LESSONS LEARNED THROUGH OPTIMIZATION OF THE VOLUNTARY CORRECTIVE ACTION PROCESS

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ABSTRACT

Valuable experience in environmental remediation was gained at Sandia National Laboratories/New Mexico (Sandia) by concurrently conducting Voluntary Corrective Actions (VCAs) at three Solid Waste Management Units (SWMUs). Sandia combined the planning, implementation, and reporting phases of three VCAs with the goal of realizing significant savings in both cost and schedule. The lessons learned through this process have been successfully implemented within the Sandia Environmental Restoration (ER) Project and could be utilized at other locations with multiple ER sites.

All lessons learned resulted from successful teaming with the New Mexico Environment Department (NMED) Hazardous Waste Bureau (HWB), Sandia management, a Sandia risk assessment team, and Sandia waste management personnel. Specific lessons learned included the following: 1) potential efficiencies can be exploited by reprioritization and rescheduling of activities; 2) cost and schedule reductions can be realized by combining similar work at contiguous sites into a single effort; 3) working with regulators to develop preliminary remediation goals (PRGs) and gain regulatory acceptance for VCA planning prior to project initiation results in significant time savings throughout the remediation and permit modification processes; 4) effective and thoughtful contingency planning removes uncertainties and defrays costs so that projects can be completed without interruption; 5) timely collection of waste characterization samples allows efficient disposal of waste streams, and 6) concurrent reporting of VCA activities results in significant savings in time for the authors and reviewers.

INTRODUCTION

The Environmental Restoration (ER) Project at Sandia National Laboratories New Mexico (Sandia) has responsibility for all environmental investigations and remediations at Solid Waste Management Units (SWMUs) listed on the Sandia Resource Conservation and Recovery Act (RCRA) permit. Many of the remediations are conducted as Voluntary Corrective Actions (VCAs) that do not require regulatory approval prior to implementation. A streamlined approach to combining VCAs at three contiguous SWMUs was implemented in Operable Unit (OU) 1333, Canyons Test Area. Illustrated in the following sections are six fundamental lessons that were learned through optimization of the VCA process, which resulted in significant cost and schedule savings.

THE VCA PROCESS

Guidance issued by the New Mexico Environment Department Hazardous Waste Bureau (NMED HWB) RCRA Permits Management Program define the VCA process. VCAs are part of the Accelerated Corrective Action Approach, which is an enhancement of the sequential process generally followed under RCRA Corrective Action. VCAs are typically low cost, short-term corrective actions intended for fairly simple sites where the remedy is obvious. VCAs may be implemented at risk by the facility without prior approval from NMED and are often intended as final remedies. However, approval of the VCA must be obtained from NMED prior to the SWMU being approved for No Further Action (NFA) and modification of the Hazardous and Solid Waste Amendments (HSWA) module of the RCRA part B permit.

SITE BACKGROUND

VCAs were conducted concurrently at three contiguously located SWMUs; 94B, 94C, and 94F in the Canyons Test Area, located in the Manzanita Mountains on Kirtland Air Force Base (Figure 1).

SWMU 94B, Debris Mound/Soil Pile, consisted of a soil mound of irregular surface area that contained some visible debris. It was established as a site because of the lack of available information about past activities that may have created the mounds and the presence of beta/gamma radiological anomalies. During removal of the mounds depleted uranium (DU) was discovered.

SWMU 94C, Bomb Burner Area and Discharge Line, was an underground corrugated culvert extending from the Bomb Burner Unit to a discharge pit. The Bomb Burner Unit itself had previously been decontaminated and decommissioned. The interior of the corrugated culvert had fixed radiological contamination and during the RCRA Facility Investigation (RFI) DU contamination was discovered in the surrounding soil.

