ANL/EA/CP--84325

An Accelerated Remedial Strategy Developed for J-Field, Aberdeen Proving Ground, Maryland

Conf-950451--2

by

C. Ron Yuen (708) 252-4869
Louis Martino (202) 488-2422
Terri Patton (708) 252-3294
Argonne National Laboratory
9700 South Cass Avenue
Argonne, IL 60439

John Wrobel
(410) 671-4840
U.S. Army Directorate of Safety, Health, and Environment
Attn: STEAP-SH-ER
Building E-4430
Aberdeen Proving Ground, MD 21010

DISCLAIMER

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

An Accelerated Remedial Strategy Developed for J-Field, Aberdeen Proving Ground, Maryland

by

C. Ron Yuen (708) 252-4869
Louis Martino (202) 488-2422
Terri Patton (708) 252-3294
Argonne National Laboratory
9700 South Cass Avenue
Argonne, IL 60439

John Wrobel
(410) 671-4840
U.S. Army Directorate of Safety, Health, and Environment
Attn: STEAP-SH-ER
Building E-4430
Aberdeen Proving Ground, MD 21010

Abstract

For an installation with many disposal sites and multiple contaminant sources, successful remediation at minimum cost can be complicated by insufficient geologic and hydrogeologic information, incomplete records of historical disposal activities, and uncertainty about the effectiveness of different investigative methods. To reduce these uncertainties and to increase the probability of successful remediation at minimum cost, a "phased and pilot" accelerated remedial strategy has been developed for the J-Field area of Aberdeen Proving Ground, Maryland.

The strategy includes four phases. First, the most contaminated site is selected as a pilot for detailed investigation. Second, the most contaminated areas within the pilot site are chosen as a pilot source area for interim action study, and a remedial action is developed to remove the primary contaminant sources. The subsequent sitewide investigation uses the effective tools developed in the first phase. Third, a cleanup operation is initiated in the pilot source area, while a sitewide feasibility study is developed by taking advantage of lessons learned in the interim action. Fourth, a sitewide cleanup operation proceeds.

I. Introduction

A successful hazardous waste site cleanup must begin with a well-planned site characterization program. However, the planning is constrained by many uncertainties, such as the lack of information about the site operational history and site-specific geological and hydrological conditions, the applicability of various field methods, the readiness of involved parties, and logistical supports for the site operator and sponsor. A military waste-disposal site poses further challenges because of the potential presence of unexploded ordnance (UXO) and chemical warfare agents (CWA).

---

* Work supported under a military interdepartmental purchase request from the U.S. Department of Defense, U.S. Department of the Army, Aberdeen Proving Ground, Directorate of Safety, Health, and Environment, through U.S. Department of Energy contract W-31-109-Eng-38.

Several accelerated remediation strategies have been developed for Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) sites in the past few years (Burton et al. 1994; Carlson and Wittreich 1992; Garland and Hammond 1993; OSWER 1989, 1992). Most of these strategies emphasize the use of early action at subsites that pose immediate public health or environmental threats while the whole site is studied (Carlson and Wittreich 1992; Garland and Hammond 1993; OSWER 1989, 1992). Little attention is given to the strategy of remedial investigation (Burton et al. 1994) and logistical support from other involved agencies and parties. In this paper, we integrate the U.S. Environmental Protection Agency's Superfund Accelerated Cleanup Model concept and present a "phased and pilot" strategy for remedial investigation and site remediation. This strategy has been developed for a complicated hazardous waste site that includes many disposal sites and contaminant sources. As a case study, we discuss how the strategy was applied at J-Field, a military waste-disposal site being investigated under CERCLA at Aberdeen Proving Ground, Maryland. The strategy allows the investigative team to apply a "lessons learned" approach by choosing a pilot study area to accelerate the remedial investigation/feasibility study process while testing various field methods. The investigation at the pilot study area also aids the team in working out logistical details with the Army and learning about issues of concern to local citizens. This approach has increased the team's efficiency and accuracy in identifying and characterizing other areas of concern (AOCs), which translates into overall time and cost benefits for the project.

