Review of Barriers to Superfund Site Cleanups

- CASE STUDIES

- #6400016

Inspector General Division Conducting the Review:

Headquarters Audit Division

Program Offices Involved:

Office of Solid Waste and Emergency Response

Office of Enforcement and Compliance Assurance

Photographs included in this report were provided

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TABLE OF CONTENTS

Review of Barriers to Superfund Site Cleanups

WHITMOYER LABORATORIES CASE STUDY

SUMMARY OF BARRIERS

Site Overview

EPA added Whitmoyer Laboratories to the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) in May 1983, and included the site on the National Priorities List (NPL) in June 1986. Over 12 years have passed since the site entered the Superfund pipeline and cleanup remains ongoing. The site is estimated to reach construction completion in 2001 and estimated to be deleted from the NPL in 2050. Although actions have been taken to prevent further threats to the public and the environment, other actions that were planned did not take place. As a result, contamination has remained on-site and costs associated with cleanup may have risen unnecessarily.

Barriers Identified

Enforcement negotiations for Whitmoyer Laboratories went well beyond Agency goals. The Pennsylvania Department of Environmental Resources (PADER) spent 2 years developing an RI/FS workplan and conducting ultimately unsuccessful RI/FS enforcement negotiations. Rather than immediately undertaking the RI/FS, EPA took over the site and continued negotiating with the PRPs. These negotiations also proved unsuccessful. Further, the RD/RA negotiations lasted well beyond the 120 day moratorium set by the Agency.

Second, because of arsenic-contaminated wells, Whitmoyer Laboratories supplied local residents with alternative water for nearly 20 years. When the company went bankrupt in 1984, the residents had to supply their own alternative water. In 1985, EPA performed a removal assessment and determined that a removal action to supply an alternative water supply was not justified. In 1987 a change in EPA policy lowered the maximum contamination level for arsenic. As such, EPA re-visited the water supply issue and decided that an immediate removal action to install a water line to residents was needed. Once this decision was made, differences between EPA and the local government over issues surrounding the water line began which resulted in a 3-year delay in the removal action.

Third, a planned removal of an on-site vault was not implemented. All indications from our review showed that the vault, which contained an estimated 4 million pounds of arsenic and other hazardous wastes, was leaking, and was a major source of ground water, surface water and soil contamination. In 1988, EPA planned to remove the vault and its contents at an estimated cost of $3 million, but the removal was not implemented. Rather, clean up of the vault is being handled by the remedial process, is estimated at $18 million due mainly to the application of additional regulatory requirements according to Agency officials, and has yet to be completed. Further, and more importantly, if the vault is leaking, additional ground and surface water contamination may have occurred over the 12 years since EPA became aware of the vault. It is possible that if the removal action had been completed, additional ground and surface water contamination could have been avoided.

Another barrier the Agency encountered revolved around the 1990 remedial action decision to use on-site incineration for the contents of the vault and other wastes at the site. The decision sparked opposition from the community, state, local government, Congressional leaders, and PRP officials. According to many of these officials, there was great skepticism and uncertainty in the ability to safely incinerate the wastes, and additional concerns about having the incinerator operating so close to the community. In an effort to address these concerns, EPA allowed the PRPs to search for an off-site incinerator. In the summer of 1995, an off-site

incinerator was located and approved by EPA for use. Although a good decision, overall it resulted in a delay of approximately 4 years.

One final barrier that was identified involved severe weather conditions. Excessive snow and ice formations caused one of the hazardous waste storage buildings to collapse. Those portions of the collapsed building which came in contact with the stored hazardous wastes were then looked upon as hazardous wastes. This caused approximately six weeks of delay at the site. While this delay is not necessarily significant, it does show that while the Agency can plan for unforeseen circumstances, some delays in site cleanup are out of the Agency's control.

WHITMOYER LABORATORIES
CASE STUDY

BACKGROUND AND SITE HISTORY

Whitmoyer Laboratories is a 22-acre veterinary pharmaceutical manufacturing plant located in the borough of Myerstown, Lebanon County, PA. The company manufactured veterinary pharmaceuticals between 1934 and 1984 and produced and stored soluble arsenic compounds and aniline. The site itself consists of numerous buildings, a large waste storage vault, lagoons, storage tanks, a waste pit, and a petroleum products pipeline and pump station. The area surrounding the site is agricultural and residential. About 4700 people reside within three miles of the site. Additionally, there is an elementary school located within a half mile of the site.

In 1957, Whitmoyer Laboratories began the production of arsenical pharmaceuticals. Waste water from these operations containing arsenic and arsenic compounds were ultimately dumped into the Atlantic Ocean. However, concern over ocean dumping forced Whitmoyer to change disposal practices. As a result, Whitmoyer began disposing of arsenic and other wastes in unlined lagoons on-site.

In 1964, Rohm and Haas Company purchased Whitmoyer Laboratories. About this time, two local residents were hospitalized with chronic arsenic poisoning. Rohm and Haas then initiated an investigation into contaminated ground water and residential wells. The investigation revealed arsenic contamination in the lagoons, soil, surface water, ground water and nearby residential wells. Arsenic was also found in the nearby Tulpehocken Creek and Union Canal and could be traced as far downstream as Philadelphia. Ground water contamination was reported to have reached 150,000 parts per billion (ppb)[(1)], exceeding the Maximum Contamination Level by a factor of about 3000, and arsenic from the Whitmoyer plant was also found in springs up to 20 miles from the site.

In 1964, Rohm and Haas voluntarily began cleanup efforts to address contamination on- and off-site. These efforts included changing waste water disposal operations, excavation of sludges and soils, ground water pumping and

Figure 1

Whitmoyer Laboratory
Current Site Map
Site Map not available

treatment, and supplying bottled water to nearby residences. In 1965, the arsenic concentration in residential wells was as high as 14,800 ppb. Rohm and Haas also constructed a large cement vault to dispose of highly contaminated hazardous materials. The vault measures 123 feet long by 83 feet wide by 12 feet deep. The vault was filled to capacity and was estimated to contain nearly 4 million pounds of arsenic and other hazardous wastes.

In 1973, a United States Geological Survey (USGS) study confirmed the presence of elevated levels of arsenic in soil on and adjacent to the Whitmoyer site. In 1976, EPA and the Pennsylvania Department of Environmental Resources (PADER) investigated the Myerstown Sewage Treatment Plant (MSTP) for arsenic contamination. The study concluded that ground water containing arsenic was entering the sewer lines near the Whitmoyer plant and that it was the probable source.

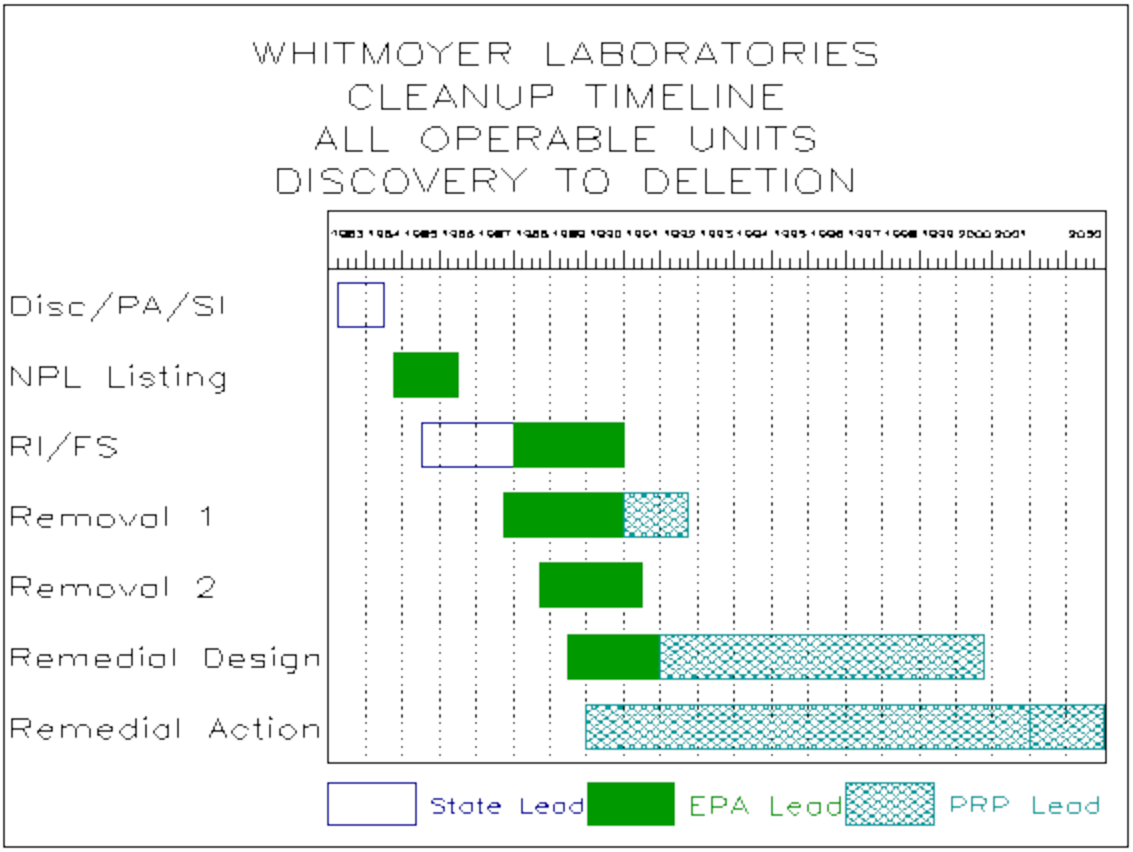
In 1978, Rohm and Haas sold Whitmoyer Laboratories to Beecham Inc. As a condition of sale, Beecham agreed to continue providing bottled water to residents whose wells were contaminated. Beecham sold Whitmoyer Laboratories to Stafford Laboratories in 1982. Stafford also agreed to supply bottled water to residents with contaminated wells. In March of 1982, four of the residents who were receiving bottled water entered into a cash settlement with Whitmoyer Laboratories for no further claims against Whitmoyer Laboratories. We spoke with other residents who told us they refused a cash settlement because it would prevent any future claims against the Laboratory.

In February 1983, a Resource Conservation and Recovery Act (RCRA) Hazardous Waste Treatment and Storage Closure Plan was submitted by Whitmoyer Laboratories to PADER. The plan called for Whitmoyer Laboratories to cease treatment and storage of hazardous waste on site (except within the 90-day RCRA limits). Any future waste that was generated through production would be sent to a permitted hazardous waste disposal facility.

In 1984, Stafford Laboratories filed for bankruptcy and eventually abandoned the facility. Little, if any, of the RCRA closure plan was implemented. Further, alternative water was no longer supplied to the residents. This forced the residents to locate and pay for their own alternative water supplies.

Chronology of EPA Superfund Involvement

Figure 2



Source: EPA Data depicted in calendar year.
Remedial Design and Remedial Action timeframes are RPM estimates.

SITE DISCOVERY/PRELIMINARY ASSESSMENT/SITE INSPECTION/NPL LISTING

In May 1983, EPA, Region 3, Hazardous Waste Management Division was notified by an anonymous caller of the conditions at Whitmoyer Laboratories. Specifically, the caller noted waste from the on-site vault was leaking into the ground and into the nearby Tulpehocken Creek. While others (USGS, PADER, Corp of Engineers, and EPA's RCRA and Water program offices) were aware of the site and had studied the area around the Whitmoyer facility, this is the earliest record of EPA Superfund involvement that we could identify in the site files. Therefore, we used this date for Site Discovery.

The Preliminary Assessment (PA) for Whitmoyer Laboratories was completed by PADER in December 1983, approximately seven months after site discovery. The PA Report states that the seriousness of the site problems ranked high and possessed the following potential hazards: threat to human life, contamination of food chain, contamination of ground water, surface water and soil, leaking containers (specifically arsenic within the concrete vault). As a result, a Site Inspection (SI) was recommended.