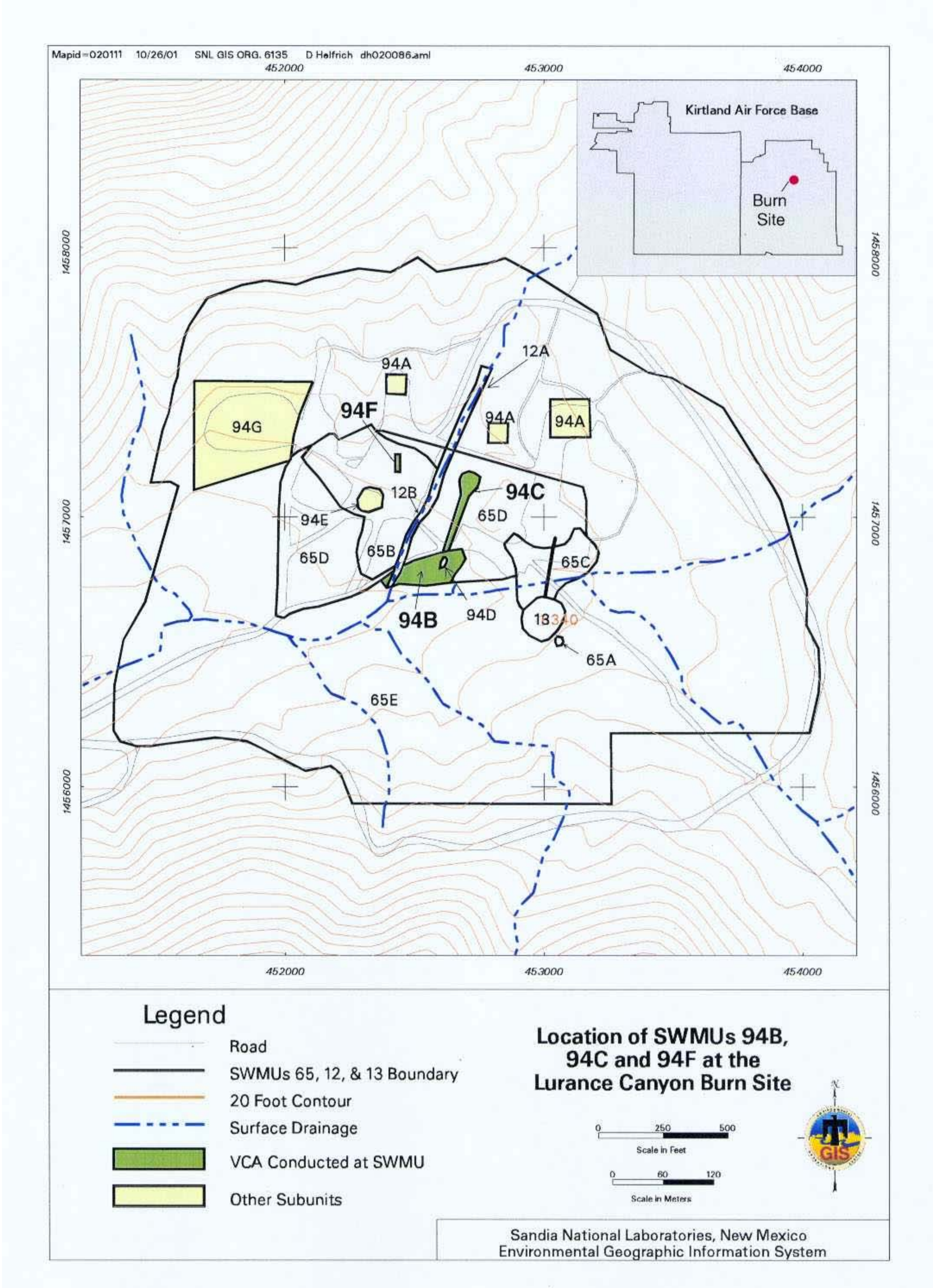

Fig. 1. Location of SWMUs

SWMU 94F, Light Airtransport Accident Resistant Container (LAARC) Discharge Pit, consisted of the southern half of a shallow, open rectangular trench located approximately 50 ft south of the LAARC Unit. The discharge pit received all jet propulsion fuel grade 4 (JP-4) contaminated wastewater from operation of the LAARC Unit.

OPTIMIZING THE VCA PROCESS

Optimizing the VCA process involved streamlining the planning, implementation, and reporting phases to achieve the goals of reducing the overall schedule and cost. Critical to this approach was the teaming of all the key stakeholders in the process: NMED HWB personnel, Sandia management, Sandia risk assessment team, and Sandia waste management personnel. The NMED HWB has responsibility for regulatory oversight of the Sandia project, therefore their concurrence on the approach was key to it's success. Sandia management was responsible for approving the overall streamlined approach, associated baseline cost and schedule modifications, and obtaining Department of Energy (DOE) approval. The Sandia risk assessment team was responsible for assuring the data generated was sufficient to support a human health and ecological risk screening assessment and NFA decision for the SWMUs. Sandia waste management personnel had responsibility for the characterization and disposal of all generated wastes.

Planning

Lesson Learned - Potential efficiencies can be exploited by reprioritization and rescheduling of activities.

The baseline originally developed for the three SWMUs had scheduled the VCAs separately over two fiscal years. These estimates were evaluated for potential cost and schedule efficiencies. The evaluation showed that by reprioritizing a number of tasks within OU 1333 the VCAs could be conducted concurrently as one field effort with a minimal increase in the overall fiscal year (FY) 00 budget. In addition, a significant reduction in the FY01 budget would be realized by this reprioritization.

Lesson Learned - Cost and schedule reductions can be realized by combining similar work at contiguous sites into a single effort.

