

Efficiencies in the Environmental Restoration Operations at Sandia National Laboratories, New Mexico - 12198

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ABSTRACT

The mission of the Environmental Restoration Operations at Sandia National Laboratories – New Mexico is to complete all necessary corrective actions at 268 legacy release soil sites and three groundwater Areas of Concern. Additional scope impacted the anticipated 2009 completion of corrective action at the remaining 32 soil sites and the three groundwater Areas of Concern. This additional scope is baselined to require 10 years (2011-2020) at an estimated cost of \$34 M to \$39 M. Efficiencies been proposed to reduce the impact of this recently realized additional corrective action scope:

- (1) Perform activities concurrently when possible to help reduce the length of the overall schedule;
- (2) Implement a “high-performance, one-pass” concept based on an early resolution of deficiencies in draft documents and attempt to avoid multi-submission cycles with long turnaround review times, and
- (3) Assess the appropriateness of progressing “at risk” from groundwater characterization to groundwater remediation using existing data, conceptual models and potential remedies.

The ongoing promotion and implementation of these ideas with the New Mexico Environment Department will produce scope and cost saving -- without any reduction in the protection of public health and the environment.

INTRODUCTION

The mission of Environmental Restoration (ER) Operations at Sandia National Laboratories – New Mexico (SNL) is to complete all necessary corrective actions at 268 legacy release soil sites and three groundwater Areas of Concern (AOCs). Additional work scope and regulatory delays impacted the anticipated 2009 closure of the ER cleanup operations, and efficiencies have been proposed to reduce the impact of the additional corrective action scope.

METHOD

Background

The majority of the legacy release sites at SNL result from past activities conducted at test sites and laboratory facilities. Some of the sites date back to SNL’s roots in the World War II's Manhattan Project when the Z Division of Los Alamos moved to Sandia Base outside of Albuquerque, New Mexico. The Z Division’s growth prompted its designation as Sandia

Laboratory, a separate branch of Los Alamos. Sandia Corporation assumed management responsibility for Sandia Laboratory in November 1949. The test sites include various firing sites, explosive test sites, burn sites, and other test sites such as rocket sled tracks and aerial cable drop sites. In addition to the test sites, several landfills and numerous dumps, burial sites, disposal pits, and oil spills required investigation and potential remediation. Potentially contaminated infrastructure associated with these sites included storm drains, waste lines and septic systems.

ER Operations are chartered with the identification, assessment and, if necessary, the remediation of sites that were formerly used for operations, testing and disposal. This assessment began formally in 1984, when the Department of Energy's (DOE's) Albuquerque Operations Office initiated the Comprehensive Environmental Assessment and Response Program to identify, assess, and remediate potentially hazardous waste sites. A similar assessment was conducted by the Environmental Protection Agency, Region VI in April 1987 during the Resource Conservation and Recovery Act (RCRA) Facility Assessment. These programs ultimately defined a working inventory of Solid Waste Management Units (SWMUs) to be investigated during the course of the ER Operations.

There are a total of 268 legacy release sites and three groundwater AOCs that are required to meet the corrective action requirements to remediate environmental releases under RCRA and the New Mexico Environment Department (NMED) requirements. Corrective actions at three of the 268 release sites are considered to be “deferred because of active-mission” and these sites are not addressed in the current baseline of activities. These three sites represent a future cleanup liability. Corrective action at the remaining 265 legacy sites and three groundwater AOCs must be accomplished as part of the Facility's RCRA Part B Permit, the Compliance Order on Consent (Consent Order) (2004) and the Final Order for the Mixed Waste Landfill (MWL) (2005).

The Consent Order provides the corrective action requirements and defines the schedules and deliverables. The purposes of the Consent Order are: 1) to determine the nature and extent of releases of contaminants at or from the sites; 2) to identify and evaluate, where needed, alternatives for corrective measures, including interim measures, to clean up contaminants in the environment, and to prevent or mitigate the migration of contaminants at or from the sites; and 3) to implement such corrective measures.

Through enforcement of the Consent Order, NMED may take the following actions, or some combination of the actions to enforce the requirements of the Consent Order: issue a compliance order seeking injunctive relief or civil penalties for noncompliance; file a civil action seeking injunctive relief or civil penalties for alleged violations of the Consent Order; and file an action seeking criminal penalties. The Consent Order further provides that “[if] *the Respondents violate any requirements of this Consent Order, the State's sole remedy for such noncompliance shall be to enforce those requirements pursuant to applicable law* ”. Fines of up to \$10,000 per day of noncompliance are possible.