The SI for Whitmoyer Laboratories was completed on April 11, 1984, approximately 11 months after site discovery. The SI Report shows that the SI was conducted using existing EPA information. The report stated that the containment of wastes at the site was insecure, unsound, and dangerous. A Hazard Ranking System score for the site was completed on April 12, 1984. The site ranked third in Pennsylvania and number 244 nationally at the time of ranking. In October 1984, Whitmoyer Laboratories was proposed for listing on the National Priorities List (NPL). In June 1986, approximately 21 months later, and approximately 37 months after discovery, the site was finalized on the NPL.

REMEDIAL INVESTIGATION/FEASIBILITY STUDY

On June 26, 1985, PADER began the RI/FS by contracting with E&E Inc. to develop the Remedial Action Master Plan (RAMP). Additionally, PADER began conducting formal negotiations with the PRPs for conducting the RI/FS. In April 1986, PADER submitted the RAMP to EPA for review and acceptance. EPA rejected PADER's RAMP, calling it inadequate. The work plan was never implemented. The RI/FS negotiations with PADER continued until April 1987. At this time PADER turned the site lead over to EPA because of difficulties in

negotiating an RI/FS settlement with the PRPs and pressure from EPA to take quicker action. Overall, PADER spent approximately 2 years developing the RAMP and negotiating with the PRPs.

While the negotiations for conducting the RI/FS were being conducted by the state, the PRPs approached EPA with a 50/50 preauthorized mixed funding proposal. According to the EPA files, in February 1987, one PRP (Rohm and Haas Company) offered to enter into a consent order to conduct the RI/FS if EPA would accept a 50/50 preauthorized mixed funding agreement. While EPA agreed that SARA section 122 (a) and (b) allowed EPA to enter into preauthorized mixed funding agreements, EPA officials declined the offer stating they would rather use mixed funding agreements for Remedial Designs and Remedial Actions.

In April 1987, the state formally returned the site to EPA as a Federal lead site. According to the site files the site was returned because the state was having difficulties negotiating the RI/FS settlement with the PRPs. EPA continued the RI/FS negotiations through September 1987, however, no agreement could be reached. EPA ultimately decided to fund and conduct the RI/FS.

To better manage the RI/FS and cleanup operations, the site was divided into six Operable Units (OU) encompassed in three Records of Decisions (RODs):

OU Number	Description	ROD
1	Concentrated Liquids	1
2	Buildings, Structures and Miscellaneous Products and Feedstocks	2
3	Soils and Sediments	3
4	Vault Waste	2
5	Lagoons	2
6	Groundwater	3

In November 1987, EPA contracted with Ebasco to develop and perform the RI/FS for all of the operable units. In June 1988, the work plan for conducting the RI/FS was accepted by EPA. Field sampling was conducted from July 1988 through May of 1989.

On March 24, 1989, the equivalent of an RI/FS report, "Concentrated Liquids Assessment" was issued for OU 1. This operable unit was completed early because Agency officials believed they had sufficient information to begin remedial action. On June 30, 1989, approximately 4 years after the RI/FS was started, and 6 years after site discovery, the Regional Administrator signed the ROD for OU 1.

Concurrent with the RI/FS fieldwork, Region 3 officials conducted enforcement negotiations with the PRPs to take responsibility for conducting the Remedial Design/Remedial Action (RD/RA) for OU 1. These negotiations were unsuccessful and EPA took the lead in conducting the RD/RA for OU 1.

The second ROD, which encompasses OUs 2, 4, and 5, was signed by the Regional Administrator on December 17, 1990. The third ROD which encompasses OUs 3 and 6 was signed on December 31, 1990. In total, over 2 years were spent negotiating the RI/FS, and over 3 years were spent completing the RI/FS. To put this in some perspective, EPA Headquarters goal is 120 days for RI/FS negotiations and 18 months for actual RI/FS completion. Overall, nearly 8 years passed from site discovery until the RI/FS completion.

RI/FS Negotiation Durations	
RI/FS Negotiations (State)	644 Days
RI/FS Negotiations (EPA)	238 Days
Total Days in Negotiations	882 Days
Agency Goal for RI/FS Negotiations	120 Days

RI/FS Durations	
Start RI/FS to ROD 3 Approval	3.2 Years
Agency Goal for RI/FS	1.5 Years

REMOVAL ACTIVITIES

Potential Water Line Installation

As stated earlier, Whitmoyer Laboratories started supplying bottled water to residences with contaminated wells in 1964. In 1983, PADER assessed the Whitmoyer facility. The assessment revealed that arsenic contamination was not confined to any discreet aquifer, but had spread to various depths. As a result, EPA was requested to investigate the site for a possible removal action.

In January 1984, EPA's Removal Program directed its Technical Assistance Team (TAT) to perform a site assessment of Whitmoyer Laboratories for possible CERCLA removal actions. From February 1984, through May 1985, EPA's contractor collected samples from the site and the surrounding residences. In July 1984, Stafford Laboratories, the current owners, filed for Chapter 11 bankruptcy. On or about September 6, 1984, after 20 years of doing so, Whitmoyer Laboratories stopped providing bottled water to nearby residences.

On July 17, 1985, the Agency for Toxic Substances and Disease Registry (ATSDR), the Department of Health and Human Services, issued a memorandum to EPA on the results of the Whitmoyer Laboratories sampling. ATSDR's opinion was that five wells should not be used for human consumption purposes. Two of the wells had unacceptable levels of arsenic. Three other wells indicated organic contamination, but the levels did not exceed the Office of Drinking Water's Ten-Day Health Advisory. They were sufficiently high, however, to require either frequent monitoring or an alternative water supply. The ATSDR report recommended that the best course of action, in the short term, would be an alternative water supply and that, in the long term, residents with contaminated wells should be connected to a public water supply. The ATSDR report further stated that there were additional wells with historically high arsenic values that were not included in this study and using these wells would be questionable without current monitoring information. ATSDR concluded that the contamination of wells over such a widespread area, would indicate that all the private and public wells in the area should be sampled.

In August 1985, the OSC drafted a removal request calling for:

1. Providing a temporary drinking water supply to one resident (whose well was contaminated with unacceptable levels of arsenic).

2. Identifying homes and conducting sampling to determine any additional homes that may require alternate water.

3. An evaluation of the data collected from Step 2 as well as an investigation of the necessity, feasibility and cost effectiveness of providing a permanent water supply to the affected residents.

The removal request was not approved by the Region. The Region found that one resident, with a well showing high levels of arsenic had already been hooked up to the public water supply; hence, there was no need to provide an alternative water supply. Similarly, another resident reached a private, cash settlement with Whitmoyer Laboratories, thereby undermining the need for alternative water.

As mentioned above, ATSDR recommended that the best course of action for the three residents with elevated organics would be to provide an alternative water supply rather than monitoring followed by an alternative water supply in the future. EPA chose to monitor the three wells rather than supply an alternative water supply.

On October 9, 1985 an EPA official wrote a letter to a resident whose well was identified as having elevated levels of arsenic (76 ppb). The information on the well was sent to the CDC for review. The letter states:

The Centers for Disease Control has reviewed this data and concluded that the water is suitable for consumption over the short term. However, due to the historical arsenic fluctuations in your well water we recommend that you continue using an alternative water supply for drinking purposes.

The next day, October 10, 1985, this same official wrote to the same resident:

... EPA and DER conducted sampling of drinking water wells adjacent to the site to determine if conditions warrant emergency action. Your well was included in this sampling. The results of the sampling were sent to the Centers for Disease Control (CDC).

Based on CDC's review of the data I have concluded that at this time groundwater contamination at the site poses no immediate and significant risk of harm to human life or health. Therefore, no EPA funded emergency action is justified. Cleanup actions will remain the responsibility of the Superfund Remedial Program.

We spoke with the resident who received these letters who told us that Whitmoyer stopped providing water in 1984. Further, EPA knew they did not have an alternative water supply because the removal request stated that the PRPs had stopped providing bottled water. The residents told us that they had to supply their own water from 1984 through 1987, when EPA began providing bottled water.

Actual Water Line Installation

The 1986 Superfund Amendments revised the threshold for a removal action from, "potential risk of harm" to an "imminent and substantial risk." Further, the MCL for arsenic was reduced from 50 ppb to 15 ppb. In light of these changes, in March 1987, PADER again requested that EPA consider Whitmoyer for a possible removal action.

According to the On-Scene Coordinator's (OSC) Report, the primary concerns surrounding Whitmoyer Laboratories in 1987, were arsenic contamination in five residential wells, organic contamination in 12 wells, and an increase of arsenic contamination by 900 percent in the nearby Union Canal. On December 17, 1987, a removal request to extend the water line to the affected residents was approved. Until the water line was installed, EPA provided bottled water to the affected residents.

We found that some of the residents who received the water line were the same ones that were considered in 1985. Further, some residents receiving the water line did not have contamination that exceeded the established

risk level. We discussed this issue with EPA officials who stated that because of the history and extent of contamination at this site, they chose to take a conservative approach when installing the water line. Further, according to EPA officials, "the region had a well founded belief that there was a significant likelihood that the levels might fluctuate and increase to the established risk level."

We found indications in the site files that Congressional, community, and news media interest in the site may have also influenced the initiation of the 1987 water line extension. While we could find no evidence in the site files, a couple of residents told us that they believed the primary reason for the water line action stemmed from a young man in the town being diagnosed with a brain tumor. These residents believed the brain tumor was somehow related to the arsenic contamination. This sparked community, news media and Congressional concern over the progress of site cleanup. Additional indications could be found in the weekly pollution reports:

> -- Media interest in the site is high, as several newspaper articles have recently appeared expressing concern about the quality of ground water in the area surrounding the Whitmoyer facility.
>
> -- EPA [staff] expressed concern about the current status of available uncontaminated drinking water for residents at the site, in light of high current media interest.
>
> -- Congressional and news media interest is high due to local community concerns involving contaminated groundwater and children entering the site through a hole in the fence.
>
> -- The existing health threat, as described in the ATSDR health consultation memo, in addition to the public and political implications of citizens purchasing their own bottled water due to chemical contaminated wells, dictates that the concurrence chain review be kept to a minimum.

On March 17, 1988, an EPA contractor submitted a preliminary engineering design report for the water line extension. EPA officials objected to the design because it exceeded the minimum requirements necessary to supply water to the affected residents. They claimed that the design was too costly and was beyond the scope of the Agency's authority because it included provisions for future development. In May 1988, EPA regional officials revised the design and limited the extension to that which was necessary to provide potable water to the affected residents. The local water authority refused to sign a letter of intent for ownership and maintenance of the redesigned system. They demanded the system meet their specifications and provide provisions for future expansion.

From July of 1988, through September of 1990, EPA and the local water authority debated the following issues:

> -- The size of the water main: The local water authority wanted EPA to pay for a water line large enough for future growth while EPA claimed that CERCLA funds could only pay for a water line large enough to supply the current residents;
>
> -- Who would take over ownership and maintenance: EPA wanted the local water authority to take over, while the water authority would not if the line did not meet their specifications;
>
> -- Specifications for the water pressure and water flow: The water authority claimed that the EPA design did not meet fire protection specifications for water pumping stations.

To resolve the debate, EPA designed two systems: one for potable water for existing residences (Alternative I); and one for potable water for existing residences plus fire water and future expansion (Alternative II). The water authority chose alternative II and agreed to pay the difference in construction costs. Finally on September 13, 1990, agreement on the water line extension was reached.

Concurrent to the water line debate, EPA and two PRPs successfully negotiated an agreement that the PRPs would install the water line. On September 28, 1990, EPA and two PRPs signed an Administrative Order By Consent. According to PRP representatives, the water line which was installed was larger than either of the alternatives proposed, and cost approximately $1.5 million. The PRPs completed installation of the water line, and hook-ups for a total of 24 residents on October 15, 1992, approximately 5 years after the removal action started.