Sandia management agreed with the streamlined approach to concurrent implementation of the three VCAs. The VCA for SWMU 94C was moved into FY00 and lesser priority work was moved out to FY01. The changes to the baseline constituted an increase of approximately $90,000 to the original FY00 budget, but moved the completion of the 94C VCA eight months ahead of schedule. The optimized approach decreased the FY01 budget for OU 1333 by $150,000 and included the submission of the NFA proposals for the three SWMUs in FY01, one of them a year ahead of schedule. Changes were documented in a Baseline Change Proposal (BCP) which was submitted to the DOE for approval. The DOE was encouraged with the proposed approach and approved the increased funding for OU 1333.

Lesson Learned - Working with regulators to develop preliminary remediation goals (PRGs) and gain regulatory acceptance for VCA planning prior to project initiation results in significant time savings throughout the remediation and permit modification processes.

At the initiation of project plan preparation a meeting was held with NMED to discuss the streamlined approach to the VCAs. NMED embraced the optimized approach that was proposed and agreed to work closely with Sandia to assure project success. The risk assessment team evaluated the RFI data and developed a PRG of 100 milligrams per kilogram (mg/kg) diesel range organics (DRO) for the petroleum-contaminated soil at SWMU 94F, which was accepted by NMED. In addition, the risk team specified the analytical parameters and sample density that would be required to support the risk assessment screening process for the SWMUs.

Preparation of project plans was streamlined by the concurrent implementation of the three VCAs. All of the VCAs involved excavation, field screening, and waste segregation as their primary field activities. Three separate VCAs plans were developed but the level of effort and schedule for their completion was reduced by approximately 25 percent. Once the VCA plans were drafted the details of the technical approaches were discussed with NMED and their comments incorporated. Regulatory involvement throughout the planning process helped assure future acceptance of the NFA proposals for the SWMUs.

Waste Management personnel were brought into the process during the planning phase to assure that all anticipated waste streams were properly characterized. Waste Management was responsible for determining the waste acceptance criteria for the waste disposal facilities and defining waste characterization sampling requirements. Radiologically-contaminated soil and metal would be disposed of at the Nevada Test Site and petroleum-contaminated soil would be disposed of at a local permitted NM facility. Up front waste management planning aided in efficient and timely disposal.

Lesson Learned - Effective and thoughtful contingency planning removes uncertainties and defrays costs so that projects can be completed without interruption.

Preliminary work included contingency planning to cover uncertainties in the project. Historic operations in OU 1333 made the potential for discovery of unknown radiological contamination a possibility. A radioactive waste staging area, radiation protection support, and a contracted disposal facility were all available so that disruption of field activities would be minimized if unexpected contamination was encountered. The volume of waste to be generated could not be accurately estimated prior to initiation of the VCAs but funds from anticipated efficiencies were identified up-front to cover potential overruns. Field activities were scheduled to minimize disruption and achieve a continuous work flow. By conducting the VCAs consecutively, remediation activities could be conducted at one SWMU while awaiting confirmatory results from another.

Implementation

Implementation of the three VCAs required only one mobilization/demobilization of equipment and personnel and the entire field effort from initiation to final waste disposal was conducted over a six-month period. Efficiencies in cost and schedule were realized by conducting only one kickoff meeting, having a dedicated field crew for the duration, obtaining extended leases on field equipment, and using standby time caused by unforeseen delays for equipment maintenance, and records management.

Throughout the field effort unexpected conditions were encountered. At SWMU 94F the original estimate of 800 cubic yards (cy) of petroleum-contaminated soil increased to 1,200 cy. This increase in waste volume necessitated expansion of the waste staging area, increased waste characterization sampling, and detailed evaluation and planning to cover budget impacts. In addition, contamination extended into bedrock and approximately 100 cy of weathered bedrock required excavation and segregation from the soil. During excavation of uncontaminated overburden at SWMU 94F a DU hot spot was encountered outside the site boundary. Despite the unexpected discovery of DU field activities continued uninterrupted. While conducting excavation of the DU hot spot, performing radiological surveys, and collecting confirmatory samples, the VCA at SWMU 94C was initiated. The radiologically-contaminated corrugated metal pipe and DU-contaminated soil were excavated during what normally would have been standby time for much of the field crew. The flexibility of conducting three VCAs concurrently allowed field activities to proceed uninterrupted and downtime was kept to a minimum by rescheduling activities.

Lesson Learned - Timely collection of waste characterization samples allows efficient disposal of waste streams.

When areas of high contamination were excavated (based on field screening) waste characterization samples, representing the worst-case scenario, were collected for analyses. Up front collection of waste characterization samples provided waste management personnel the opportunity to review results and transmit them to the disposal facilities well in advance of shipment. Thus, potential delays caused by the disposal facilities review and acceptance of waste characterization data were avoided and waste staging area compliance was assured.

