ENVIRONMENTAL RESTORATION PROGRAM INTERIM ACTION CASE STUDIES

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ABSTRACT

The Environmental Restoration Program for the Albuquerque Operations office of DOE is tasked with complying with RCRA/CERCLA and NEPA. Therefore, before remediation of a site can be initiated, a NEPA Record of Decision (ROD) must be approved, along with either a CERCLA ROD or approval of a RCRA Closure Plan. Sometimes, however, situations arise that make it necessary to initiate cleanup prior to the approval of a NEPA ROD. For these cases, several actions are available. These are: 1.) Under RCRA, perform an interim action in order to stop or reduce the impact to human health or the environment, 2.) Under CERCLA, perform a removal action in order to stop or reduce the impact to human health or the environment, 3.) Perform an emergency action to protect human health or the environment.

This paper presents two case studies that were initiated to protect human health and the environment by reducing or containing the spread of contamination in a shallow groundwater aquifer: in one case, action was taken because the contamination was spreading off-site, and in the other case because the aquifer was a primary source of drinking water. These sites are designated the 4.5-Acre Site which is at the Pinellas Plant in Largo, Florida, and the Area B Groundwater, which is at the Mound Plant in Miamisburg, Ohio.

This paper presents the background for each site, the regulatory requirements of each site, the problems encountered, the time frame for implementation, the results of each to date, and any future actions.

INTRODUCTION

The Environmental Restoration (ER) Program was initiated in 1986 by the Albuquerque Operations office of the Department of Energy (DOE)in order to fulfill its obligations under the following laws: the Resource Conservation and Recovery Act (RCRA), and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (as amended by the Superfund Amendments and Reauthorization Act [SARA]). Additionally, the ER Program is tasked with compliance with the National Environmental Policy Act (NEPA). The ER Program evaluates all inactive waste disposal sites and potentially contaminated areas to determine if there is any environmental risk. At the Pinellas Plant in Largo, Florida, the investigations are being conducted under a RCRA Hazardous and Solid Waste Amendment (HSWA) Permit and under an agreement with the state of Florida. At the Mound Plant in Miamisburg, Ohio, the investigations are being conducted under CERCLA and an Interagency Agreement (IAG) with the U.S. Environmental Protection Agency (EPA), with additional oversight from the State of Ohio. Both sites have groundwater contamination that requires remediation prior to completion of the RCRA or CERCLA process.

Pinellas Plant 4.5-Acre Site

The 4.5-Acre Site at the Pinellas Plant (see Fig.1) was identified in April 1985, prior to the ER Program preliminary assessment/site inspection for remedial design and remedial action. The 4.5-Acre Site is located adjacent to the northwest corner of the site on land that was formerly owned by the DOE installation, but was sold prior to the discovery that the site was used for disposal of drums in the early 1960's. In 1985, interviews with Installation personnel discovered that the site had been used for drum disposal.

This prompted the Installation, as part of their site assessment program, to contract with the U.S. Geological Survey (USGS) to perform an electromagnetic survey to locate buried drums (1). This discovery prompted the Pinellas Plant to contract with a firm for a detailed assessment and an initial cleanup (i.e., removal of source materials). This initial work resulted in the installation of six monitoring wells and the removal of 303 tons of contaminated soils and eighty-three 55-gallon drums containing various amounts of waste solvents from past plant operations (2).

The locations of the buried drums and contaminated soil that were removed are shown in Fig. 2. In order to further characterize the extent of groundwater contamination, 31 additional wells were installed at various depths and