We discussed the water line installation with the affected residents. According to most of the residents, they were very pleased with the water line once it was installed. However, many commented that it took an extraordinary amount of time to get it installed. Further, once the water line was installed the residents began receiving water bills. According to several residents, they did not think it was fair that they had to pay a water bill when in the past they did not have one. Most residents stated that the PRPs, being the ones who contaminated the water to begin with, should be responsible for picking up their water bills. According to EPA officials, this was not considered during the negotiations.

Duration of Removal Action # 1	
Removal Start to PRP Takeover	2.8 yrs
Actual PRP Water line installation	2.0 yrs
Total Duration Removal # 1	4.8 yrs

Potential Vault Removal

As mentioned earlier, during 1964 and 1965, Rohm and Haas constructed a large cement vault to dispose of highly contaminated arsenic waste and other hazardous wastes. The vault was built partially underground along the banks of the Tulpehocken Creek and measures 123 feet long by 83 feet wide by 12 feet deep. The vault was filled to capacity and was estimated to contain nearly 4 million pounds of soluble arsenic and other hazardous wastes.

(Site Pictures not available)

In 1978, Rohm and Haas sold the facility to Beecham Inc. From 1978 to 1982, increasing concern over the stability of the vault prompted Whitmoyer personnel to gather samples from the nearby Tulpehocken Creek. Forty pairs of samples were gathered, 36 of which showed an increase in arsenic concentration between the water that enters Whitmoyer Laboratories property and the same water after it passes the vault. The overall results showed a 900 percent increase in the average arsenic concentrations in the Tulpehocken Creek. Further, Whitmoyer Laboratories personnel concluded that the most likely source of the contamination was the vault because the arsenic wastes within the vault were soluble while the arsenic wastes from the old lagoons were relatively insoluble. In 1983, Whitmoyer Laboratories began making plans to remove the vault and its contents. However, it never implemented this removal.

In 1984, PADER inspected the Whitmoyer site. According to an incident notification report, PADER recommended that EPA perform a removal action because the storage vault was leaking and had been since the 1970's. We found no record of any response to this recommendation.

Again, on March 16, 1987, PADER requested that a removal action be initiated in accordance with the new requirements in the 1986 Superfund Amendments. The request stated that the vault removal should be the first priority at the site.

...The quantity of arsenic contaminated waste in the vault is estimated at about 4500 cubic yards. Beginning in March 1979, a variety of sampling surveys were initiated by Whitmoyer Labs' staff to determine if the storage vault was leaking. In 1981, the results of the sampling and inspections by Whitmoyer Labs' personnel indicated

that the concrete walls of the vault were cracked, and personnel expressed concern that the arsenic wastes may be coming into contact with a fluctuating groundwater table. A 1984 inspection by DER inspectors reported that hairline cracks were visible along some of the vaults outside walls. Although the integrity of the vault was in question and a removal action had been recommended and planned by Whitmoyer Labs' personnel in 1983, it was never implemented.

PADER recommended that the concentrated arsenic wastes in the vault, "...be removed at once, since available evidence indicates that the integrity of the 22-year-old structure is no longer sound. A removal action is clearly justified and could be accomplished quickly and efficiently in a cost-effective manner. This would also eliminate one current potential source of the groundwater contamination at Whitmoyer Labs."

In June 1987, EPA's Emergency Response Team (ERT) began examining and sampling the vault for possible removal action. More soil samples were taken in the vicinity of the vault. They showed arsenic concentration levels as high as 28,400 ppm in the vicinity of the vault, and arsenic concentration levels as high as 670,000 ppm[(2)] (67 percent) within the vault. On October 23, 1987, the OSC obtained prices for the removal of the vault's contents. Estimates for removing approximately 4500 cubic yards of vault waste, plus an additional 2000 cubic yards of contaminated concrete and soil, totaled about $3 million.

In a November 1987 meeting in Region 3 the OSC described the significance of the analytical data that indicated arsenic was migrating out of the vault and said the most immediate threat to the environment from the Whitmoyer facility appeared to be the state of decay of the vault. Later, on December 18, 1987, (one day after the removal request for the water line was approved) the OSC and the RPM concurred that the removal of the vault contents should be combined with the ongoing water line removal action. According to an EPA document, "a speedy removal of the arsenic in the vault would remove the threat of a catastrophic release of arsenic into the Tulpehocken Creek." The RPM for the site indicated that the removal of the vault contents would be clearly consistent with future remedial actions at the site. Accordingly, the OSC began making preliminary arrangements for the preparation of an additional funding request for the vault removal.

On February 1, 1988, another meeting was held to discuss options for the vault removal. According to EPA files, one ERT official questioned the evidence supporting an immediate removal. However, the OSC and PADER representatives, who knew the most about the site, argued that the evidence proved that the arsenic in the vault was leaching directly into the ground water and Tulpehocken Creek. To settle this debate, it was decided to take additional samples from the perimeter of the vault and from the Tulpehocken Creek.

The analysis of these new samples was completed on February 18, 1988. According to EPA files, the results indicated what was previously suspected--that the arsenic in the vault was leaching into the surrounding soils north of the vault. The OSC forwarded the analytical results to the ERT who then concluded that the vault was leaking and suggested a removal action be initiated. A request for an exemption to the $2 million limit was prepared by the OSC on March 4, 1988.

About this same time, Rohm and Haas Company and Beecham Inc. approached EPA and offered to conduct the vault removal and committed to having it completed by the fall of 1988, if EPA would agree to a 50-50 mixed funding arrangement. Again, EPA declined to enter into the mixed funding agreement and the vault contents were not removed.

In July 1988, the OSC received a memorandum from the RPM stating that the RI/FS contractors identified some drums that were stored on-site that might contain explosives. The RPM requested an emergency removal of the drums. According to the memorandum, the drums could be considered abandoned because the previous site owner was under State and Federal orders to remove them. On August 22, 1988, a funding request and change of scope for a removal action was prepared by the OSC. The request called for the stabilization of all drums and laboratory waste on site. Funding for the drum removal was approved by the Regional Administrator on September 21, 1988.

Once the drums were identified for potential removal action, we could not identify any further mention of a removal action for the vault. We asked Agency officials why the vault removal was never performed. One Agency official told us that he did not think the vault added any more contamination than was already present. A second official thought it was a management decision not to conduct a removal of the vault, however, he did not know who, if anyone, made the decision. A third official stated that because of the consistency of the contamination (dry and flaky) he did not think the vault was leaking. However, he did not know why the removal action did not take place. According to Agency officials, another complicating factor in approving the removal was the implementation and application of Land Disposal Restrictions (LDR). LDR set limits on the concentrations of waste that can be disposed of in a land disposal facility. Agency officials were concerned that they may not be able to meet the LDR requirements. As will be described later, the vault is being handled under the remedial program. As of June 1995, the vault and its contents remain at the site.

Drum Removal

As mentioned above, on September 21, 1988, an additional funding request of $1.1 million and change of scope of work was added to the water line removal. The request covered actions to:

-- Identify, segregate, and package laboratory reagent chemicals. Repair structures which house the waste.

-- Assess, sample and stabilize an estimated 800 drums of known and unknown chemicals.

-- Treat or dispose of the drums and labpack waste.

Removal activities began on November 1, 1988. Wastes removed from the site consisted of 1414 drums and 20 one-gallon containers of hazardous substances, including flammable and corrosive liquids, a total of 24,657 gallons of arsenic-contaminated waste water and 630 cubic yards of waste material. A variety of other wastes were neutralized on the site: one 55 gallon drum of hydrazine, a small quantity of potassium metal, one container of benzoyl peroxide, two jars of picric acid, four 8-ounce bottles of nitromethane, one gallon can of petroleum ether, and small quantities of yellow and red phosphorous. Once these substances were neutralized, they were also removed from the site.

According to the OSC report, disposal of substances generated at the site posed several problems. First, due to the highly toxic nature of arsenic and its compounds, extensive compatibility testing and research into disposal methods, and extensive negotiations with disposal facilities were required. The testing, research and negotiations caused the disposal phase of the project to be extended requiring the continued monitoring and maintenance of the laboratory and the hazardous waste staged for removal. As a result, tank leaks occurred on several occasions. However, these leaks were quickly resolved and the disposal and neutralization of hazardous substances, including flammable and corrosive liquids was completed by May 7, 1991.

Duration of Drum Removal	
Removal Start Date	**September 21, 1988**
Removal Completion Date	**May 7, 1991**
Total Duration	**2.6 yrs**

REMEDIAL DESIGN/REMEDIAL ACTION

As mentioned earlier, three RODs were issued for cleanup of six OUs. ROD 1 encompassed the concentrated liquids; ROD 2 covered the buildings and structures, vault wastes, and lagoons; and ROD 3 was for the soils and sediments and the ground water.

ROD 1, Concentrated Liquids, was the first to be completed. As stated earlier, RD/RA enforcement negotiations were unsuccessful. Therefore, the Agency took the lead and performed the cleanup for OU 1. As shown in Figures 3 and 4, (See pages 29 and 30) this work is complete. On the other hand, much of the cleanup efforts for RODs 2 and 3 has only recently started and is substantially incomplete.

Controversy over the remedy selected for OU 4 has significantly delayed remedial action. Nearly everyone; the state, the community, the PRPs, and the Congressional representatives have opposed on-site incineration as a remedy. The proposed plan for these efforts was issued in April 1990. Because of concerns over the use of on-site incineration, EPA announced, at the mandatory public meeting, that the comment period would be extended for an additional 30 days to allow all interested parties to comment.

> -- On June 12, 1990 the Jackson Township Board of Supervisors stated:
>
> ...we reviewed the records of the Whitmoyer site found in the Myerstown library and it appears that incineration on the site will release gases which would, in our opinion, pose a health hazard to the community and put at risk a larger number of people than those exposed to the danger presently at the Whitmoyer site. Therefore, we are going on record as being opposed to the method of removal proposed by EPA at the present time...
>
> -- On June 15, 1990, the Honorable David Brightbill, Pennsylvania Senate, formally opposed incineration.
>
> -- On October 29, 1990, the Borough of Myerstown emphatically opposed the use of incineration.
>
> -- On October 31, 1990, the Honorable Nicholas Moehlmann, Pennsylvania House of Representatives, registered his total opposition to incineration.
>
> ...Arsenic, being an element and incapable of being broken down into harmless components, cannot be rendered non-toxic by burning. I have seen no study or other information which suggests that sending it up a smokestack is safe for the surrounding population...
>
> I urge you to discontinue consideration of incineration as an option for this site. A decision for incineration, I believe, will create a huge public outcry which may well deteriorate to actions in the courts, resulting in serious delays in an extremely important project.

PADER also objected to the use of on-site incineration. PADER wrote EPA pursuant to the state participation provision of CERCLA. PADER did not concur with the decision to use incineration. The letter states:

Based on current information, the Department is not convinced that incineration is appropriate or acceptable at this facility. As a matter of course, a waste trial burn and a subsequent risk analysis using trial burn data should have preceded the determination of an incineration remedy.

In response to these concerns, EPA held meetings with Congressional Representatives and the local community to explain that the incineration proposed by the Agency, if properly designed and operated, would not pose any significant risk to the community surrounding the Whitmoyer site. Further, EPA agreed to conduct test burns to ensure that the incinerator would operate as planned.

On December 17, 1990, 8 months after the proposed plan was issued, the Regional Administrator approved ROD 2, providing for on-site incineration. According to Agency officials, EPA had to choose on-site incineration because at the time, there were no off-site incinerators available that could handle the wastes.

On May 23, 1991, EPA sent out Special Notice Letters providing the PRPs an opportunity to participate in the RD/RA for ROD 2 and ROD 3. The subsequent negotiations were successful and the consent decree was lodged on September 16, 1992. We asked Agency officials why the negotiations exceeded the 120 day goal. They told us that because of the size of the cleanup operation, nearly $125 million, and because the negotiations were going well, they elected to extend them in the hopes of reaching settlement with the PRPs.