Following completion of the excavation at SWMU 94F confirmatory samples were collected from the base of the excavation. The excavation remained open while the other two VCAs were completed and results from the confirmatory samples were reviewed by the risk assessment team to assure the site would pass the risk screening process.

Throughout the project the incurred costs were reviewed against the baseline and potential efficiencies in remaining tasks were evaluated to off set the over runs in waste management costs. Sandia management was updated regularly on the progress of the VCAs and approved all expenditures of funds and modified estimates to complete. Field activities progressed ahead of schedule and cost savings realized by decreased labor were applied to waste management over runs.

Key to the success of the entire field project were weekly meetings with NMED personnel to evaluate progress and discuss the latest results. Petroleum contamination extending into bedrock at SWMU 94F was technically impractical to remove, therefore, the agreed upon PRG of 100 mg/kg DRO could not be achieved. Discussions with NMED resolved the issue. NMED concurred that the majority of the source material had been removed with the soil. Continued monitoring of low level petroleum-related contamination detected in the groundwater at the site would allow future evaluation of the overall effectiveness of the VCA. Although the PRG had not been achieved, regulatory interaction throughout the VCA allowed Sandia to proceed with the NFA process for the SWMU and to decouple soil and groundwater contamination.

Reporting

Lesson Learned - Concurrent reporting of VCA activities results in significant savings in time for the authors and reviewers.

All three NFA proposals were written consecutively by one author and submitted to NMED in FY01. The author followed a similar format for all three proposals, which greatly reduced the overall writing time. The NMED Oversight Bureau reviewed all draft NFA proposals prior to submittal for management review. The editing, document production, and peer, management, and DOE reviews were simplified by having all three VCAs completed the same FY. The NMED was able to review and approve all three NFA proposals the same FY. This expedited review by NMED was possible due to reporting being accomplished soon after the completion of the VCAs. A cost savings of approximately $15,000 was realized in the final phase of the project due to the efficiencies of concurrent reporting.

CONCLUSIONS

Optimization of the VCA process was achieved by combining the planning, implementation, and reporting of the three VCAs and working closely with the regulators and stakeholders. Cost savings were realized through efficiencies gained by the streamlined process which reduced the overall schedule significantly. With the funding fluctuations seen throughout the DOE the Sandia ER Project regularly implements lessons learned from projects such as this. Sandia management consistently evaluates the ER baseline to reprioritize work, place milestones on the critical paths, and make the most efficient use of available resources.

Specific lessons learned, and examples of their effect on the project, include:

1. Potential efficiencies can be exploited by repriortization and rescheduling of activities:

    - Combing the three VCAs and moving lower priority work out to the following FY significantly streamlined the planning, implementation, and reporting phases and maximized the effectiveness of available personnel and financial resources.

2. Cost and schedule reductions can be realized by combining similar work at contiguous sites into a single effort:

- Combing the three VCAs reduced the total overall cost by approximately 15%, despite significant increases in waste volume.
- No Further Action proposals for all three SWMUs were submitted as DOE performance measures in one FY, one of them a year ahead of schedule.
- Conducting all three VCAs in FY00 reduced the FY01 budget by $150,000 while only increasing the FY00 budget by $90,000.

3. Working with regulators to develop PRGs and gain regulatory acceptance for VCA planning prior to project initiation results in significant time savings throughout the remediation and permit modification process:

- Clearly defined end points were established prior to beginning field activities.
- Regulatory buy-in on the technical approach was received up front. Although the remedial actions were voluntary the risk of not receiving final regulatory acceptance was greatly reduced.
- Day-to-day regulatory interaction allowed understanding of difficulties encountered while conducting the VCAs and potential issues to be resolved in real time, avoiding misunderstandings that could delay site closure.

4. Effective and thoughtful contingency planning removes uncertainties and defrays costs so that projects can be completed without interruptions.

- The potential for discovery of unknown DU contamination was factored into the overall schedule and budget.
- The volume of waste to be generated could not be accurately estimated so funds from anticipated efficiencies were identified up-front to cover potential overruns.
- Continuous work flow was achieved by concurrently conducting the three VCAs.

5. Timely collection of waste characterization samples allows efficient disposal of waste streams:

- Collecting worst-case scenario waste characterization samples up front allowed results to be received, validated, reviewed, and transmitted to the disposal facility well in advance of shipment requirements and assured compliance.

6. Concurrent reporting of VCA activities results in significant savings in time for the author and reviewers.

- One author was responsible for all three NFA proposals, providing consistency in format and content.
- Data management, data validation, writing, editing, and peer, management, and DOE reviews were all streamlined by producing the NFA proposals in one FY.
- NMED review and approval were streamlined by submitting NFA proposals shortly after the completion of the VCAs.