Realization of Regulatory Uncertainty

The “realization of regulatory uncertainty” during 2008-2009 brought about the identification of additional compliance scope and milestones that require funding/completion:

- Requirement to further characterize the Tech Area V Groundwater AOC with three additional, deep soil vapor wells and four additional groundwater wells.
- Requirement to further characterize the perchlorate plume at the Burn Site Groundwater AOC with four new wells.
- Requirement to characterize groundwater at five SWMUs. At two of the SWMUs (149, 154), the characterization will be conducted using existing groundwater monitoring wells and at three of the SWMUs (8, 58 (co-located sites) and 68), no groundwater monitoring wells exist, and new wells are required. Figure 1 presents a photograph of the installation of a new monitoring well at SWMUs 8 and 58. All five of these SWMUs, where groundwater characterization is required, were on the proposed Corrective Action Complete (CAC) Permit Modification list. These five sites are identified as the “Re-Opened Soil Sites for Groundwater Assessment.”



Figure 1. Installation of a Monitoring Well at SWMUs 8 and 58 in 2011

- Anticipated requirement to further characterize groundwater at the Tijeras Arroyo Groundwater AOC with additional wells to determine corrective action.
- Long-term monitoring and maintenance plan and regulatory closure of the MWL with a public hearing.
- Regulatory closure process for the 26 CAC SWMUs, including a Class III Permit modification public hearing.
- Class III Permit Modification with public hearing (~18 month process) for each of the three groundwater AOCs to arrive at a final remedy.

Recognizing the additional compliance scope, SNL personnel were directed by the DOE's Office of Environmental Management (DOE/EM) in April of 2010 to close-out the existing "ER Project" and open a new "ER Operations" for future ER activities. SNL personnel were asked to submit a Critical Decision (CD)-4 project completion package along with CD-1-like document (alternative selection and cost range) defining activities and costs to complete the remaining and additional compliance scope.

Critical Decision-4 and Critical Decision-1 Packages

On June 9, 2010, SNL personnel submitted a CD-4 closeout package (recognizing that the last known field cleanup activity was completed in September, 2009) and a CD-1-like document titled the *Sandia National Laboratories, Resource Loaded Scope, Schedule & Cost for the Sandia National Laboratories Operations Activities for the Remaining Administrative and Post CD-4 Cleanup Requirements from PBS VL-SN-0030 Soil and Water Remediation*, or simply the Scope, Schedule & Cost for Post CD-4 Cleanup Requirements.

The Scope, Schedule & Cost for Post CD-4 Cleanup Requirements included a resource-loaded baseline for the following:

- (1) Complete characterization and corrective action process at the three groundwater AOCs
- (2) Complete characterization and corrective action process at the five re-opened soil sites for groundwater assessment, and
- (3) Complete regulatory closure on the remaining sites (the Chemical Waste Landfill, the MWL, and the 26 SWMUs in the CAC process).

The resource-loaded baseline shows a cost range of \$34 M to \$39 M (50% and 80% Confidence Level, respectively) and a schedule of FY2011 to FY2020 for the additional compliance scope. Table I presents the funding profile from the Scope, Schedule & Cost for Post CD-4 Cleanup Requirements. This additional scope is being realized during at time of shrinking Federal and State budgets. A shrinking budget (Federal and/or State) does not justify non-compliance, but it does provide a more urgent incentive to continue to seek additional efficiencies.

Table I. Funding Profile for Baselined SNL ER Operations

Total ER	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	Total
**Escalated Spendplan Total	4.948	5.020	4.917	3.784	3.496	2.559	2.829	2.254	1.629	1.451	32.887
Monte Carlo Analysis 50% Escalated (Includes MR)	5.196	5.110	5.201	3.892	3.792	2.572	2.903	2.392	1.687	1.463	34.209
Monte Carlo Analysis 80% Escalated (Includes MR)	5.321	5.359	5.651	4.346	4.354	3.035	3.522	2.983	2.162	1.929	38.662

RESULTS

The Integrated Project Team carefully reviewed the remaining ER activities and identified three areas where efficiencies may be realized. These efficiencies were proposed during the June 2011 site visit/tour of SNL by New Mexico's Cabinet Secretary and Deputy Secretary of the Environment. The DOE/Sandia Site Office (DOE/SSO) recommended efficiencies for NMED's consideration are:

- ❖ Use a “high-performance, one-pass” process for documents

SNL documents (such as characterization work plans) commonly receive a Notice of Disapproval (NOD) from the NMED. Resolution of each NOD adds six to eight months to the schedule (NOD response time plus NMED approval time), with corresponding cost increases. Early and better communication on document submittals could reduce the need for an NOD. For example, technical staff can meet on a submittal prior to delivery to discuss potential issues; or, if that is not practical, staff can meet regarding technical concerns after a document has been submitted but prior to issuance of a NOD.