PRP representatives told us they also did not agree with ROD 2 which called for on-site incineration. As a result, the PRPs explored the possibility of locating an off-site incinerator that could handle the wastes. On December 28, 1994, the PRPs obtained EPA approval of an Explanation of Significant Differences (ESD) which calls for off-site incineration of certain hazardous materials on site. According to the RPM, he expects another ESD calling for off-site incineration of carbon and tars from the vault to be approved in the near future. The RPM also told us that he expects off-site incineration to be used as much as possible, perhaps eliminating the need for any on-site incineration.

Nevertheless, delays in remedial action have occurred as a result of the reaction to the remedy selected. The ROD was signed in December 1990, and remedial actions under ROD 2 did not start until September 1993. The remedial actions that have occurred through May 1995, include removing non-hazardous wastes, piping and residual waste from the buildings and the demolition of buildings and structures. According to the RPM, while both EPA and the PRPs considered remediation of the on-site vault a high priority, the demolition of buildings was moved ahead of the vault remediation so that treatability studies could be conducted on the vault wastes. On October 25, 1993, full scale excavation and on-site storage of the upper vault wastes were initiated and excavation and treatability studies of the lower vault wastes also began. Excavation and treatment of the lower vault wastes is scheduled to be completed in December 1995. Treatment of the upper vault waste is estimated to be completed in 1999, depending on the capacity of the off-site incinerator to process the waste.

The status of all cleanup activities are summarized in Figures 3 and 4. (See pages 29 and 30.) As of May 1995, RD/RA efforts have been completed on OU 1 and most of OU 2. While construction is estimated to be completed at the site in the year 2001, the RPM estimates that the long term remedial actions (i.e. groundwater pump and treat) will most likely continue until the year 2050.

Figure 3

Remedial Design Timeframes

ROD #	OU #	Phase	RD Start	RD Completion
1	1	Concentrated Liquids	8/89	1/90
2	2	Non-Hazardous Debris	3/92	9/93
2	2	Piping/Residual Waste	3/92	11/94
2	2	Buildings and Structures	3/92	4/95
2	2	Hazardous Debris	3/92	7/95*
2	4	Lower Vault Sludge	3/92	8/95*
2	4	Carbon and Tar (Drums)	3/92	8/95*
2	4	Carbon and Tar (Roll Offs)	3/92	2/96*
2	4	Vault Debris	3/92	6/96*
2	4	Vault Soil	3/92	1/97*
2	5	Lagoons (**)	3/92	10/97*
3	3	Soil and Sediments (**)	3/92	1/98*

3	6	Groundwater - Initial	3/92	7/96*
3	6	Groundwater - Fullscale	10/99*	10/00*

* RPM Estimate
** Not yet broken into phases.

Figure 4

Remedial Action Timeframes

ROD #	OU #	Phase	RA Start	RA Completion
1	1	Concentrated Liquids	2/90	12/90
2	2	Non-Hazardous Debris	9/93	2/95
2	2	Piping/Residual Waste	11/94	2/95
2	2	Buildings and Structures	4/95	7/95
2	2	Hazardous Debris	7/95	2/96*
2	4	Lower Vault Sludge	8/95*	12/95*
2	4	Carbon and Tar (Drums)	8/95*	9/95*
2	4	Carbon and Tar (Roll Offs)	2/96*	2/98*
2	4	Vault Debris	6/96*	9/96*
2	4	Vault Soil	1/97*	9/99*
2	5	Lagoons (**)	10/97*	7/98*
3	3	Soil and Sediments (**)	1/98*	3/99*
3	6	Groundwater - Initial	7/96*	9/97*
3	6	Groundwater - Fullscale	10/00*	02/01*

* RPM Estimate
** Not yet broken into phases.

Once the remedial cleanup actions at the site actually started we identified little in the way of delays. However, we noted that an on-site building which was constructed to stage hazardous waste collapsed under the weight of excessive snow and ice causing about a six week delay. While the delay is not substantial, we believe it is worth pointing out that some delays in site cleanups are outside of anyone's control.

(Site Pictures not available)

COST RECOVERY ACTIONS

EPA incurred costs of about $5.3 million conducting pre-remedial, removal, and OU 1 remedial activities. In 1992, EPA initiated cost recovery actions against the PRPs. EPA entered into a Consent Decree with the Whitmoyer Estate (original site owner), calling for the estate to reimburse costs of $2.9 million plus pay EPA 50 percent of the residual value of the Whitmoyer estate (amount to be determined). Additionally, Rohm and Haas Company and Beecham Inc. agreed to reimburse EPA $250,000 in past costs and agreed to conduct the RD/RA for actions under RODs 2 and 3 which are estimated to cost about $124 million.

The two settlements collectively total $127.15 million and represent a 98.3 percent settlement of the United States claim. Approximately $2.15 million in past costs remain outstanding and EPA continues seeking these costs from the recalcitrant PRPs.

As part of the 1992 RD/RA settlement agreement, Rohm and Haas and Beecham agreed to reimburse EPA for all future costs incurred by the Agency not inconsistent with the National Contingency Plan. As part of this agreement, EPA agreed to annually bill for these costs. As of May 1995, EPA had not billed for oversight costs for fiscal years 1993 and 1994, and Agency officials could not tell us the total dollar amount that should be billed. We discussed this with Agency officials who told us that a bill is being generated and will be sent out in the near future.

CONCLUSIONS

While our review may not have captured every barrier that the Agency faced on the site, some of the more prominent barriers did come to light. The state spent 2 years negotiating with the PRPs to conduct the RI/FS, yet the negotiations were unsuccessful. Rather than undertaking the RI/FS, EPA decided to hold another round of negotiations. Further, the negotiations for conducting the RD/RA were also extended well beyond the Agency goals of 120 days. Although enforcement first is an Agency policy, and the policy seeks to strike a balance between the need for PRPs to fund cleanups versus the need to proceed expeditiously, the actions at this site indicate that failure to abide by the Agency's established timeline for negotiations can unduly delay site cleanup.

Further, some of the residents in the community stated that they felt abandoned by EPA. The PRPs provided water to the residents for approximately 20 years. Once the PRPs stopped providing bottled water in 1984, these residents had to supply their own bottled water or use well water with a history of arsenic contamination. It wasn't until 1987 that EPA made the decision to provide these residents with bottled water until the water line was installed. Once the decision to install the water line was made, 3 additional years were spent considering size, capacity and other issues surrounding the water line. Once an alternative was decided upon, it took an additional 2 years for installation.

Documentation from the site files shows that the on-site vault was leaking, was coming into contact with the fluctuating ground water table, and was deteriorating. The files also indicated that the vault was one of the main sources of ground and surface water contamination. EPA became aware of this situation in 1983. In 1987, a removal action to address the vault was planned by EPA at a cost of approximately $3 million. This removal never took place. Rather, EPA chose to handle the vault wastes under the remedial program using on-site incineration. The remedial action costs are currently estimated at about $18 million, due mainly to the application of additional regulatory requirements associated with Land Disposal Restrictions, according to Agency officials. Because of community, Congressional, state and PRP objections to the proposed remedy, the remedial action was delayed. While actions are currently being taken to treat and dispose of the vault waste, the question remains whether the proposed removal action could have prevented additional contamination and provided additional protection of human health and the environment at a significantly lower cost.

While the remedial actions at the Whitmoyer site are underway, much of the work on the site has yet to be completed. Much of the time, with the exception of those removal and remedial activities mentioned, has been spent studying the site and designing remedies. Many more years will pass before the site will be cleaned up.

Footnotes

1. The maximum contaminant level (MCL) for arsenic was 50 parts per billion.

2. According to the RPM, additional samples revealed arsenic concentrations of 12-15 percent, which is believed to be more representative of actual levels.

Review of Barriers to Superfund Site Cleanups

WASATCH CHEMICAL CASE STUDY

SUMMARY OF BARRIERS

Site Overview

EPA listed August 1980 as the discovery date of the Wasatch Chemical site in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) and added a portion of the site, Lot 6, to the National Priorities List (NPL) in 1991. Over 15 years have elapsed since the site was identified and cleanup of the site is not yet complete. Although some actions have been taken (the removal of drums and capping of contaminated soil), untimely cleanup may have ultimately resulted in additional contamination and higher cleanup costs.

Barriers Identified

Our review disclosed several barriers encountered by the Agency, which may have resulted in a longer and more costly cleanup of the site. We identified barriers related to the following: removals, enforcement negotiations, RPMs, innovative technologies, site study and the weather.

First, the planned investigation and potential removal of the evaporation pond was not implemented. Utah state officials documented evidence from 1981 to 1985 indicating that the ground water at the Wasatch Chemical site was contaminated with toxic chemicals, many of which were probable or suspected carcinogens. Evidence also indicated that the evaporation pond, used to contain process wastes, was the source of this contamination. In 1985, EPA proposed further investigation and possible removal of the evaporation pond. However, neither action, investigation or removal of the evaporation pond, occurred. Thus, the evaporation pond remained unaddressed until 1994, at which time remediation of the pond began.

Second, a removal action was repeated because over 5 years had elapsed since the initial removal and remedial cleanup had not yet started. The first removal was conducted in 1986 to removal deteriorating drums and gas cylinders and visibly stained dioxin-contaminated soils. This action cost approximately $200,000. The second removal was conducted in 1991 to address the soils in the same area as the 1986 removal action and cost approximately $70,000. If the remedial action had been started in a more timely manner, it would not have been necessary to perform the second removal action.

We also identified lengthy RI/FS negotiations as a barrier at the Wasatch site. The first removal action was completed in June 1986; however, the RI/FS did not start until September 1988. During this period, EPA and the State of Utah debated the lead for the RI/FS for approximately 16 months. The state spent an additional 12 months negotiating with PRPs regarding performance of the RI/FS. Thus, for 2 1/2 years, there was no actual cleanup activity at the site.

The turnover of RPMs, EPA and the state, was identified as a barrier to a more timely and cost-effective cleanup. From 1987 to the present, there were at least six different EPA RPMs at Wasatch, two of whom were on detail from other program offices and had no prior Superfund experience. Moreover, the State of Utah had at least five RPMs during this time. EPA officials attribute this turnover to resource limitations, promotions and people leaving the Agency. However, when the site changes hands as many as six times, historical knowledge of the site may be lost and the learning curve associated with each new RPM may add additional time and expense to the site cleanup.

We noted that the use of an innovative technology at the Wasatch Chemical site presented a barrier to timely and cost effective cleanup. However, it is not our intention to discourage the use of innovative technologies, but to note that any new process is likely to add cost and time to a cleanup.

The innovative technology, in-situ vitrification (ISV), is being used at the Wasatch Chemical site to remediate soils and sludges contaminated with dioxins as well as other toxic chemicals. Before implementing ISV at Wasatch Chemical, the technology was not fully demonstrated. As expected, the operation of ISV at Wasatch was not flawless. There were a number of incidents that added additional time and cost to the cleanup. ISV was initially estimated to be complete within 6 months from the first melt. It is currently expected to take at least a year to complete. In addition, the cost of ISV was originally estimated at $3,345,438. However, the most recent cost estimates, projected through the end of the ISV process, are $6,320,000. Moreover, until sampling in and around the vitrified rock is performed, it is unclear how effective ISV has been in remediating the site.

Another barrier identified at the Wasatch Chemical site involved prolonged site study. With the exception of 2 removal actions, 12 years have basically been spent performing pre-remedial activities and studying the site, while only the past 3 years have involved actual remediation of the site. Thus, the site has been in the Superfund pipeline for approximately 15 years and cleanup is not yet complete.

Finally, weather conditions were identified as a barrier to cleanup. The landfarming portion of the remedial action was delayed for approximately 6 months, November 1992 to April 1993, due to unfavorable weather.

WASATCH CHEMICAL CASE STUDY

BACKGROUND AND SITE HISTORY

The Wasatch Chemical site is located within an industrialized corridor in Salt Lake City, Utah. The population within a one-mile radius is approximately 5,000, with the nearest residential area being located approximately a quarter-mile northwest of the site. The 15-acre Wasatch property consists of all or portions of Lots 2 through 6. Lot 6, which is an unpaved 3.7-acre area located at the north end of the Site (see site map on p.38) was placed on the National Priorities List (NPL) on February 11, 1991. Lot 6 contains a former concrete evaporation pond, which was used to reduce chemical waste water to a sludge. It also contains leach lines and an old septic tank.

For over 30 years, this site was the location of several chemical operations. In 1958, Wasatch Chemical Company (WCC) began producing agricultural chemicals including fertilizers and toxic pesticides. Among the chemicals produced were chlordane, 2,4,-Dichlorophenoxyacetic acid (2,4,-D) and 2,4,5-Trichlorophenoxyacetic acid (2,4,5-T), all of which are suspected carcinogens. WCC continued operations until 1968, when, it was sold to Mountain Fuel Supply Company. WCC then became a wholly-owned subsidiary of Mountain Fuel Supply Company. In 1971, Entrada Industries was incorporated as a wholly-owned subsidiary of Mountain Fuel and WCC was merged into Entrada. Entrada continued to operate the WCC business as the Wasatch Chemical Division of Entrada.

Also in 1971, the Salt Lake City Health Department reported an unauthorized waste water discharge from the Wasatch chemical plant to a drainage ditch along 700 West Street. After determining that the waste water was unsuitable for discharge, the Utah Water Pollution Committee requested WCC to immediately discontinue this practice. In response, WCC proposed the construction of an evaporation pond to contain the waste water. The plan was approved and the pond was constructed on Lot 6 in late 1972. The evaporation pond measured approximately 125 feet by 125 feet by 4 feet deep. Waste water drained from chemical operations and was pumped into the evaporation pond.

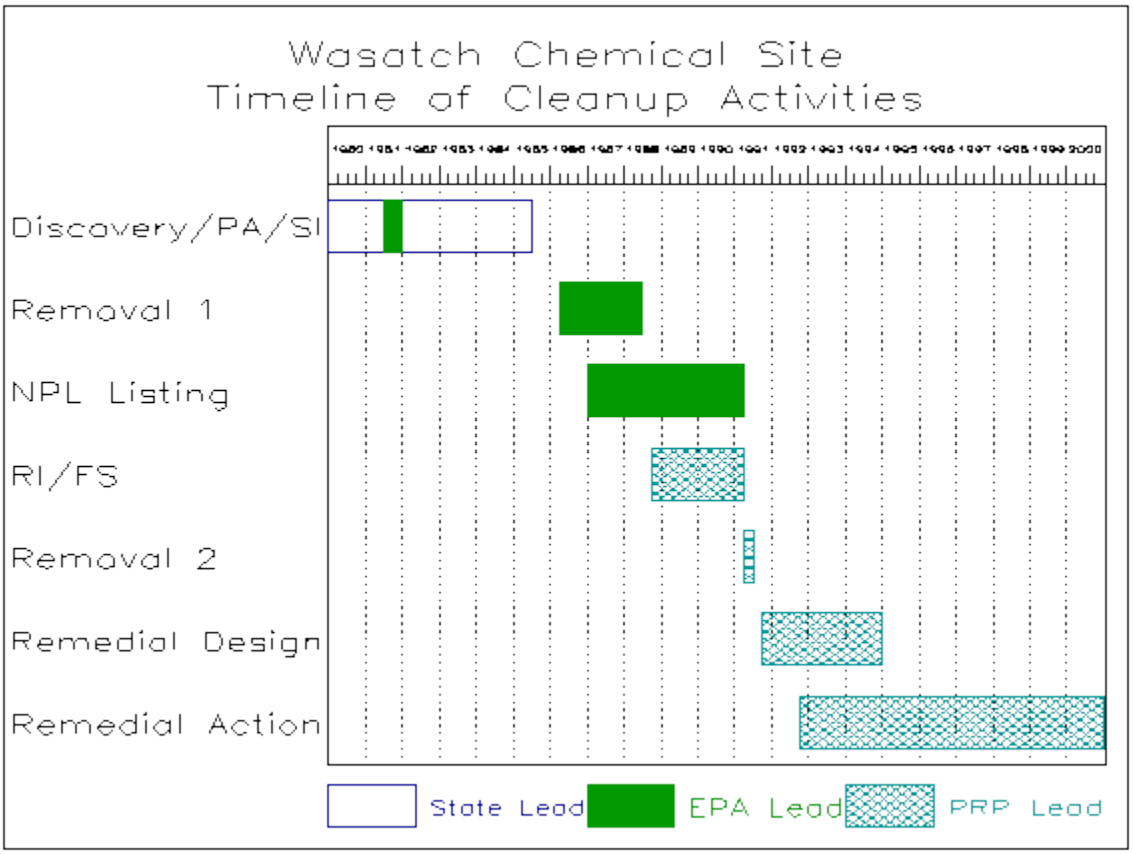
WCC continued operations until 1978. At this time, Entrada Industries sold its industrial chemical business, not including the property, to Great Western Chemical Company. Their connection with the evaporation pond was

reportedly severed. Entrada then leased, with a purchase option, the WCC property to Huntsman-Christensen Chemical and Oil Corporation.

(Site Pictures not available)

As part of the lease agreement, Huntsman-Christensen assumed responsibility for cleaning up the evaporation pond. In 1980, Huntsman-Christensen submitted an application to the State Department of Health for the in-place storage of the contents of the evaporation pond. In February 1980, the State Department of Health granted the permit. The permit required that the waste be dry, no more material be discharged to the evaporation pond and that wells be installed around the pond and sampled annually. The evaporation pond, which contained approximately eight inches or 1200 cubic yards of sludge, was backfilled with layers of cobble rock, sand, and clay, and capped with a concrete slab.

Chronology of EPA Superfund Involvement



Note 1: Physical removal activities during Removal 1 were completed within approximately 2 months. However, the removal program was responsible for oversight of the temporary dioxin-storage facility until the remedial program assumed responsibility for the site in June 1988. Thus, the site remained the responsibility of the removal program from March 1986 until June 1988.

Note 2: Phase I of the RA is complete, Phase II is scheduled for completion by 10/95 and Phase III is scheduled for construction completion by the end of calendar year 1995. However, the groundwater treatment system included in Phase III will be in operation until at least the year 2000. See p.51 for additional information.

Source: EPA data depicted in calendar year

SITE DISCOVERY, PRELIMINARY ASSESSMENTS, AND SITE INSPECTIONS

The Comprehensive Environmental Response, Compensation, Liability Information System (CERCLIS) lists August 1980 as the site discovery date for the Wasatch Chemical site. Available documentation did not indicate by whom or when the site was discovered. Therefore, we could not verify the date listed in CERCLIS. However, a Utah official said that EPA directed the state in 1980 to identify potential Superfund sites and Utah identified the Wasatch Chemical site at that time.

On April 15, 1981, EPA prepared Preliminary Assessment (PA) and Site Inspection (SI) reports for the Wasatch Chemical site. The information in the reports was based on an inspection conducted by Utah State Health Department officials on January 29, 1979, and ground water sampling results obtained from Huntsman-Christensen Corporation in March 1981. The ground water samples were collected from the monitoring wells installed around the encased evaporation pond. According to a Utah official, these sample results were the initial indication that the ground water around the evaporation pond was contaminated. However, both the PA and SI reports completed in 1981 concluded that there were no apparent serious problems at the site. Available documentation did not indicate the reason for the discrepancy between the sampling results and the conclusion reached on the PA and SI reports.

In 1982, Utah officials inspected the site and completed a second PA report. The report stated, "Leakage has been allegedly detected. Contamination of groundwater has been documented, although the extent of the problem is unknown." This second PA report recommended that the site be given high priority for a site inspection. The report was transmitted to EPA on February 23, 1984. The transmittal memo reiterated the recommendation contained in the PA report "that action on this site be continued, and that it be given a high priority."

Utah officials conducted an SI and submitted a report to EPA on July 30, 1984. According to the SI report, ground water samples collected beneath the evaporation pond contained concentrations of many toxic chemicals believed to be stored in the evaporation pond. The state also submitted a preliminary Hazard Ranking System (HRS) score with this report of 51.02. This ranking qualified the site for listing on the NPL.

A third SI was conducted by Utah officials in June 1985. Based on information gathered during the 1984 and 1985 SIs, a second HRS scoring package was submitted to EPA on October 9, 1985. The HRS package included a score of 63.31; however, this score was based on incomplete laboratory analyses and results. After additional results were submitted, the site was assessed a final HRS score of 66.43. This SI report concluded that the surface stream along 700 West Street, the street running parallel to the site, and the ground water underlying the facility had been affected, and that the site exhibited a high contamination potential.

REMOVAL ACTIONS

Potential Removal of Evaporation Pond Contents

Before capping the evaporation pond in 1980, Huntsman-Christensen had the sludge sampled to characterize the waste. The hazardous substances contained in the pond included arsenic, cadmium, lead, and 2-4-D. In 1981 and 1982, in accordance with the provisions of the pond closure plan, Huntsman-Christensen collected samples from the four monitoring wells installed around the evaporation pond. Results from these samples indicated that many of the hazardous substances believed to be in the evaporation pond were detected in the ground water.

In June 1984, Utah officials collected ground water samples from the monitoring wells beneath the evaporation pond. The analysis of these samples revealed that concentrations of some of the contaminants associated with the evaporation pond were present in the ground water. The following table describes the concentrations of the

contaminants that exceeded the corresponding EPA Drinking Water Standard. In addition to those contaminants included in the table, there were three other contaminants present which did not exceed the standards.

June 5, 1984 Sample Results of Evaporation Pond Wells
Concentrations in g/l (micrograms/liter)

Contaminant	EPA Drinking Water Standard	East Well	West Well	South Well	North Well
Arsenic	50	350	430	150	160
Cadmium	10	28	15	13	13
Lead	50	1640	960	500	290
2,4,5-TP	10	.08	142.1	1.4	.6
2,4-D	100	.4	1.25	4.8	10.4
Trichloroethylene	27	5.1	35.7	42.3	2
Tetrachloroethylene	8	No Data	314.7	10.6	No Data

Source: Table 1, EPA Study Plan, February 19, 1985

The July 1984 SI report, summarized the site conditions as follows:

As the Huntsman-Christensen pond may be presenting a serious potential hazard to an important municipal well and is releasing toxic and carcinogenic compounds to the local ground and surface waters, it is felt that further CERCLA action there should be given a high priority. While at this point it is too early to say just what dangers it really has created or what measures will be required to correct the situation, it appears likely that removal will be the final outcome.

As a result of the state's sampling information, EPA, the Technical Assistance Team (TAT), and the state met to discuss potential removal actions. In a November 30, 1984 memo, EPA's Emergency Response Branch (ERB) Chief indicated that the main concern at the site was the covered concrete pond and the apparent leakage of materials from the vault into ground water. The Chief, ERB, indicated that the evaporation pond needed to be sampled and that a removal action may be necessary if the situation was determined to pose a threat to human health or the environment.

In order to further assess the threats posed by the evaporation pond, the On-Scene Coordinator (OSC) prepared a site study plan in February 1985. The plan described the condition of the evaporation pond as follows:

The source of on-site contamination is believed to be the vault [evaporation pond]... Visually, several cracks appear in the walls of the vault and the cap-wall joints appear to be loose. The gas-vent pipes contain water above elbow joints, indicating that the sludge, which was supposedly dry or dehydrated when the cap was built, may now be saturated or submerged.

The plan proposed sampling of ground and surface waters, soil and deteriorating drums which had been previously discovered on Lot 6.

In May 1985, the OSC completed a draft Action Memorandum for an immediate removal action. The purpose was to determine the extent of ground water and surface contamination and to possibly remove the source of contamination, which was believed to be the evaporation pond. Further, the memo indicated that there were several private wells near the evaporation pond, which were believed to be used for industrial purposes only. However, no surface water or drinking water wells, either private or municipal, had been sampled to determine

the extent of off-site contamination. The memo also mentioned that, "no Federal, state, local, or privately sponsored activities to abate the threat at the site has yet been undertaken." The cost of the removal activities was estimated at approximately $70,000.

According to a TAT memo, on May 8, 1985, the Region 8 Office of Regional Counsel (ORC) reviewed the draft Action Memo and conditions at the site and determined that "only the 60 drums and carboys stored on-site constituted an immediate threat, and, therefore, a CERCLA Section 106 Administrative Order could not be issued for the removal of the contents of the vault since the sampling plan would not adequately identify the source of contamination." Thus, the evaporation pond was neither investigated nor removed at this time.

(Site Pictures not available)

Removal of Drums

After the ORC determined that only the drums constituted an immediate threat, a new draft Action Memorandum was completed. State officials took samples in June 1985 and confirmed that the drums and their contents posed an imminent threat to human health and the environment. In December 1985, state officials held several meetings with the potentially responsible parties (PRPs) regarding the removal of the drums and gas cylinders. In January 1986, after attempts to prompt the PRPs to conduct a removal action failed, the State of Utah filed a complaint in Federal District Court seeking an order to require the PRPs to undertake an immediate removal action. Three days later, on January 13, 1986, state officials requested EPA to initiate immediate removal of the drums and gas cylinders.

In March 1986, EPA initiated the removal action at the Wasatch Site. The drums were staged, sampled and overpacked. After this was complete, contaminated wooden pallets and visually stained soils on and adjacent to the drum storage area were overpacked. An area of stained soil approximately eight feet by nine feet to a depth of two inches was excavated from the storage area. Samples of excavated soils and of the newly exposed ground surface within the cavity were collected for analysis. The excavated area was backfilled with clean dirt and on June 4, 1986, removal crews demobilized. This removal action cost about $200,000.

An OSC memo discussed the analytical results of samples collected beneath the excavated soil. The samples contained tectrachlorodibenzo-p-dioxins (TCDD), commonly known as dioxins, at concentrations of **21,487 parts per billion** (ppb). The cleanup standard at that time was **1 pbb**. The OSC determined that all drums, where TCDD analytical detection limits exceeded 1.0 ppb, would be placed in temporary storage on-site. However, the unexcavated soils, which contained concentrations of dioxins in excess of 20,000 times the cleanup standard, were left on-site covered by clean dirt.

The OSC told us that the removal program was aware that the remaining soil was contaminated. However, the removal program assumed the remedial program would be addressing the site in approximately 18 months. Therefore, they believed that the placement of clean dirt over this portion of the site was sufficient. When asked about the protectiveness of the clean dirt, the OSC responded that it is designed to protect anyone walking through the soil; however, it is not designed to protect the underlying aquifer.

Only a year later, the OSC was considering another removal action. A June 1987 memo from the OSC stated, "further removal actions or 'housekeeping type' measures were justified and could be taken at the site to further insure site stability until remedial actions had run their course (i.e., RI/FS)." However, based on our review of the site files, it does not appear that these additional removal actions or "housekeeping" measures were pursued at this time. Moreover, as a result of negotiations between EPA and the State of Utah regarding the lead and the state and the PRPs regarding the remedial investigation and feasibility study, the remedial program did not assume responsibility for the site until 1988.

In August 1990, as part of the "Make Sites Safe Initiative"[(1)] and after the remedial investigation (RI) started, the removal program staff revisited the site to evaluate the actions taken in 1986. Specifically, samples were collected from around the backfill area, from the backfill area itself, and from underneath the backfill. It was determined that an additional removal action would be necessary to stabilize this area of the site. According to a March 12, 1991 Action Memorandum:

...the surface soil around the backfill area contained up to 212 ppb 2,3,7,8 TCDD. The two samples collected from immediately underneath the backfill through borings four inches in diameter contained 50.7 and 403 ppb 2,3,7,8 TCDD. The backfill had eroded to one-half inch thickness in places, apparently due to repeated vehicular and foot traffic across the backfill, settling, or erosion.

Unless measures are taken before remedial action to contain the dioxin at issue, ongoing contaminant release from the DSA (drum storage area) can be expected, possibly exposing to that contamination any visitor entering the Lot 6 portion of the Wasatch Chemical Site.

Therefore, on June 12, 1991, approximately 5 years after the first removal, a time-critical removal action was initiated to cap and secure the dioxin-contaminated soils. The cap consisted of placing a liner over the area, which was then staked down with fence posts and secured with sand bags. No soil was removed from this area of the site. This removal action was estimated to cost approximately $70,000.

NATIONAL PRIORITIES LIST

In February 1986, Region 8 officials recommended the entire Wasatch site be proposed for listing. After a debate over listing the entire site or just Lot 6, EPA Headquarters proposed listing only Lot 6 in January 1987.

In March 1987, comments were received from the state and the PRPs. Utah officials supported listing the entire site; the PRPs requested the entire site be dropped from NPL consideration. EPA Headquarters officials were reluctant to list the entire site because of conflicts between CERCLA and Resource Conservation and Recovery Act (RCRA). Apparently, a new policy was being developed where lot 6 would be under CERCLA and lots 2 through 5 would be under RCRA. They were reluctant to list the site before the policy was finalized. Also, in October 1988, EPA's contractor reviewing the HRS package posed several questions regarding the state's documentation. However, it was not until March 15, 1990, approximately 17 months later, that the NPL Listing Coordinator forwarded the questions to the state. In April 1990, state officials informed EPA that the documentation supporting the scoring package had been destroyed. State officials suggested using the data obtained during the removal action. However, according to EPA officials the data collected during the RI was of higher quality and therefore, it was used to score the site. On January 11, 1991, approximately 4 years after proposal of the site, lot 6 of the Wasatch Chemical site was listed in the NPL.

REMEDIAL INVESTIGATION/FEASIBILITY STUDY

In May 1986 EPA began considering whether the Wasatch Chemical site should be classified as a federal or state-lead site. Officials were divided on the issue, and no decision was made at the time. In February 1987, Utah officials requested a letter from EPA that would formally give the state the lead for the remedial investigation and feasibility study (RI/FS) at the site. EPA responded that the state would have to submit an application for a cooperative agreement before a final decision regarding the lead could be made. The state eventually did so, and EPA officials again debated the issue among themselves in the summer of 1987. In September 1987, EPA agreed to allow Utah officials to take the lead on the RI/FS.

The State of Utah then entered into negotiations with the PRPs regarding performance of the RI/FS. Entrada Industries, the primary PRP at the site, proposed a mixed funding agreement, which would allow them to conduct 100 percent of the RI/FS, but only pay for 50 percent of the costs. EPA Headquarters would not approve a mixed funding agreement. However, in September 1988, a partial consent decree between the State of

Utah and Entrada Industries was executed. In June 1988, conflict of interest issues arose regarding the contractor Entrada Industries had selected to conduct the RI/FS. Therefore, Entrada Industries had to find a replacement contractor. In September 1988, over 2 years after the first removal action, Entrada Industries assumed responsibility for conducting the RI/FS. The other PRP active in negotiations, Huntsman-Christensen Corporation, requested a de minimis settlement, which was granted.

In March 1990, Entrada completed the RI. The RI identified elevated concentrations of chemicals in the following areas of the site: the process drainage system, yard drain system, the septic system and the former evaporation pond. The chemicals of concern included pesticides, herbicides, volatile organic compounds (VOCs), base/neutral and acid extractables, and dioxins. Elevated concentrations of the same chemicals were also found in soils and VOCs were detected in the ground water.

The FS was delayed due to disagreements between EPA and Entrada Industries regarding the Endangerment Assessment. Entrada Industries conducted the endangerment assessment and concluded that there were no significant current risks at the site, particularly related to the ground water. However, according to discussions with the EPA remedial project manager, EPA and the state believed that Entrada conducted the risk assessment incorrectly. In addition, EPA officials stated that Entrada fought for months to use calculation methods that understated the risk. Thus, EPA requested that Entrada take the necessary actions to revise the assessment. Entrada eventually agreed to do additional ground water investigations and the issue was resolved. When asked about the problems with the endangerment assessment, Entrada officials stated that they had to be concerned with tort claims that may arise as a result of risk assessments that included high numbers. The FS was issued on August 22, 1990.

EPA issued the Proposed Plan regarding the remedial action alternatives considered for the site in October 1990 for public comment. EPA only received limited comments, which was indicative of the level of public interest and involvement in this site. The comments were reviewed and incorporated into the Record of Decision (ROD), which the Regional Administrator signed on March 29, 1991, approximately 11 years after the site was discovered.

REMEDIAL DESIGN

The ROD prescribed remedial action to occur in three phases: (1) land farming of hydrocarbon contaminated soils, (2) in-situ vitrification (ISV) treatment of soils, sludges and dioxin removal wastes, and (3) ground water pumping and treating using air stripping. The following chart illustrates the actual timeframes for the remedial design.

Timeframes for Remedial Design Activities

Remedial Design Phase	Start Date	Completion Date
Landfarming	9/30/91	10/16/92
ISV	9/30/91	9/10/93
Ground water Treatment	9/30/91	3/8/95

REMEDIAL ACTION ACTIVITIES

The remedial action began in October 1992. The first phase, landfarming, was completed in January 1994. The other two phases, ISV and ground water treatment, are ongoing. The following chart illustrates the actual start and completion dates for each phase.

Schedule of Remedial Action Activities

Remedial Activity	Start Date	Completion Date
Landfarming	10/16/92	1/19/94
ISV	11/23/94	Planned completion 10/95
Ground Water Treatment[(2)]	10/11/94	Unknown at this time

Landfarming

The first phase involved landfarming of contaminated soils. During this process, approximately 1000 cubic yards of soil contaminated with toluene and xylene were excavated from an area between buildings K and M as shown on the site map on page 38. Excavated soils were spread over an asphalt area on the site and remediated by aeration and enhanced biodegradation. The landfarming was delayed approximately 6 months, November 1992 to April 1993, due to weather-related unfavorable work conditions. Landfarming was completed in January 1994. Samples of the remediated soil were collected. Soils which met cleanup standards were used as backfill. The soils exceeding cleanup levels were placed in and over the evaporation pond for final remediation during ISV.

ISV

The second phase involved a new and innovative technology, ISV. ISV is used to melt wastes, soils and sludges in place. The waste is bound in a glassy, solid mass, which is resistant to leaching. During the ISV process, electrodes are inserted into the soil to the desired treatment depth (7-8 feet at Wasatch). Heat from the high current of electricity passing through the electrodes creates a melt. The soils and/or sludge are heated to temperatures in the range of 3,000 to 3,600 degrees fahrenheit. As the melt grows downward and outward, it destroys the organic components. When the electric current ceases, the molten mass cools and solidifies. A hood placed over the processing area provides confinement for the combustion gases, drawing the gases into an off-gas treatment system.

The effectiveness of the ISV technology has been questioned. PRC Environmental Management, Inc., an EPA contractor, reported on the use of ISV at the Wasatch Chemical site. The report stated that, "ISV is not a demonstrated or proven reliable technology." The report mentions that a treatability study demonstrated the feasibility of using ISV on Wasatch Chemical site soils; however, several concerns were not resolved by this study. The primary concerns were (1) the vaporization, migration, and condensation of contaminants away from the ISV process area; (2) effectiveness of ISV in saturated soils, or below the water table; and (3) effectiveness of the off-gas collection system. In addition, the report stated that,"the limited experience with ISV at full scale is the basis of the concerns because there is no history of successful use of ISV in environments similar to the Wasatch Chemical site." As a result of a second treatability study, EPA was able to resolve 2 of the 3 concerns raised by PRC through engineering of the technology. However, EPA determined that the possible vaporization, migration and condensation of contaminants away from the ISV process area would have to be addressed after ISV was complete. At which time, subsequent sampling would be performed to verify whether this occurred.

The ISV process was started in November 1994 and is being conducted over the old evaporation pond. Contaminated wastes such as excavated soils and the dioxin-contaminated wastes were consolidated and placed into the evaporation pond for vitrification. This area was then covered with the soils, including those remediated during the landfarming process. ISV will be used to reduce the contaminant levels in the soils, sludges and dioxin wastes to levels suitable for continued industrial use of the site. The ISV process is scheduled to be performed in 37 melts and was originally estimated to be complete within six months of the first melt. However, it is currently estimated to take an additional six months and be completed by October 1995.

To date, there have been problems with several of the ISV melts at the site. The first melt was started on November 23, 1994, and stopped on November 26, after problems with underhood flaring and damage to the blower.

The second melt started on December 15, 1994. However, before completion of this melt, pressurization of the hood resulted in the displacement of a small amount of molten material from under the hood. The hood movement caused one of the electrodes to break and fall into the melt. This caused molten material to be ejected from the vacant electrode port. It was also reported that the electrodes had melted through the concrete floor of the evaporation pond. Emergency crews were dispatched and the melt was terminated.

According to the incident report, the probable cause of the incident was a trapped bubble of water vapor that rose suddenly to the surface and caused the displacement of molten material. This may have occurred as a result of melting through the bottom of the pond and into the ground water table. An official associated with cleanup activities said that melting through the bottom of the pond may have allowed contaminants to escape into the ground water below the evaporation pond. There were also incidents involving pressurization on the fourth, seventh, and twelfth melts.

In addition, the Salt Lake City Health Department is concerned about the health effects associated with the ISV incidents. We spoke with one official at the Health Department who expressed great concern. He mentioned that some employees, working adjacent to the Wasatch Chemical site, experienced ill effects they believe were associated with the ISV incidents. On two occasions, both correlating with ISV-related incidents at Wasatch, some employees experienced burning of eyes, shortness of breath and nausea. In a letter responding to these concerns, the Director of Utah's Division of Environmental Response and Remediation provided assurance that air emissions from these incidents were monitored and negligible releases of contaminants were detected. Agency officials also indicated that they were satisfied with the quality of the air monitoring of these incidents. However, another person involved with the cleanup work at the Wasatch site stated that the quality of air monitoring at the site is extremely poor.

EPA officials expressed confidence that the ISV technology is working at the Wasatch Chemical site; however, the overall effectiveness of the technology at the site is yet to be determined. Upon completion of ISV, sampling is planned in and around the vitrified rock to ensure that the contaminated wastes were effectively treated.

Ground Water

Phase three involves pumping and treating of ground water using an air stripper. The goal is to reduce the levels of contaminants found in the shallow portions of the aquifer by 50 percent within the first 5 years of remediation. The ground water pump and treat system started operating on an incremental basis in October 1994. The system will not run on a continuous basis until the ISV treatment is complete. At some point, yet to be determined, the ground water will be pumped and treated for 5 consecutive quarters, at which time it will be evaluated to determine if the contamination is being reduced. Based on results obtained at that point, pumping and treating may continue for up to 5 years. The Agency will, at that time, have to determine if it is technically practicable to achieve the 50 percent reduction of ground water contamination.

(Site Pictures not available)

RPM Turnover

Entrada Industries is conducting remedial activities at the Wasatch Chemical site, and EPA and State of Utah remedial project managers (RPMs) are overseeing the activities. Since 1987, there have been at least six EPA RPMs at the Wasatch Chemical site, including two RPMs detailed from other EPA program offices. Two of these RPMs had no background in the Superfund program. We asked an EPA official how someone could be expected to effectively manage a Superfund site with no prior experience in the program. He stated that, at this

site specifically, it was not a problem because one of the detailed RPMs "was working with a knowledgeable contractor." In addition, there have been at least 5 state RPMs during this time. Entrada Industry officials expressed concern about the turnover of RPMs at Wasatch. An Entrada official told us that each time a new RPM was assigned, they (Entrada) were responsible for the costs associated with that RPM's learning curve. We asked one former EPA RPM, based on his experience, how long it generally took to become familiar with a site after being assigned. He stated that it took approximately 6 months to learn about the site and become comfortable with managing site activities. According to EPA officials, there were a number of reasons for the RPM turnover at Wasatch, some of which included resource limitations, promotions and people leaving the Agency.

COST RECOVERY ACTIONS

From October 1985 to September 1990, EPA incurred costs for response actions including a removal action and oversight of the RI/FS. Therefore, on March 29, 1991, EPA issued a Special Notice and Demand for Payment in the amount of $483,035 to Entrada Industries. This amount was later revised, to $418,956. On September 27, 1991, Entrada paid the revised amount.

Also, in September 1991, EPA and the State of Utah entered into a Consent Decree (CD) with Entrada Industries for performance of the RD/RA work at the Wasatch Chemical site. In accordance with the CD, EPA agreed to provide Entrada Industries annual billings of oversight and response costs associated with the agreement. However, it was not until 3 years later, on November 1, 1994, that EPA submitted a bill to Entrada Industries for the period October 1, 1990 to December 31, 1993 in the amount of $792,883. As a result, Entrada disputed the billing based on the provision in the CD which requires EPA to submit annual billings. EPA and Entrada attempted to resolve this matter through an informal dispute resolution process. The dispute is currently being negotiated through a formal dispute resolution process and remains unresolved.

During December 1994 discussions with Entrada, EPA agreed to provide billings on a yearly basis beginning in calendar year 1995. As agreed upon, EPA submitted a billing for the period of January 1, 1994 to December 31, 1994, on May 9, 1995.

CONCLUSIONS

Although actions were taken to conduct some site cleanup at the Wasatch Chemical site, our review disclosed several barriers encountered by the Agency, which may have resulted in a longer and more costly cleanup of the site.

For example, because EPA did not address the evaporation pond until 1994, it is possible that toxic contaminants could have been leaking into the ground water for as many as 14 years (1981 - 1994).

Also, there were two removal actions completed to address the same area of the site. The first removal was completed in 1986. It was almost 2 years until the remedial program assumed responsibility for the site and another 4 years before remedial cleanup began. Therefore, an additional removal action was completed in 1991 to readdress the dioxin-contaminated soils that were subject to the 1986 removal. Thus, had the remedial action been initiated in a more timely manner, a second removal action would not have been necessary.

After the 1986 removal action and until the RI/FS was negotiated in September 1988, there was no cleanup activity conducted at the Wasatch Chemical site. During this period, EPA and the State of Utah spent approximately 16 months negotiating the lead for the RI/FS (May 1986 - September 1987). The state spent an additional 12 months negotiating with the PRPs regarding the performance of the RI/FS (October 1987 - September 1988). Therefore, for almost 2 1/2 years no actual cleanup activity occurred at the site.

Moreover, there were at least six EPA RPMs and five state RPMs at the Wasatch Chemical site. At least two of the EPA RPMs were from other program offices and had little or no Superfund experience. Considering the site changed hands at least six times, there is concern that historical knowledge of the site may be lost and the learning curve associated with each new RPM may add additional time and expense to the site cleanup.

Additionally, we noted that there were difficulties with the innovative technology at the site. We acknowledge that this is anticipated and is a part of trying something new. However, the difficulties encountered during operation of the technology have added time and cost to the cleanup. It appears that completion of ISV will take at least 6 months longer than originally estimated. In addition, it appears that ISV will cost approximately $6,320,000, which is almost $3,000,000 more than originally estimated. Moreover, until sampling in and around the vitrified materials is performed, the overall effectiveness of the ISV technology cannot be determined.

With the exception of 2 removal actions, almost 12 years were spent performing pre-remedial activities and studying the Wasatch Chemical site, while only 3 years have involved actual remediation of the site. Thus, this site has been in the Superfund "pipeline" for approximately 15 years and it will be several more years before cleanup is actually complete and the site can be deleted.

Footnotes

1. The "Make Sites Safe Initiative" was introduced to reevaluate sites where EPA had performed previous response actions to ensure the actions remained protective of human health and the environment. This initiative was prompted by the slow response of the remedial program in addressing sites.

2. Construction completion of the ground water treatment system is scheduled to be complete by the end of calendar year 1995. However, the system will be in operation until at least the year 2000.

Review of Barriers to Superfund Site Cleanups

SOUTHERN MARYLAND WOOD TREATING CASE STUDY

SUMMARY OF BARRIERS

Site Overview

We limited our review of this site to an analysis of the events surrounding the local community's concerns regarding the use of on-site incineration as a cleanup remedy. We were particularly interested in learning how the Agency reacts to a community which objects to an approved remedy and how that ultimately affects site cleanup. While other factors at this site also delayed cleanup, we wanted to examine how community involvement can play a role in slowing down the decision-making and cleanup process. We included the timeframes for the various phases of activity to provide a site chronology and for consistency with the other two case studies.

The Southern Maryland Wood Treating (SMWT) site originally operated as a wood treating facility from 1965 to 1978. The main chemicals used to treat wood were creosote and pentachlorophenol (PCP). The operators of the facility disposed of waste in unlined lagoons on the site. Hazardous wastes on the site eventually contaminated the ground water, surface water, and a fresh water pond on the site. Contamination was also found in a tributary west of the site which empties into the Potomac River.

EPA discovered the site in December 1981 and added it to the National Priorities List (NPL) in June 1986. EPA began investigating and assessing the site in 1982 and took a number of actions to stabilize the site and mitigate the further spread of contamination. However, partially due to community and political pressures, work on a 95 percent-completed remedial design was halted in 1992. EPA reexamined other alternatives and conducted a Focused Feasibility Study, which was released in February 1995. The new Record of Decision (ROD) had not been issued by the end of our review. Over $30 million has been expended on this site. Although various cleanup activities have taken place on-site, the site remedy is not operational and the site is not cleaned up.

Barriers Identified

Community involvement in the selection of a remedy to clean up a Superfund site is an important factor to ensure community acceptance of the remedy. During our review, we found documentation which indicated that EPA attempted to inform the community about activity at the site. Public meetings were held and the local paper published a number of articles concerning the site. Prior to 1988, EPA received only minimal response from the community. However, by 1992, community concern had increased dramatically. The community, in general, was adamantly opposed to on-site incineration of the waste materials. Relationships had deteriorated to the point that residents believed EPA was not being forthright and honest. They had developed substantial mistrust of the Agency. They further doubted EPA when the RPM could not answer technical questions regarding the site. The community representatives stated that the community believed EPA tried to force them to accept on-site incineration. Later in 1992, EPA held monthly conference calls with the community to discuss possible remedies, resulting in improved relationships.

Several EPA Region 3 officials noted that community and political pressures slowed down the cleanup process. Even community representatives we talked with stated their involvement probably extended cleanup efforts. The community representatives stated that while community intervention may have slowed down the cleanup process, the delay was worth it to obtain a safer and more effective remedy.

SOUTHERN MARYLAND WOOD TREATING CASE STUDY

BACKGROUND AND SITE HISTORY

The Southern Maryland Wood Treating (SMWT) facility, a wood treating facility on the western shore of the Chesapeake Bay in Hollywood, Maryland (see Figure 1), operated from 1965 to 1978. Approximately four acres of the property were used to treat or process wood. Two tributaries, Brooks Run and McIntosh Run flow alongside the site and a pond is located on-site. Adjoining land is primarily used for residential and agricultural purposes. About 260 residents living within 3 miles of the site relied on wells for their drinking water.

Site Location Figure 1

(Site location picture not available)

Creosote and pentachlorophenol (PCP) were used as preservatives to pressure-treat wood at the SMWT facility. This process produced waste water which was deposited in six unlined lagoons. The waste water ultimately contaminated the soil, ground water, and surface water on the property. The contamination affected a shallow aquifer and the on-site pond.

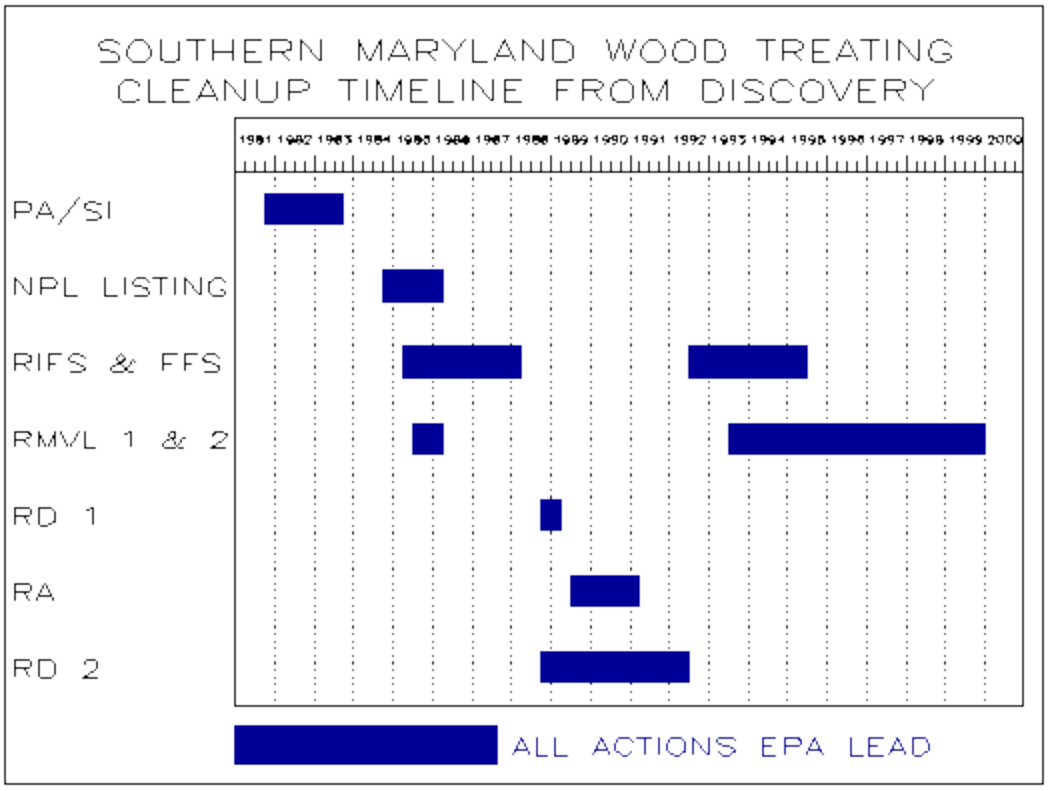
In 1973, officials from St. Mary's County Department of Environmental Hygiene inspected the property and discovered a potentially serious source of contamination. Officials in the Maryland Water Resources Administration (WRA) conducted further inspections at the site. In 1977, WRA also sampled residential wells which indicated low levels of creosote. In a September 1978 memorandum, WRA reported that: (1) ground water was contaminated by phenolic waste (penta and creosote); (2) ground water contamination had, in turn, contaminated a small stream; (3) nearby shallow water wells showed traces of penta and creosote; and, (4) an old, abandoned, and unsealed well posed a serious threat to a deep aquifer.

L.A. Clarke and Son, Inc., purchased the SMWT facility in 1975. In 1977, the state issued a State Discharge Permit to SMWT, to develop a plan for site renovation and to construct a waste water treatment facility. L.A. Clarke and Son, Inc. was experiencing financial difficulties and closed the facility in 1978. In 1980, following a series of court actions, L.A. Clarke and Son, Inc. agreed to clean up the site in compliance with a consent decree issued by the St. Mary's County Court. Lagoon liquids were disposed of by spray irrigation to an adjacent wooded area and lagoon sludges were treated (excavated, backfilled, graded). South of the freshwater pond, a stone and straw filter fence was constructed to mitigate any sediment and oily waste from migrating into Old Tom's Run, a tributary to McIntosh Run and the Potomac River.

According to documents in the administrative record file, state officials believed the site had been stabilized. However, when EPA conducted its initial investigation in 1982, officials found that attempts made by L.A. Clarke and Son, Inc. to stabilize the site were not successful. In fact, the company's efforts resulted in more widespread contamination of the topsoil with polycyclic aromatic hydrocarbons (PAHs). The unlined lagoons were also seeping, while other site areas were contaminated by wood treatment drippings. The ground water was contaminated with volatile organic compounds (VOCs), PCPs, and PAHs. Furthermore, contaminants continued to empty into the pond on the site. Further activities would be necessary to properly clean up the site to ensure the protection of public health and the environment.

Chronology of EPA Superfund Involvement

Figure 2



Source: EPA data depicted in calendar year.

SITE DISCOVERY, PRELIMINARY ASSESSMENT, SITE INSPECTIONS

The SMWT facility was originally identified in 1973 by the St. Mary's County Department of Environmental Hygiene. The date of EPA site discovery was listed in CERCLIS as December 1, 1981 (see Figure 2). A preliminary assessment was completed by Ecology and Environment Inc., an EPA contractor, on August 22, 1982. The preliminary assessment evaluated the site risk as "low," but the report recommended that an immediate site inspection be conducted by the Field Investigation Team (FIT), Region 3.

Several site inspections were conducted by FIT and TAT between August 1982 and January 1985 in an effort to characterize site conditions. The Region 3 FIT contractor sampled residential wells, surface water, soil, and sediment, and identified contamination on the site. Tests of residential wells, however, did not find any contamination. However, the sampling results were never validated by EPA Region 3. The January 1983 site inspection report classified the apparent seriousness of the contamination at this site as "low."

REMOVAL ACTIONS

In January 1985, because prior samples were not validated, the On-Scene Coordinator (OSC), the technical assistance team (TAT), and the Environmental Response Team conducted additional site assessment sampling. Samples were collected from on-site tanks, soil core, sediment, surface water, and monitoring wells. This sampling verified that contamination from Polynuclear Aromatics (PNAs) and PCPs were in surface water and sediments of the freshwater pond and a tributary, on-site soils, and an on-site monitoring well. Tank sludge samples were contaminated with chlorinated dibenzodioxins. Based on these results, the OSC requested that a removal action be initiated and on March 12, 1985, funding was approved.

This was the first removal action, and it began on March 15, 1985. An additional 350 samples were collected and analyzed on-site. Results disclosed widespread distribution of contaminants throughout the site. The most contaminated areas were in the former processing area, the lagoon area, and the land treatment and spray irrigation areas. Exploratory pits were dug to characterize waste and soil horizons and establish depths of ground water and water bearing sands. Based on surveys of these pits, construction of an underflow dam on Old Tom's Run was initiated.

Around April 1985, straw filter fences were installed to control downstream migrations of sediment along Old Tom's Run. In August 1985, heavy rains destroyed the underflow dam and two of the filter fences. The underflow dam and two filter fences were not replaced. Instead the state agreed that excavating and securing the contaminated pond was an acceptable alternative. In January 1986, soil was excavated from the northwestern bank of the pond. The excavated soil was then placed onto a synthetic liner and capped with a synthetic cover on the site. The OSC believed that adequate measures had been taken to stabilize the site, and all personnel were demobilized by the end of January 1986.

On June 29, 1993, a second removal action was approved because of delays in implementing the remedial action. Hazardous conditions justifying the removal action were described in the June 29, 1993, removal action memorandum:

The tanks were rusting and have deteriorated over time... found breaches in the cover on the waste pile created during the 1985-1986 removal action. These breaches expose the waste pile to the weather. Tanks are in poor condition... Sampling results indicate that the tanks contain PCP and creosote... Approximately 200 drums of soil contaminated with PCP and creosote are on-site and in poor condition. There is a high likelihood that the drums could fail.... An on-site pond which feeds Old Tom's Run, a tributary of the Potomac River, is being impacted by a black oily seep which contains high levels of PCP and creosote.

During the second removal action, the following activities occurred: (1) several buildings that were in danger of collapsing were demolished; (2) liquids and solid waste, tanks, retorts (small laboratory containers), and over 350 drums of waste, and sludge were removed for off-site disposal; (3) the pile of previously excavated sediment was re-covered; (4) a trench was constructed to collect contaminated ground water; (5) an underflow dam was installed to prevent the release of floating and sinking materials from an on-site pond; and (6) a water treatment facility was constructed. The facility treats the surface water and operates to mitigate the further flow of contaminated surface water from the site. The RPM, at the time of our site visit on July 5, 1995, informed us the water facility would be operating throughout site remedial activities.

Approximately 8 years elapsed between the start of the first and second removals. EPA Region 3 officials stated the reason for the long period between the removal actions was because they believed that remedial action (incineration) would be implemented. Another Region 3 official stated that the remedial program officials had lead responsibility and did not promptly request assistance from the removal program officials. The same official stated that, in some instances, remedial personnel may not immediately recognize a severe condition that needs a removal action. The official also believed that the site was not in an emergency state, but because site conditions met the criteria for a removal and because of political pressures, a time-critical removal was performed.

LISTING AND REMEDIAL INVESTIGATION/FEASIBILITY STUDY

In June 1986, about 4 months after the first removal ended, the site was listed on the National Priorities List (NPL) with a score of 48.77. According to an EPA Region 3 official, there were no viable PRPs, so the SMWT facility became a fund-lead site.

The RI/FS took over 3 years to complete. This phase began in March 1985, and was completed in June 1988. An EPA contractor conducted the RI/FS and also performed a risk assessment and found that the site had an

unacceptable level of risk to human health and the environment. The Record of Decision (ROD) was signed on June 29, 1988, which estimated cleanup costs at $38 million. The Maryland Department of the Environment (MDE) agreed with the remedy selected, but requested that EPA reevaluate the remedy if its cost (as determined through the remedial design and bid-selection process) exceeded the ROD estimate.

REMEDIAL DESIGN/REMEDIAL ACTION

Remedial Design

EPA wanted to begin remedial action as soon as possible. Therefore, the Agency divided the remedy into phases. Phase 1 consisted of constructing a barrier wall around the heavily contaminated area (process and lagoon areas) to control ground water migration, and constructing a large vehicle decontamination facility. The remedial design for Phase 1 took about 9 months, from September 22, 1988 to June 30, 1989. The other part of the remedy, incineration and treatment of ground water, was to be initiated under Phase 2. The remedial design for phase 2, which took over 3 years, was begun on September 22, 1988, and was 95 percent completed on May 11, 1992. A Region 3 official said the lengthy timeframe was needed to fully characterize the volume of soils to be treated during the incineration process.

Remedial Action 1 Completed

EPA, the Army Corps of Engineers, and the Phase 1 design contractor agreed to install interlocking steel sheet piles around the heavily contaminated ground water area. The sheet piles were driven into an underlying clay layer to help contain the contaminated ground water. The Phase 1 construction contract was awarded in September 1989 and field work began in January 1990. All construction activities were completed in November 1990. The closeout report was not signed until March 1991.

Remedial Action 2: Incineration Remedy Suspended After Design 95% Complete

Phase 2 design activities continued until May 1992 when activities were 95 percent completed and the estimated cost of the remedy was over $70 million. Due to the increased costs, (the original estimate was $38 million), MDE was unable to fund its 10 percent share required by law. Consequently, because this was a fund-lead site, EPA could not implement the remedial action. At the same time, the community and local government expressed deep concern about the health risks related to on-site incineration. