SITE-WIDE VADOSE ZONE MODELING
1.4.2.6.01.01.20.1W	1.4.2.6.01.01.20	GEOLOGIC FRAMEWORK
1.4.2.6.01.01.20.2X	1.4.2.6.01.01.20	GW DATA ADEQUACY - WELL REHABILITATION
1.4.2.6.01.01.20.2Y	1.4.2.6.01.01.20	GW DATA ADEQUACY - DATA QUALIFICATION
1.4.2.6.01.01.20.6P	1.4.2.6.01.01.20	LA/P CYN GW INVESTIGATION REPORT
1.4.2.6.01.01.20.A9	1.4.2.6.01.01.20	SANDIA CHROMIUM ADDENDUM
1.4.2.6.01.01.20.G3	1.4.2.6.01.01.20	PUEBLO PLUTONIUM TRANSPRT-CYNS ASSMNT OF R. ALT
1.4.2.6.01.01.20.G4	1.4.2.6.01.01.20	DP/LOS ALAMOS- CANYONS TRACER STUDY
1.4.2.6.01.01.20.G9	1.4.2.6.01.01.20	LA/PUEBLO-CANYONS SURFACE AGGREGATE REPORT
1.4.2.6.01.01.20.HA	1.4.2.6.01.01.20	BAY0/GUAJE/RENDIJA/BARANCAS-CANYONS WORK PLAN
1.4.2.6.01.01.20.HB	1.4.2.6.01.01.20	BAYO/GUAJE/RENDIJA-CANYONS SEDIMENT INVESTIGATN
1.4.2.6.01.01.20.HE	1.4.2.6.01.01.20	BAYO/GUAJE/RENDIJA-CANYONS INVESTIGATION REPORT
1.4.2.6.01.01.20.HF	1.4.2.6.01.01.20	BAYO/GUAJE/RENDIJA-CANYONS SURFACE WATER INVEST
1.4.2.6.01.01.20.MM	1.4.2.6.01.01.20	R-6 DEEP WELL - LOS ALAMOS CANYON
1.4.2.6.01.01.20.MV	1.4.2.6.01.01.20	R-3 DEEP WELL - PUEBLO CANYON
1.4.2.6.01.01.20.N1	1.4.2.6.01.01.20	WELL R-6 QUARTERLY SAMPLING
1.4.2.6.01.01.20.N5	1.4.2.6.01.01.20	WELL R-2 QUARTERLY SAMPLING
1.4.2.6.01.01.20.N6	1.4.2.6.01.01.20	WELL R-3 QUARTERLY SAMPLING
1.4.2.6.01.01.20.N8	1.4.2.6.01.01.20	WELL R-4 QUARTERLY SAMPLING
1.4.2.6.01.01.20.NH	1.4.2.6.01.01.20	LA/PUEBLO CYN - INTERMED WELL 2 (R-6I)
1.4.2.6.01.01.20.NJ	1.4.2.6.01.01.20	LA/PUEBLO CYN - INTERMED WELL 3 (LAOI-3.2)
1.4.2.6.01.01.20.NK	1.4.2.6.01.01.20	LA/PUEBLO CYN - INTERMED WELL 2 QTRLY SAMPLING
1.4.2.6.01.01.20.NL	1.4.2.6.01.01.20	MW-1 MONITORING WELL - LA/PUEBLO
1.4.2.6.01.01.20.NM	1.4.2.6.01.01.20	MW-2 MONITORING WELL - LA/PUEBLO
1.4.2.6.01.01.20.NT	1.4.2.6.01.01.20	MW-6 MONITORING WELL - LOS ALAMOS CANYON
1.4.2.6.01.01.20.NU	1.4.2.6.01.01.20	MW-7 MONITORING WELL - LA/PUEBLO
1.4.2.6.01.01.20.NV	1.4.2.6.01.01.20	LA/PUEBLO CYN - IM WELL I-7
1.4.2.6.01.01.20.NW	1.4.2.6.01.01.20	LA/PUEBLO CYN - IM WELL LADP-5
1.4.2.6.01.01.20.NX	1.4.2.6.01.01.20	LA/PUEBLO CYN - IM WELL I-7 QUARTERLY SAMPLING
1.4.2.6.01.01.20.NY	1.4.2.6.01.01.20	LA/PUEBLO CYN - IM WELL I-5 QTRLY SAMPLING
1.4.2.6.01.01.20.R6	1.4.2.6.01.01.20	LA/PUEBLO CYN - IM WELL 3 QTRLY SAMPLING
1.4.2.6.01.01.20.RA	1.4.2.6.01.01.20	WELL MW-1 QUARTERLY SAMPLING
1.4.2.6.01.01.20.RB	1.4.2.6.01.01.20	WELL MW-2 QUARTERLY SAMPLING
1.4.2.6.01.01.20.RF	1.4.2.6.01.01.20	WELL MW-6 QUARTERLY SAMPLING
1.4.2.6.01.01.20.RG	1.4.2.6.01.01.20	WELL MW-7 QUARTERLY SAMPLING
1.4.2.6.01.01.2A	1.4.2.6.01.01	LA/PUEBLO CANYONS REMEDIATION
1.4.2.6.01.01.2A.5J	1.4.2.6.01.01.2A	GW REMEDIATION LOS ALAMOS CANYON