II. Strategy for Remedial Investigation and Remediation

The main objective of the accelerated strategy is to minimize the financial cost and time required for the sitewide remedial investigation and site remediation. To increase the efficiency of the data-collection process, two major factors were considered: (1) the investigative methods and remediation technologies used and (2) the coordination of logistical support with other involved agencies and parties. Good investigative methods are essential to efficiently locating contaminant sources and determining the extent of contamination. Therefore, selection of the most appropriate investigative methods can have tremendous impact on the cost and schedule of the remedial investigation. Similarly, the choice of remediation technologies affects the acceptability of the solution to the stakeholders and defines the time required to complete remediation.

The strategy is a combination of "phased and pilot" approaches (Figure 1). In Phase I, the most contaminated area is selected as a pilot study area, on the basis of preliminary assessments. The pilot area is vigorously investigated by various direct and indirect methods. Significantly fewer investigation activities are carried out in other AOCs. Meanwhile, coordination is initiated with supportive parties, including sponsor, site operator, technical escort for UXO clearance, and subcontractors for CWA monitoring. This is a learning phase meant to seek out the most effective investigative tools under site-specific logistical, geologic, and hydrogeologic conditions and to find the most time-saving approaches for working with the different administrative systems of various parties.

In Phase II, an effective investigative protocol is developed for each type of waste disposal site. A cooperative relationship is cultivated among various contacts of involved parties to maximize logistical support. Meanwhile, a better understanding is obtained of the response time from each party. This information is used to plan and implement the remedial investigation activities for all AOCs. Because many areas of uncertainty have been reduced, the investigation can be accelerated; moreover, the efficiency of delineating the contaminated area is improved. For the pilot area, a study of interim actions is initiated to clean up one of the contaminant sources (pilot source area). The results of the study will be used to develop effective methods for sitewide cleanup.

Phase	Pilot Source Within Pilot Area	Pilot Area	Sitewide	Remarks
Phase I	Extensive investigation	Extensive investigation	Limited investigation	To find effective investigatory methods and streamline logistic supports.
Phase II	Interim remediation study	Extensive investigation	Extensive investigation	Apply what was learned in Phase I to the sitewide investigation.
Phase III	Interim remediation	Feasibility study	Feasibility study	Apply what was learned from interim remediation to sitewide cleanup.
Phase IV	Cleanup	Cleanup	Cleanup	Sitewide cleanup.

Figure 1. "Phased and Pilot" Approach

In Phase III, the cleanup operation is begun for the contaminated media from the pilot source area. Meanwhile, a feasibility study for sitewide cleanup is initiated and takes advantage of lessons learned in the interim action.

Phase IV involves sitewide cleanup. The treatment facilities built for the interim action are re-used or expanded to accommodate the needs for the sitewide cleanup, thereby reducing the capital investment of the remediation operation.

III. Application of the Strategy at J-Field

J-Field consists of more than eight AOCs. Archival information indicates that most of the AOCs were used for the open burning of CWA and hazardous wastes and for the detonation of munitions. Many AOCs have several subareas, including burning pits (either exposed or buried), open disposal and pushout areas, and detonation craters. The burning pits are linear trenches where waste was burned. After burning, combustion residuals (such as scrap metal, shell casings, waste containers, and refractory chemical wastes) were pushed out from the trenches into adjacent marshes, creating "pushout" areas. Open disposal included demolition of explosives and disposal of liquid smoke. The burning pits and pushout areas represent the most likely sources of contamination at J-Field.

Archival information, including limited results from past groundwater, surface water, soil sampling surveys, and the concerns of regulatory agencies, indicates that the Toxic Burning Pits AOC is the most contaminated site at J-Field; therefore, it was chosen as the pilot study area of the remedial investigation. The Toxic Burning Pits AOC consists of five burning pits, some exposed and some buried. Investigatory efforts focused on the pilot area with a combination of aerial photographic interpretation, geophysics (ground penetrating radar, electromagnetics, magnetic survey), passive soil-gas sampling, and portable X-ray fluorescence analysis of inorganics in surface soils. In addition to interacting with regulatory agencies during the development and execution of the investigation, extensive coordination efforts occurred among different

departments of the U.S. Army to arrange UXO clearance in the sampling locations, to install borings, to monitor CWA during the boring, and to access the site.

The effective investigative methods developed for burning pits at J-Field include a combination of aerial photographic analysis, geophysics surveys, and passive soil-gas survey. The aerial photographic analysis (Yuen 1994) helped to identify the approximate locations of burning pits that have been filled. The soil-gas monitoring surveys (Prasad and Martino 1994) facilitated further identification of potential volatile organic compound hot spots within pits and characterization of the nature of volatile organic compound contaminants present in the pits. A better delineation of the pits boundaries is made possible by using the ground penetrating radar, electromagnetic, and magnetic methods with very fine-spaced grids.

For the pushout areas and the surface disposal areas, a combination of aerial photographic analysis and field-portable X-ray fluorescence analysis is useful to characterize the extent of metals contamination in surface soils. Because a large number of surface soil locations can be examined within a short period of time, the X-ray fluorescence is a very effective tool for delineating metal-contaminated areas (Martino et al. 1994) when the technique is combined with aerial photographic analysis. A more focused subsequent sampling and analysis effort can be designed to confirm the delineation.

We are currently applying these effective investigative methods to the characterization of burning pits and pushout areas at other J-Field AOCs. Meanwhile, a cooperative working relationship has been developed with various departments of the U.S. Army. One burning pit and a pushout area have been selected for interim remedial action. The lessons learned from that interim remedial action will be used for sitewide cleanup.

IV. Measures of Success

Even though a complete analysis of cost savings is not yet possible, several measures of success can be applied to the accelerated remedial strategy. One measure of success is the identification of unknown contaminant sources. By using our field approach, we found several buried burning pits missed by previous investigators. Also, several undocumented surface disposal sites have been identified at J-Field in a short time.

Another measure of success is the acceptability of the technical conclusions of the remedial investigation. The methodologies used to find potential contaminant sources have been shown to be effective in the pilot area. When applied to sitewide investigation, the methodologies help us to justify that the remedial investigation is comprehensive and that the technical conclusions of the investigation have merit. The credibility will increase the acceptability of the technical conclusions to various stakeholders.

V. Conclusions

By applying the "phased and pilot" strategy, we have been able to better plan our remedial investigation and decrease uncertainty. The combination of investigative methods has been effective in finding previously unknown disposal sites and in characterizing potential contaminant sources. This information makes a comprehensive remedial investigation at J-Field possible.

Because investigatory effort in Phase I has been concentrated in the pilot study site, we were able to better allocate our human resources and did not overload our supportive parties. The cooperative working relationship we have cultivated among the parties and the success finding effective investigative methods in

the first phase allow us to accelerate the remedial investigation in the second phase. Because the pilot contaminant source area has been characterized fairly quickly, an interim remediation action can be implemented as other areas are undergoing remedial investigation. The remedial facility built for the pilot source area can be used later for the cleanup of other contaminated sites.

VI. References

Burton, J.C., J.L. Walker, T.V. Jennings, P.K. Aggarwal, B. Hastings, W.T. Meyer, C.M. Rose, and C.L. Rosignolo, "Expedited Site Characterization: A Rapid, Cost-Effective Process for Preremedial Site Characterization," *Proceedings of SUPERFUND XIV Conference and Exhibition*, Vol. II, pp. 809-826, Hazardous Materials Control Resources Institute, Rockville, Maryland, 1994.

Carlson, R.H., and C.D. Wittreich, "Implementation of the Hanford Past-Practice Strategy for the 200 Areas," Nuclear and Hazardous Waste Management International Topical Meeting, Boise, Idaho, August 23-27, 1992.

Garland, S.B., II, and R. Hammond, "Source Control Strategy Accelerates Remediation," 1993 Federal Environmental Restoration Conference & Exhibition, Washington, D.C., May 25-27, 1993.

Martino, L., J. Wrobel, E. Cho, and J. Sandler, "In-Situ Analysis of Soil at an Open Burning/Open Detonation Disposal Facility: J-Field, Aberdeen Proving Ground, Maryland," Ninth Annual Conference on Contaminated Soils, University of Massachusetts, Amherst, October 17-19, 1994.

OSWER (Office of Solid Waste and Emergency Response), "Accelerated Response at NPL Sites Guidance," OSWER Directive No. 9200.2-02, December 15, 1989.

OSWER, *The Superfund Accelerated Cleanup Model (SACM)*, OSWER Publication 9203.1-021, November 1992.

Prasad, S., and L. Martino, unpublished information, Argonne National Laboratory, Argonne, Illinois, 1994.

Yuen, C.R., *Identification of Potential Areas of Concern at J-Field, Aberdeen Proving Ground, Maryland*, TU-13/ANL/APG/J-F/RI, Argonne National Laboratory, Argonne, Illinois, 1994.