A document containing shortcomings, can still achieve “approval with conditions” which is more efficient than an NOD with its six to eight month cycle time. Summary points:

- ✓ Early resolution of gaps in draft documents (assess content adequacy)
- ✓ Attempt to avoid multi-submission cycles on documents and long turnaround review times.

- ❖ Perform activities concurrently when possible

Many ER activities have to be performed in series. For example, a field investigation work plan must be finalized prior to conducting field investigations. However, efficiencies can be realized when documents or work can be completed concurrently. For example, a site closure report can be prepared at the same time as a long-term monitoring and maintenance plan for the site. Summary point:

- ✓ Assess the benefit of performing concurrent activities to help reduce any potential schedule impacts (assess applicability to priority 1 and 2 items in Table II below).

- ❖ Assess the appropriateness of using existing data to proceed from groundwater characterization to groundwater corrective action (remediation).

The majority of the additional ER work scope at SNL is associated with groundwater. There is known groundwater contamination at the three groundwater AOCs and SNL will be conducting additional groundwater characterization at the five re-opened soil sites. These groundwater related activities define the critical path for completion of ER activities at SNL. Currently, eight quarters of groundwater analysis is required prior to decision making, and high-resolution characterization has been desirable. In the vast majority of cases, the characterization data does not change from quarter to quarter, and work could move forward, during the analysis of the last four quarters of data. It is recognized that proceeding on four quarters of data (while the last four quarters of data are being gathered) would be “at risk.” Additionally, it is SNL personnel’s opinion that higher-resolution groundwater characterization does not necessarily change the key parameters associated with the selection of a corrective action (where the key parameters are the nature of the source term in the groundwater and the receptors). Summary points:

- ✓ Assess option of proceeding at-risk with four quarters of data, while the last four quarters of data are gathered
- ✓ Assess the adequacy of existing groundwater data and conceptual models for the remedy selection process.

The remaining ER scope is listed in DOE/SSO priority order in Table II. DOE/SSO believes that the recommendations described above, or in some combination, can help complete the listed tasks in an environmentally sound manner with cost and schedule improvements.

Table II. Remaining ER Scope in DOE/SSO Priority Order

Scope	Priority	Status
Regulatory Closure of the Mixed Waste Landfill (soil cover remedy implemented 2009)	1	Closeout depends on approval of: (1) Corrective Measures Implementation (CMI) Soil Cover Report (completed) (2) Long-term Monitoring & Maintenance Plan (3) Completion of Class III Permit Modification Request
Complete Characterization and Identify Final Remedy for the Burn Site groundwater AOC, Contamination: Nitrates at 0 to 35ppm (standard 10ppm); plus Perchlorate at 0 to 9ppb (no drinking water standard); if detected at 4ppb, Compliance Order on Consent (Consent Order) requires evaluation of nature & extent; if no MCL at time of CME then use Haz Index = 1.0 with residential scenario	2	Groundwater monitoring and reporting continues at present. Requires approval of Corrective Measures Evaluation (CME) Report and selection of a final remedy through Class III Permit Modification process.
Complete Characterization and Identify Final Remedy for the Tech Area-V groundwater AOC Contamination: Nitrates at 0 to 12ppm (standard 10ppm); plus	2	Same as above.

Scope	Priority	Status
Trichloroethylene (TCE) at 0 to 16ppb (standard 5ppb)		
Complete Characterization and Identify Final Remedy for the Tijeras Arroyo Groundwater AOC Contamination: Nitrates at 0 to 30ppm (standard 10ppm), plus Trichloroethylene (TCE) at 0 to 7ppb (standard 5ppb)	2	Same as above.
Class III Permit Modification Request (CAC) for 26 Soil Release Sites	3	Approval of this permit modification request is linked to renewal of the SNL RCRA Facility Permit that is in progress.
Soil Sites 8, 58 & 68: GW evaluation	4	Installation of five new GW wells and 8 quarters of groundwater monitoring. Well installation completed.
Soil Sites 149 & 154: GW evaluation	5	Use existing monitoring wells to characterize groundwater.

SUMMARY

DOE/SSO developed and presented to the NMED three areas where efficiencies in ER Operations may be realized. The NMED has not formally responded to these proposals, but in discussions with NMED in the fall of 2011 the NMED is conceptually supportive of these proposals. NMED cannot commit to an outcome (such as no NOD), but NMED is very willing to seek efficiencies that will reduce the overall scope, while achieving regulatory compliance and considering public input.

The challenge of finding efficiencies to reduce the new schedule and cost has become even more of a necessity due to shrinking budgets. A prioritization of remaining activities has been discussed with the regulatory authority. Efficiencies in the ER Operations at SNL have been proposed to reduce the impact of recently realized regulatory delays and additional corrective action scope. The ongoing promotion and implementation of these ideas with the NMED will produce scope and cost saving, without any reduction in the protection of public health and the environment.