Table 5.0-1 (continued)

WBS Code	Reports to	Title
1.4.2.6.01.01.2A.5X	1.4.2.6.01.01.2A	LA/PUEBLO CANYONS - CME REPORT
1.4.2.6.01.01.30	1.4.2.6.01.01	WATER/VALLE CANYONS
1.4.2.6.01.01.30.ND	1.4.2.6.01.01.30	POT/FENCE-CYN SURFACE WATER & ALLUVIAL GW INVEST
1.4.2.6.01.01.30.TD	1.4.2.6.01.01.30	WATER/VALLE-CANYONS SEDIMENT INVESTIGATION
1.4.2.6.01.01.30.TE	1.4.2.6.01.01.30	WATER/VALLE-CANYONS WORK PLAN
1.4.2.6.01.01.30.TF	1.4.2.6.01.01.30	WATER/VALLE-CANYONS INVESTIGATION REPORT
1.4.2.6.01.01.30.TG	1.4.2.6.01.01.30	POTRILLO/FENCE-CANYONS SEDIMENT INVESTIGATION
1.4.2.6.01.01.30.TH	1.4.2.6.01.01.30	POTRILLO/FENCE-CANYONS INVESTIGATION REPORT
1.4.2.6.01.01.30.XA	1.4.2.6.01.01.30	WATER/VALLE-CYNS SURFACE & ALLUVIAL GW INVEST.
1.4.2.6.01.01.30.XK	1.4.2.6.01.01.30	WATER CYN - INTERMED. WELL 1
1.4.2.6.01.01.30.XM	1.4.2.6.01.01.30	R-29 DEEP WELL - WATER CANYON
1.4.2.6.01.01.30.XN	1.4.2.6.01.01.30	WELL R-29 QUARTERLY SAMPLING
1.4.2.6.01.01.30.Y0	1.4.2.6.01.01.30	WATER CYN - INTERMED. WELL 2
1.4.2.6.01.01.30.Y6	1.4.2.6.01.01.30	WATER CYN - INTERMED. WELL 1 QTRLY SAMPLING
1.4.2.6.01.01.30.Y7	1.4.2.6.01.01.30	WATER CYN - INTERMED. WELL 2 QTRLY SAMPLING
1.4.2.6.01.01.40	1.4.2.6.01.01	SANDIA CANYONS
1.4.2.6.01.01.40.6Y	1.4.2.6.01.01.40	SANDIA CYN - INTERMEDIATE WELL #1
1.4.2.6.01.01.40.T1	1.4.2.6.01.01.40	SANDIA-CANYONS INVESTIGATION REPORT
1.4.2.6.01.01.40.T2	1.4.2.6.01.01.40	SANDIA-CANYONS SEDIMENT INVESTIGATION
1.4.2.6.01.01.40.T3	1.4.2.6.01.01.40	SANDIA-CYNS SURFACE & ALLUVIAL GW INVESTIGATION
1.4.2.6.01.01.40.T9	1.4.2.6.01.01.40	WELL R-11 QUARTERLY SAMPLING
1.4.2.6.01.01.50	1.4.2.6.01.01	PAJARITO CANYONS
1.4.2.6.01.01.50.2K	1.4.2.6.01.01.50	WELL MITIGATION PILOT
1.4.2.6.01.01.50.2L	1.4.2.6.01.01.50	MODIFIED DRILLING SCOPE
1.4.2.6.01.01.50.2M	1.4.2.6.01.01.50	R-17 DEEP GW INVESTIGATION IN PAJARITO CANYON
1.4.2.6.01.01.50.2W	1.4.2.6.01.01.50	WELL R-17 QUARTERLY SAMPLING
1.4.2.6.01.01.50.7N	1.4.2.6.01.01.50	TA-3 PRS 03-010(A) GW SAMPLING - YR 1
1.4.2.6.01.01.50.7P	1.4.2.6.01.01.50	TA-3 PRS 03-010(A) GW SAMPLING - YR 2
1.4.2.6.01.01.50.9J	1.4.2.6.01.01.50	PAJ-CANYONS SURFACE & ALLUVIAL GW INVESTIGATION
1.4.2.6.01.01.50.9K	1.4.2.6.01.01.50	PAJARITO - CANYONS BIOTA INVESTIGATION WORKPLAN
1.4.2.6.01.01.50.9N	1.4.2.6.01.01.50	PAJARITO - CANYONS BIOTA INPLEMENTATION
1.4.2.6.01.01.50.9V	1.4.2.6.01.01.50	PAJARITO CYN - INTERMED WELL 1 (R-23I)
1.4.2.6.01.01.50.A4	1.4.2.6.01.01.50	PAJARITO CYN - INTERMED. WELL 2
1.4.2.6.01.01.50.A5	1.4.2.6.01.01.50	PAJARITO CYN - INTERMED WELL 3
1.4.2.6.01.01.50.CN	1.4.2.6.01.01.50	PAJARITO CYN - IM WELL1 QTRLY SAMPLING
1.4.2.6.01.01.50.CP	1.4.2.6.01.01.50	PAJARITO CYN - IM WELL 2 QTRLY SAMPLING
1.4.2.6.01.01.50.CR	1.4.2.6.01.01.50	PAJARITO CYN - IM WELL 3 QTRLY SAMPLING
1.4.2.6.01.01.50.P7	1.4.2.6.01.01.50	PAJARITO-CANYONS SEDIMENT INVESTIGATION
1.4.2.6.01.01.50.P8	1.4.2.6.01.01.50	PAJARITO-CANYONS INVESTIGATION REPORT

Table 5.0-1 (continued)

WBS Code	Reports to	Title
1.4.2.6.01.01.60	1.4.2.6.01.01	ANCHO CANYONS
1.4.2.6.01.01.60.A1	1.4.2.6.01.01.60	ANCHO-CANYONS SEDIMENT INVESTIGATION
1.4.2.6.01.01.60.A2	1.4.2.6.01.01.60	ANCHO-CANYONS INVESTIGATION REPORT
1.4.2.6.01.01.60.E9	1.4.2.6.01.01.60	ANCHO-CYNS SURFACE WATER & ALLUVIAL GW INVEST
1.4.2.6.01.01.60.F3	1.4.2.6.01.01.60	R-30 DEEP WELL - ANCHO CYN
1.4.2.6.01.01.60.F5	1.4.2.6.01.01.60	WELL R-30 QUARTERLY SAMPLING
1.4.2.6.01.01.70	1.4.2.6.01.01	CHAQUEHUI CANYONS
1.4.2.6.01.01.70.G1	1.4.2.6.01.01.70	CHAQUEHUI-CANYONS SEDIMENT INVESTIGATION
1.4.2.6.01.01.70.G2	1.4.2.6.01.01.70	CHAQUEHUI-CANYONS INVESTIGATION REPORT
1.4.2.6.01.01.EA	1.4.2.6.01.01	INTERIM SITE-WIDE MONITORING
1.4.2.6.01.01.EA.2C	1.4.2.6.01.01.EA	NATIONAL ACADEMY OF SCIENCE (NAS)
1.4.2.6.01.01.EA.5A	1.4.2.6.01.01.EA	PLANNING FOR SITE-WIDE MONITORING
1.4.2.6.01.01.EA.5B	1.4.2.6.01.01.EA	SITE-WIDE MONITORING FIELD OPERATIONS
1.4.2.6.01.01.EA.5C	1.4.2.6.01.01.EA	SITE-WIDE MONITORING REPORTING
1.4.2.6.01.01.EA.72	1.4.2.6.01.01.EA	GWP SITE-WIDE CUSTODIANSHIP
1.4.2.6.01.01.EA.GW	1.4.2.6.01.01.EA	FACILITY WIDE GROUNDWATER MONITORING
1.4.2.6.01.01.EA.MG	1.4.2.6.01.01.EA	MORTANDAD CYN INTERIM MONITORING FIELD OPS
1.4.2.6.01.01.EA.MH	1.4.2.6.01.01.EA	LA/PUEBLO CYN INTERIM MONITORING FIELDS OPS
1.4.2.6.01.01.EA.MJ	1.4.2.6.01.01.EA	WATER/VALLE CYN INTERIM MONITORING FIELD OPS
1.4.2.6.01.01.EA.MK	1.4.2.6.01.01.EA	SANDIA CYN INTERIM MONITORING FIELD OPS
1.4.2.6.01.01.EA.ML	1.4.2.6.01.01.EA	PAJARITO CYN INTERIM MONITORING FIELD OPS
1.4.2.6.01.01.EA.MP	1.4.2.6.01.01.EA	ANCHO/CHAQ/FRJ CYN INTERIM MONITORING FIELD OPS
1.4.2.6.01.01.EA.MR	1.4.2.6.01.01.EA	WH ROCK CYN SPRINGS INTERIM MONITORING FIELD OPS
1.4.2.6.01.01.EA.T4	1.4.2.6.01.01.EA	INTERIM MONITORING - GW LEVEL PROJECT
1.4.2.6.01.01.EA.T5	1.4.2.6.01.01.EA	INTERIM MONITORING - SITE-WIDE BIOLOGICAL ASSESS
1.4.2.6.01.01.EC	1.4.2.6.01.01	SWMU/SWPP
1.4.2.6.01.01.EC.5U	1.4.2.6.01.01.EC	INDIVIDUAL PERMIT APPLICATION
1.4.2.6.01.01.EC.5V	1.4.2.6.01.01.EC	EPA SCHEDULE ORDER IMPLEMENTATION
1.4.2.6.01.01.EC.5W	1.4.2.6.01.01.EC	BMP INSTALLATION, INSPECTION, & MAINTENANCE
1.4.2.6.01.01.EC.5Y	1.4.2.6.01.01.EC	FFCA/A0 IMPLEMENTATION - FILED OPERATIONS
1.4.2.6.01.01.EC.60	1.4.2.6.01.01.EC	WATERSHED SCALE CORRECTIVE ACTIONS
1.4.2.6.01.01.EC.65	1.4.2.6.01.01.EC	FFCA/AO IMPLEMENTATION - INFO MANAGEMENT
1.4.2.6.01.01.EC.66	1.4.2.6.01.01.EC	FFCA/AO IMPLEMENTATION - REPORTING
1.4.2.6.01.01.TE	1.4.2.6.01.01	FSF CORE REPOSITORY
1.4.2.6.01.01.TE.31	1.4.2.6.01.01.TE	CORE REPOSITORY

6.0 MASTER SCHEDULE

The master schedule for Groundwater Protection Program deliverables as of September 2007 is presented in Appendix B. An updated schedule is transmitted quarterly to DOE.

7.0 RISK ELEMENTS AND RISK MANAGEMENT PLAN

Groundwater Protection Program Plan scope descriptions were developed in accordance with the EM Risk Management Plan. The Laboratory's 2005 Environmental Restoration Risk Management Plan is supplemented by the DOE risk register to provide the most current information. Cost impacts will be updated in accordance with the risk register.

8.0 REFERENCES

LANL (Los Alamos National Laboratory), May 22, 1998. "Hydrogeologic Workplan," Los Alamos National Laboratory document LA-UR-01-6511, Los Alamos, New Mexico. (LANL 1998, 059599)

LANL (Los Alamos National Laboratory), December 15, 2006. "Retrospective Assessment of LANL Historical Groundwater Data," Los Alamos National Laboratory document LA-UR-06-6957, Los Alamos, New Mexico. (LANL 2006, 098436)

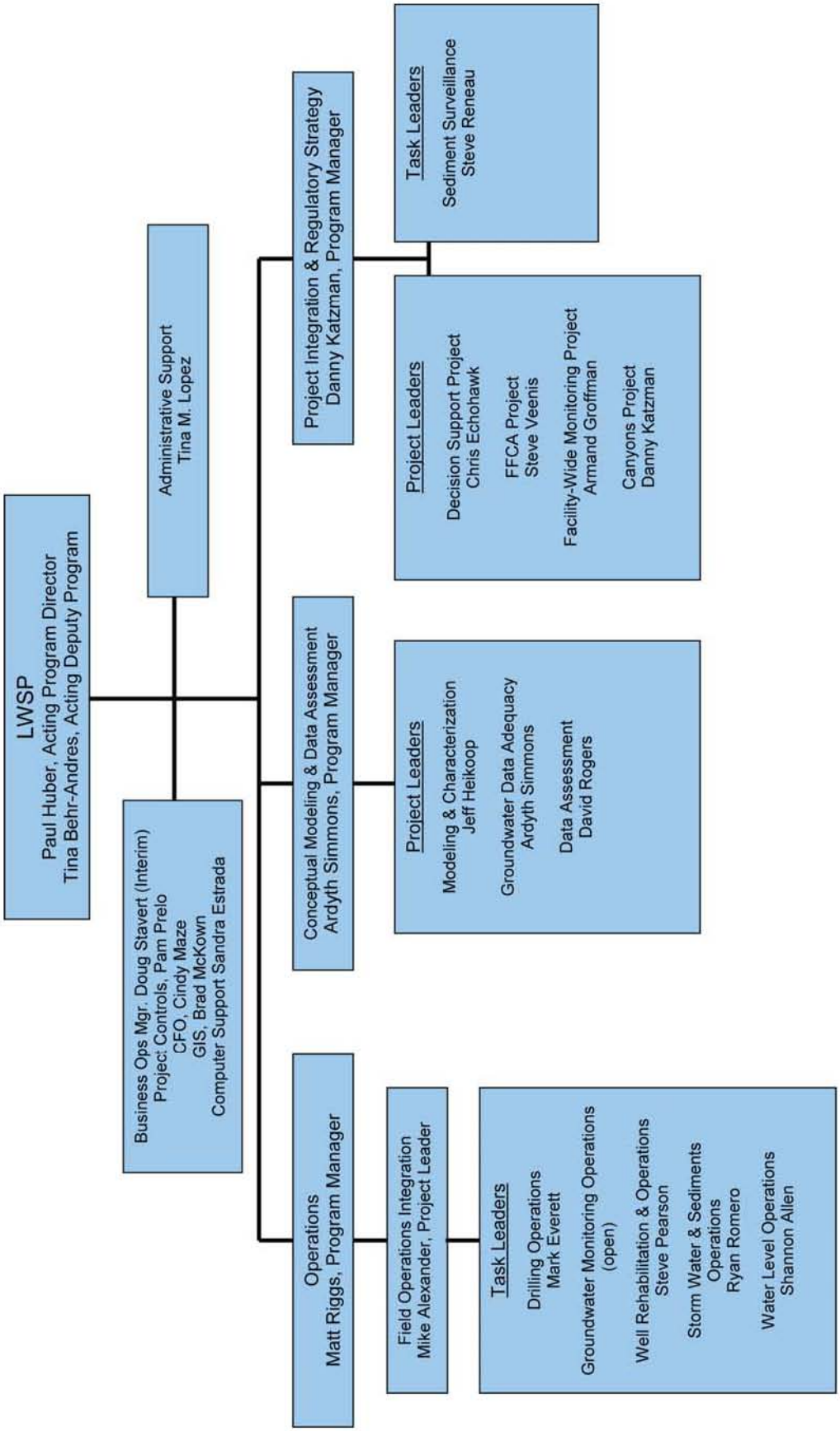
LANL (Los Alamos National Laboratory), May 2007. "2007 Interim Facility-Wide Groundwater Monitoring Plan," Los Alamos National Laboratory document LA-UR-07-3271, Los Alamos, New Mexico. (LANL 2007, 096665)

LANL (Los Alamos National Laboratory), July 2007. "Work Plan for R-Well Rehabilitation and Replacement, Revision 2," Los Alamos National Laboratory document LA-UR-07-5087, Los Alamos, New Mexico. (LANL 2007, 098119)

NMED (New Mexico Environment Department), April 5, 2007. "Well Evaluations for Intermediate and Regional Wells," New Mexico Environment Department letter to D. Gregory (DOE LASO) and D. McInroy (LANL) from J.P. Bearzi (NMED-HWB), Santa Fe, New Mexico. (NMED 2007, 095394)

Appendix A

Organization Chart of Water Stewardship Project, Environmental Programs Directorate


LWSP
Paul Huber, Acting Program Director
Tina Behr-Andres, Acting Deputy Program
Administrative Support
Tina M. Lopez
Business Ops Mgr. Doug Stavert (Interim)
Project Controls, Pam Prelo
CFO, Cindy Maze
GIS, Brad McKown
Computer Support Sandra Estrada
Project Integration & Regulatory Strategy
Danny Katzman, Program Manager
Task Leaders
Sediment Surveillance
Steve Reneau
Project Leaders
Decision Support Project
Chris Echohawk
FFCA Project
Steve Veenis
Facility-Wide Monitoring Project
Armand Groffman
Canyons Project
Danny Katzman
Conceptual Modeling & Data Assessment
Ardyth Simmons, Program Manager
Project Leaders
Modeling & Characterization
Jeff Heikoop
Groundwater Data Adequacy
Ardyth Simmons
Data Assessment
David Rogers
Operations
Matt Riggs, Program Manager
Field Operations Integration
Mike Alexander, Project Leader
Task Leaders
Drilling Operations
Mark Everett
Groundwater Monitoring Operations
(open)
Well Rehabilitation & Operations
Steve Pearson
Storm Water & Sediments
Operations
Ryan Romero
Water Level Operations
Shannon Allen

Appendix B

Master Schedule for EM-Funded Groundwater Deliverables

Table B-1
Groundwater Protection Program Plan Schedule of Deliverables by Calendar and Fiscal Year 2005–2015

Site/Activity	Deliverable Document	Due Date	Notice Date[a,b]	Actual Notice Date	New Due Date	New Notice Date
CY05[c]						
FY06						
LA/Pueblo Supplemental Investigation Report	LA/Pueblo Supplemental Investigation Report to NMED	12/15/2005 Submitted	To be decided			
CY06						
FY07						
CY07						
Monthly Groundwater Monitoring Data Summary	Monthly Groundwater Monitoring Data Summary – e-mail to LASO & NMED	Due monthly on 15th of each month	n/a[d]	n/a	n/a	n/a
LA/Pueblo Groundwater Investigation Report	Report on Groundwater Investigations in LA/Pueblo Canyons. Addendum to LA/Pueblo Canyons Investigation Report to NMED	To be decided	n/a	n/a	n/a	n/a
Summary Report	Perchlorate sources in the LA/Pueblo watershed	7/9/07				
Groundwater Well Network Evaluation	Evaluation of groundwater wells required for monitoring TA-54	7/31/07 Submitted	n/a	n/a	n/a	n/a
Chromium/Sandia Canyon Reports	1) Phase I Sandia Canyon Sediment Investigation Report 2) Chromium Fate and Transport Report 3) R-35 Status Report	9/14/07 Submitted	n/a	n/a	n/a	n/a

Table B-1 (continued)

Site/Activity	Deliverable Document	Due Date	Notice Date[a,b]	Actual Notice Date	New Due Date	New Notice Date
Work Plan for R-Well Rehabilitation and Replacement, Rev 2	Due to NMED (CT# 07-093) received 8/14/07)	7/30/07	n/a	n/a	n/a	n/a
8th Periodic Monitoring Report	Periodic Monitoring Report for Ancho Canyon	9/19/07	n/a	n/a	n/a	n/a
Groundwater Well Sampling Systems	Plan for TA-54 wells	9/30/07	n/a	n/a	n/a	n/a
Annual Site Environmental Report	LANL ESR published to web	9/30/07 Finalized	n/a	n/a	n/a	n/a
Groundwater Protection Program Plan	Final FY08 GPPP – to LASO	9/30/07	n/a	n/a	n/a	n/a
TA-50 MDA C Network Evaluation NOD Response to Mortandad Canyon GW Well Evaluation, Rev.1	NOD Response to NMED	9/30/07	n/a	n/a	n/a	n/a
Revised TA-16 Well Evaluation	NMED Letter (CT# 07-0103 & 07-093) received 9/10/07 – Request for Extension for Recommendations for Screen/Well Rehab and New Well Installation [16-021(c)]	9/30/07	n/a	n/a	n/a	n/a
Revised Mortandad Canyon Report	NMED Letter (CT# 07-081) received 8/31/07 – Address two comments regarding the report.	9/30/07	n/a	n/a	n/a	n/a
Plan for Investigation of PCBs at LA-SMA-2	NMED Letter (CT# 07-0101) received 9/4/07 – Approval w/Direction LA/Pueblo Canyons Supp Inv Report	10/1/07	n/a	n/a	n/a	n/a
Revised TA-54 Well Evaluation and Network Recommendations Report	NMED Letter (CT# 07-0100) received 9/4/07 – Approval with Direction TA-54 Well Evals and Network Recommendations	10/5/07	n/a	n/a	n/a	n/a

Table B-1 (continued)

Site/Activity	Deliverable Document	Due Date	Notice Date[a,b]	Actual Notice Date	New Due Date	New Notice Date
Mortandad #2 periodic monitoring report (PMR)	Includes sampling rounds from 10/19/06, 2/26/07, and 6/4/07	10/22/07	n/a	n/a	n/a	n/a
Sandia #3 PMR	Includes sampling rounds from 2/13/07 and 6/4/07	10/22/07	n/a	n/a	n/a	n/a
Work plan for Implementing Mortandad Canyon Well Network Recommendations	Response to NMED (CT #07-081)	10/31/07	n/a	n/a	n/a	n/a
Groundwater Well (R-36)	Install replacement well for R-12 screen 3	12/2/07	n/a	n/a	n/a	n/a
Plan for Low-Head Weirs' Design, Locations, and Monitoring & for Wetlands Stabilization	NMED Letter (CT# 07-0101) received 9/4/07 – Approval w/Direction LA/Pueblo Canyons Supp Inv Report	11/1/07	n/a	n/a	n/a	n/a
Outline for Groundwater Well Network Evaluation (Outline for TA-21 and LA/Pueblo Canyons)	Outline due 60 days before the Groundwater Well Network Evaluation Rep	11/1/07	n/a	n/a	n/a	n/a
Work Plan for Implementing the Recommendations Identified in Section 5.0 of Report	NMED Letter (CT# 07-0100) received 9/4/07 – Approval with Direction TA-54 Well Evals and Network Recommendations	11/12/07	n/a	n/a	n/a	n/a
First FY08 Period Monitoring Report (Pajarito #2 PMR, Los Alamos #2	Includes sampling rounds from 12/04/06, 3/19/07, and 6/25/07 Includes sampling rounds from 4/9/07 and 7/16/07	11/15/07	n/a	n/a	n/a	n/a
Groundwater well network evaluation	Evaluation for TA-21 LA/Pueblo Canyons	12/30/07	n/a	n/a	n/a	n/a
CY08						
Second FY08 Period Monitoring Report (Mortandad #3 PMR, Sandia #4 PMR, White Rock #2 PMR, Pajarito #3 PMR	Sampling round 9/06/07-9/21/07 Sampling round 9/06/07-9/21/07 Includes sampling rounds from 4/30/07 and 9/17/07 Sampling round 10/03/07-10/24/07	2/15/08	n/a	n/a	n/a	n/a

Table B-1 (continued)

Site/Activity	Deliverable Document	Due Date	Notice Date[a,b]	Actual Notice Date	New Due Date	New Notice Date
Remove Mortandad Canyon PRB		2/26/08	n/a	n/a	n/a	n/a
(Additional CY08 PMR dates not yet scheduled; also dates may shift as sampling rounds shift)	—	—	—	—	—	—
General Facility Information 2008	Report	3/31/08	n/a	n/a	n/a	n/a
Groundwater wells	Install South Canyon Wells, Pajarito Intermediate (3 intermediate, 2 regional)	3/31/08	n/a	n/a	n/a	n/a
R-36 well completion report	Report	5/2/08	n/a	n/a	n/a	n/a
Third FY08 Periodic Monitoring Report	Report	5/15/08	n/a	n/a	n/a	n/a
Fourth FY08 Periodic Monitoring Report	Report	8/15/08	n/a	n/a	n/a	n/a
Pajarito Canyon	Investigation Report – to NMED	9/30/08	6/28/08	n/a	n/a	n/a
Sandia Canyon	Investigation Report – to NMED	12/15/08	4/15/09	n/a	n/a	n/a
FY09						
CY09						
North Canyons (Guaje/ Barrancas/Rendija/Bayo)	Investigation Report – to NMED	6/30/09	9/28/09			
Cañada del Buey	Investigation Report – to NMED	8/31/09	11/29/09	—	—	—
FY10						
CY10						

Table B-1 (continued)

Site/Activity	Deliverable Document	Due Date	Notice Date[a,b]	Actual Notice Date	New Due Date	New Notice Date
Water Canyon/Cañon de Valle	Investigation Report – to NMED	12/31/10	4/30/11	—	—	—
FY11–15 activities have not been scheduled						

[a] "Notice Date" is described in Section III.M.2 of this Consent Order.

[b] If Respondents deliver documents after the deliverable due date, the Department's notice date shall be automatically extended by a period equal to the time the ocument was late.

[c] CY = Calendar year.

[d] n/a = Not applicable.