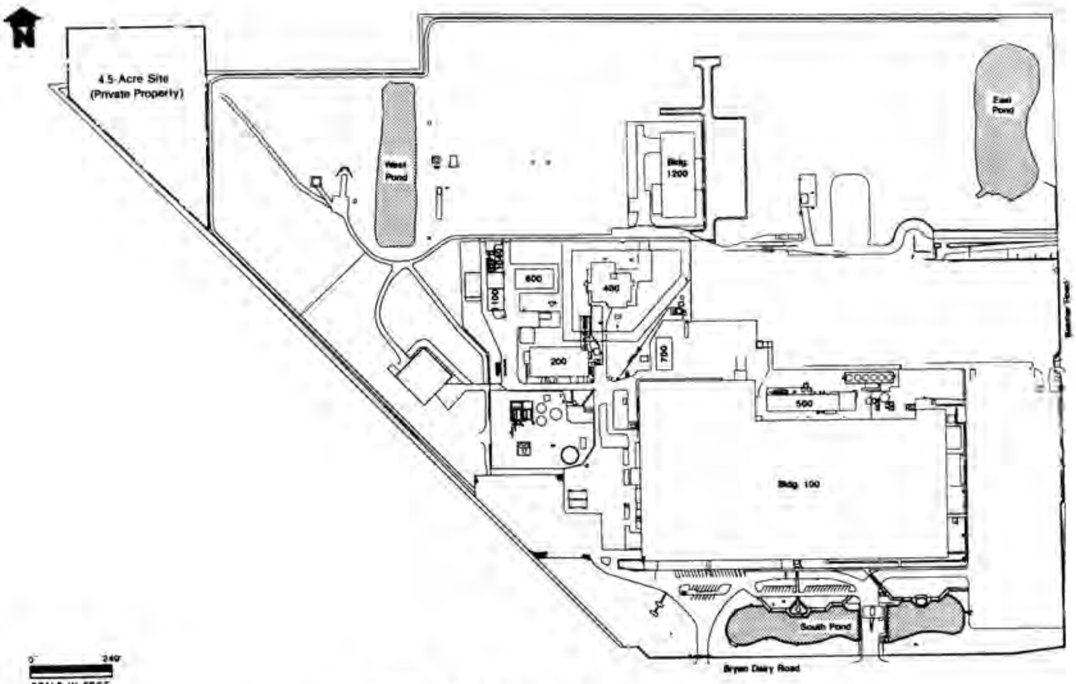

Fig. 1. Pinellas plant site map.

locations as shown in Fig. 2 (3). The results of monitoring showed that the groundwater was contaminated in the areas shown in Fig. 3 and that the contamination could be characterized as shallow (< 15ft) and deep (20 to 35 ft). The contaminants of concern and the concentration ranges are as listed in Table I (4).

TABLE I

Concentration Ranges of Contaminants Contaminant

Contaminant	Range ug/l
Benzene	13-502
Ethylbenzene	0-34
Methylene chloride	24-570
Toluene	5-22,000
1,2-Trans-dichlorethene	14-4,200
Trichloroethene	9-370
Vinyl chloride	37-19,000
Acetone	22-620
Bis (2-ethyl-hexyl) phthalate	6-180
Di-n butyl phthalate	10-30

Based on continued monitoring, contamination was determined to be moving off-site (Fig. 3). Therefore, a decision was made in 1988 to implement an interim action in order to bring the plume back onto the site. Based on a focused feasibility study (5,6), the proposed interim action recommended that 1) the location of seven recovery wells be installed to stop movement of the plume, 2) that the combined flow be discharged to the publicly owned treatment works (POTW), and 3) that the discharge permit requirement of 2.31 parts per million (ppm) total volatile compounds (VOCs) would be met.

Shortly after pumping began, it was determined that the flow from the combined effluent from the recovery wells was not consistent enough to the meet requirements of the discharge permit. Therefore, pumping was stopped and, after a revised interim remedial action plan was performed, it was recommended that an air stripper be installed to pretreat the flow prior to its discharge to the POTW. The air stripper was installed and went on line in June 1990. The air stripper can treat 30 gallons per minute (gpm), while sustained pumping for each recovery well is about 3.5 gpm. All wells pump to a surge tank for mixing prior to being put through the air stripper. This method succeeded in reducing concentrations of contaminants in the flow from the 4.5-Acre Site to those required by the discharge permit.

Regulatory Drivers

Since the site is no longer owned by the Pinellas Plant, it is not considered a solid waste management unit (SWMU) and does not fall under the HSWA permit. Additionally, since the site has not been a storage, transfer, or treatment unit, it does not fall under the RCRA Part B permit. Also, the site has not been nominated under CERCLA for the National Priority List. Therefore, the only regulatory driver is that the Plant has taken a proactive position with federal

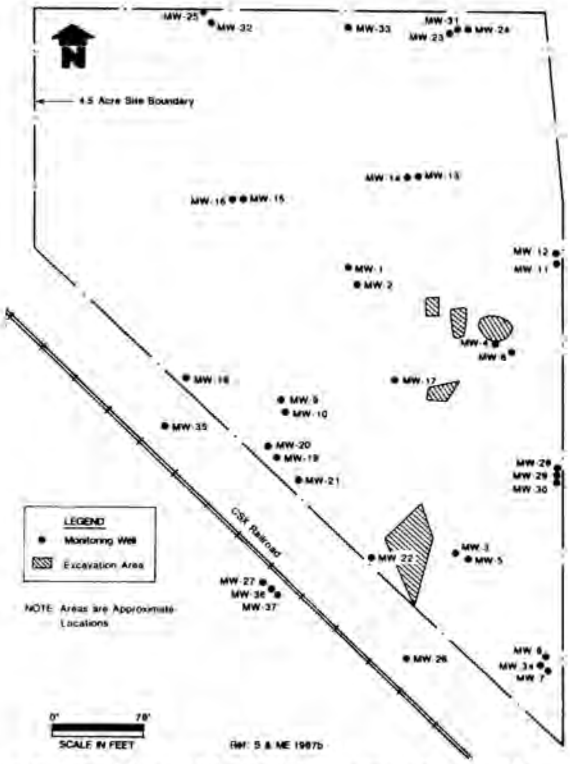

Fig. 2. Locations of buried drums removed by Haztech.

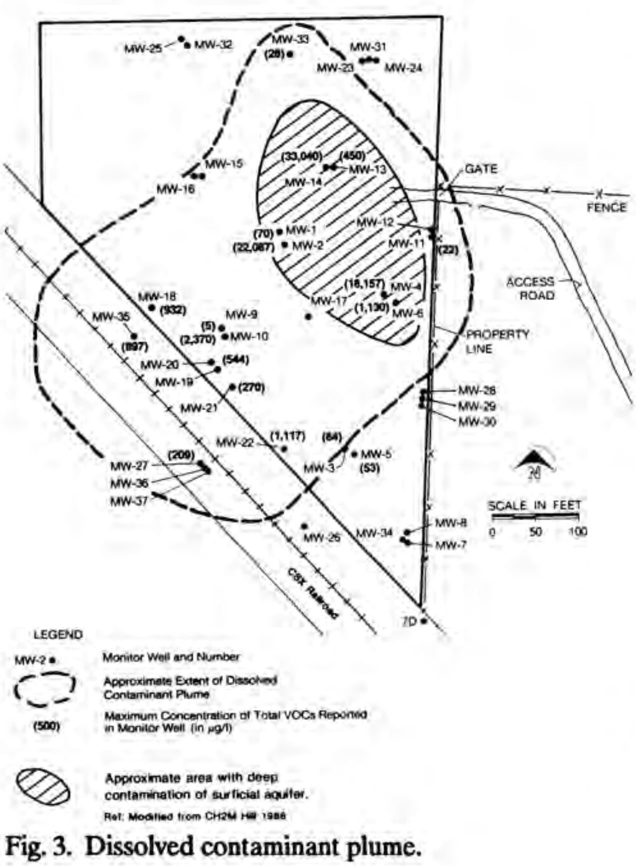

Fig. 3. Dissolved contaminant plume.

and state agencies and is working with the state under a verbal agreement.

To date, NEPA has been addressed only through an Action Description Memorandum (ADM), and, since this is an interim action, no further NEPA work is required.

Site Geology

The Pinellas Plant is located on a relatively flat coastal plain known as the Floridan Plateau and is composed of alternating layers of terrigenous clastics and carbonates. The upper unit consists of unconsolidated sands, shelly sands of Pleistocene age, and functions as the surficial aquifer. This upper unit ranges in thickness from 25 to 40 ft at the 4.5-Acre Site. The upper unit is underlain by the Hawthorn Formation, which is of late Miocene and Pleistocene Age. The Hawthorn Formation is composed primarily of sandy clay ranging in thickness from 50 to 100 ft. In the vicinity of the Pinellas Plant, the formation acts as an aquitard separating the upper Floridan aquifer from the surficial aquifer.

Site Hydrology

The groundwater hydrology of the site shows that there is a shallow aquifer (< 4ft below ground surface) which flows to the northwest at a gradient of approximately .003 ft/ft to .005 ft/ft depending on seasonal fluctuations. However, the Hawthorn layer, which acts as an aquitard, dips to the southwest. Therefore, movement of contaminants is compounded in that any contaminants with specific gravities less than one will tend to move with the gradient of the water and disperse, while contaminants with specific gravities greater than one will sink and move to the southwest along the contact of the shallow sand and the Hawthorn layer.

Results to Date

Since the start-up of the air stripper in June 1990, approximately 3 million gallons of water have been treated and discharged to the POTW. Figure 4 shows that the recovery system is working well and that the recovery area from the seven wells extends to the edge of the plume in such a way that contamination can no longer move to the west. The results to date show that the plume is being drawn back onto the property, as shown in Fig. 5. However the area around well MW13 is showing increased concentrations of VOCs. The reason for this increase is unknown at this time and further investigations are planned.

Future Actions

In order to gain approval of a plan for final removal and closure, a report is being prepared that will examine the

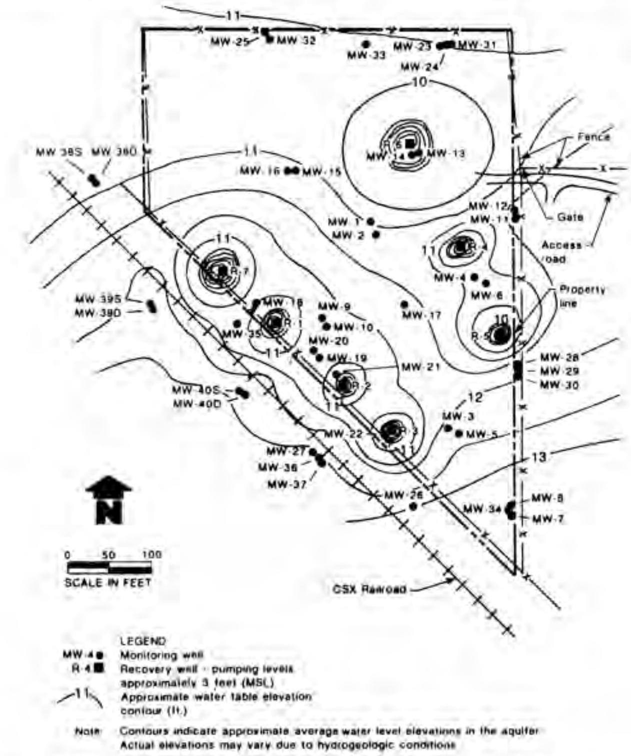

Fig. 4. Surficial aquifer water levels, 9-28-90, 4.5 acre site after approximately 5 months pumping.

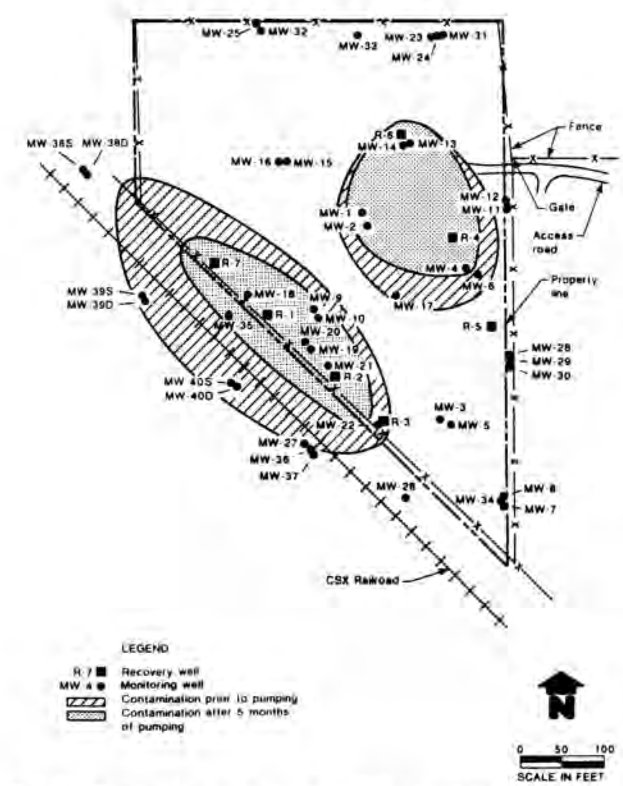

Fig. 5. Contaminated areas after 5 months of pumping.

current interim system. The goals of this examination are to:

- Estimate the contaminant removal rates of the current interim system.
- Estimate the time required to clean the surficial aquifer to promulgated cleanup levels using the current interim system.
- Develop proposed site rehabilitation levels (SRLs) based on estimated risk.
- Estimate the time required to clean the surficial aquifer to SRLs using the current interim remedial system.
- Develop and present recommendations that may be implemented to enhance the efficiency of the current interim system and reduce the cost and time required to complete remedial action.

These goals will be achieved primarily through mass transport modeling of contaminants in the surficial aquifer, coupled with a risk assessment.

Model input will include parameters that represent the groundwater flow characteristics found at the 4.5-Acre Site, the subsurface material characteristics, and the characteristics of contaminants. These characteristics include:

- Transmissivity
- Storage Coefficient
- Hydraulic Conductivity
- Porosity
- Flow velocity
- Contaminant mass
- Bulk density
- Partition coefficient
- Nodal grid spacing
- Dispersivity

Hydrologic input parameters (transmissivity, storativity, hydraulic conductivity, porosity, and groundwater flow velocity) used in the model will be estimated from aquifer test data and slug test data collected at the Pinellas Plant in 1990.

The risk assessment that will be completed as part of future work to develop SRLs will be composed of an exposure assessment, a toxicity assessment, and a risk characterization. The purpose of the risk assessment is to estimate the risks associated with a range of SRLs for the 4.5-Acre Site contaminants of concern. This risk assessment will examine the possibility that risks associated with SRLs that exceed promulgated Florida Department of Environmental Regulation (FDER) drinking water standards are within acceptable risk levels. The possibility also exists that SRLs may exceed acceptable risk levels. Until risk levels are estimated, it is assumed that promulgated FDER drinking water standards are the applicable long-term cleanup goals for the 4.5-Acre Site.

Mound Plant Area B Groundwater

The DOE Mound Plant, located near Dayton, Ohio, was placed on the CERCLA (i.e., Superfund) National Priorities List in November 1989. Pursuant to that status, a CERCLA Section 120 Federal Facility Agreement was signed between DOE and EPA (EPA Administrative Docket number VW-'90'C'075), and became effective on October 12, 1990.

The Mound Plant is adjacent to the Great Miami River valley. The glacial outwash deposits of sand and gravel in the valley constitute a highly prolific aquifer known as the Buried Valley aquifer. Many municipalities along the Great Miami River, including the city of Dayton, obtain their water supply from the Buried Valley aquifer. In recognition of its prolific nature, its susceptibility to contamination, and its regional importance, the aquifer was designated a sole source aquifer in 1988 .

In the center of the Miami River valley the sand and gravel deposits can be up to 160 ft thick. Mound Plant is on the eastern edge of the buried valley, and on the western edge of the plant the Buried Valley aquifer is present as a thin (less than 10 ft thick) basal deposit of sand and gravel. The basal unit lies above less-permeable shale and limestone bedrock and lies below approximately 40-60 ft of less permeable glacial till. Mound Plant obtains its water supply from 3 large-diameter (26-inch) wells that are completed in this basal unit and that are located just inside the western Plant boundary.

Mound Plant supply wells numbers 1, 2, and 3 are located close (100, 400, and 650 ft, respectively) to a former waste disposal area, as shown in Fig. 6, that is the source of low concentrations of groundwater contamination, primarily the chlorinated solvents tetrachloroethene, trichlorethene (TCE), and 1,2-dichloroethene. Concentrations from monitoring well samples collected from 1986 through 1990 have ranged between 10 to 200 micrograms per liter (ug/L). Use of well No. 1 was discontinued in 1987, except for emergencies, when TCE began to appear intermittently in samples from that well. At that time, EG&G Mound identified the situation to DOE as a potential ER Program removal action. When well No. 1 was pumped in 1990 (only for sampling and analysis, not for water supply), concentrations of TCE were generally less than the water supply maximum contaminant level (MCL) of 5 ug/L, with sporadic sample results slightly above that. During all of 1990, concentrations of TCE at wells No. 2 and 3 were below the MCL.

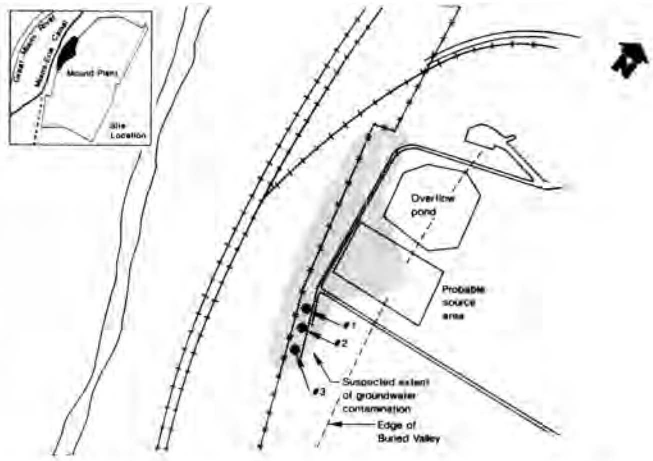

Fig. 6. Schematic diagram of contamination at Mound Plant well field.

Mound Plant has considered using an alternative water supply through a connection to the municipal supply of the adjacent city of Miamisburg. The primary constraint to that alternative is that the total capacity of the city distribution system is insufficient to meet both municipal and Mound Plant requirements. Also, the size of the nearest municipal water main is too small to transmit the flow Mound Plant would require, and installing a larger main would be an expensive, disruptive, long-lead-time project.

An additional consideration in evaluating the groundwater contamination situation at Mound Plant is that pumping of the Mound Plant supply wells is apparently creating a hydraulic barrier to the off-site migration of contamination. The high rate of pumping (the average is 550 gpm for the two wells), the closeness of the wells to the contaminant source, and the proximity of the Buried Valley aquifer boundary contribute to the effectiveness of the pumping. Recently (1990) only traces (less than 1 ug/L) of contamination were detected off the site. While there is only one domestic well, used by a single household, that is closer than 1 mile to the contaminant source, and all other nearby households are served by municipal water, it is still desirable to keep the groundwater contamination from migrating off-site.

Regulatory Drivers

The groundwater associated with Area B at Mound Plant is within Operable Unit 1 (OU1)and is governed by CERCLA and the IAG between DOE and EPA. Since this area is governed by CERCLA, it is also governed by the final

"National Oil and Hazardous Substances Pollution Contingency Plan" (NCP) 40 CFR 300. This plan states that prior to the signing of a Record of Decision (ROD), there are two major types of response actions: the first is a "removal action", which is a part of but less than the permanent solution; and the second is a "remedial action", which is a part of or all of a solution specified by a ROD following an remedial investigation/feasibility study (RI/FS). Exemptions to the laws governing these two types of response actions are granted only when an emergency action is necessary. For purposes of this discussion, an emergency action exemption would be granted only in the case of an imminent threat to human health or the environment. Therefore, declaring an emergency action is not a viable alternative to performing interim removal actions, prior to the signing of a ROD.

The general purpose of removal actions is to respond to a release, or threat of release, of hazardous substances, pollutants, or contaminants so as to prevent, minimize, or mitigate harm to human health and the environment.

The following removals, as a general rule, are appropriate precautions to take when a release has occurred:

1. Fences, warning signs, or other security or site control precautions where humans or animals have access to the release.
2. Drainage controls: for example, run-off or run-on diversion where needed to reduce migration of hazardous substances, pollutants, or contaminants off-site, or to prevent precipitation or run-off from other sources, such as flooding from entering the release area from other areas.
3. Stabilization of berms, dikes, or impoundments or drainage or closing of lagoons where needed to maintain the integrity of the structures.
4. Capping of contaminated soils or sludges where needed to reduce migration of hazardous substances, pollutants, or contaminants into soil, ground, or surface water or air.
5. Using chemicals and other materials to retard the spread of the release or to mitigate its effects where the use of such chemicals will reduce the spread of the release.
6. Excavation consolidation, or removal of highly contaminated soils for drainage or other areas where such actions will reduce the spread of or direct contact with the contamination.
7. Removal of drums, barrels, tanks, or other bulk containers that contain, or may contain, hazardous substances, pollutants, or contaminants where it will reduce the likelihood of spillage; leakage; exposure to humans, animals, or the food chain; fire; or explosion.
8. Containment, treatment, disposal, or incineration of hazardous materials where needed to reduce the likelihood of human, animal, or food chain exposure.
9. Pumping and treatment of groundwater to prevent migration of contaminated groundwater and/or to prevent ingestion my humans or animals or uptake by plants.

Under removal actions, there are two types of removals. The first is a non time-critical removal action, in which, based on site evaluation, the lead agency has determined that a removal action is appropriate and that a planning period of at least six months exists prior to initiation of the on-site removal activities. The second is a time-critical removal, in which the lead agency has determined that a removal is appropriate and that less than six months exists before on-site removal activity must begin. In each case, removal actions shall, to the extent practical, contribute to the efficient performance of any anticipated long-term remedial action with respect to the release concerned. Additionally, in each case, it is EPA's policy that applicable or relevant and appropriate requirements (ARARs) be met during removals to the extent practical, considering the urgency of the situation.

Should non time-critical removal actions be required prior to the ROD, the following must be performed:

1. The lead agency shall conduct an engineering evaluation/cost analysis (EE/CA) or its equivalent. The EE/CA is the analysis of removal alternatives for a site.
2. If environmental samples are to be collected, the lead agency shall develop sampling and analysis plans (which includes a quality assurance program plan) that shall provide a process for obtaining data of sufficient quality and quantity to satisfy data needs. All sampling and analysis plans shall be reviewed and approved by the EPA.

For time-critical removal actions, the EE/CA and sampling and analysis plans are not required; however, a plan must be prepared describing what action will be performed and its degree of compliance with ARARs. Additionally, in both cases, the removal action shall comply with section 40 CFR 300.415, which includes community relations activities specific to the removal action.

Present Condition

At this time, it is anticipated that the Area B (OU1) groundwater issues at Mound Plant will fall into the "non-time-critical" category; that is, more than six months may be taken to address the problem. This expectation is based on a limited modeling effort, which includes solute transport simulations. With Well No. 3 pumping at a rate of 750,000 gallons per day and no other wells pumping, the monthly average VOC concentrations in Well No. 3 have been calculated for the next 12 months. The modeling results show a maximum monthly average concentration of 0.7 ug/L . Therefore, there is a reasonable expectation that actual concentrations (as verified by monitoring) will remain below the relevant MCL of 5.0 ug/L for some time in the future.

Therefore, as required by 40 CFR 300.410, DOE must prepare and publish an EE/CA that considers attainment of ARARs, contribution to the final remedy, cost, etc. This EE/CA will be developed from the substantial work already accomplished and will address the following alternatives:

- Mound Plant engineering study of the service/drinking water system (cross-connection elimination);
- Groundwater pump-and-treat with air stripper or cascade;
- Alternative water supply (new well on the new property);
- Alternative water supply (connection to city system); and
- No action.

Preliminary analytical results for water samples collected in October 1990 indicate the possible migration of VOCs off the site at low levels. Should this trend continue, and should VOCs be detected in an off-site domestic well, it could become necessary to accelerate implementation of an interim action, i.e., as time-critical. Ongoing sampling of both monitoring and production wells will provide detection of any change in status that may cause DOE to declare these efforts a time-critical removal action. This allows accelerated implementation, with documentation placed in the administrative record as specified in section 40 CFR 300.415.

SUMMARY

Both sites have the same problem (i.e., contamination of a shallow aquifer); however, the solution to the problem and the time frame for the implementation of an action are significantly different at the two sites. Because the 4.5-Acre Site is not under any regulatory permit, the interim action has been able to move forward rapidly on its own schedule.

Because the Mound Plant is on the NPL, all actions must follow the requirements of the NCP, 40 CFR 300.410, go through approval from the EPA, and meet community relations requirements.

The lessons learned from these sites are: when at all possible, do not push for a permit as a driver, but do be proactive in actions. This however, is in direct conflict with DOE prioritization, which directs funding towards sites that are permitted or have regulatory drivers. The task, which all involved with the ER Programs are faced with, is presenting DOE Headquarter with a rationale for why sites without regulatory drivers should receive continued funding, so that proactive actions can be continued.

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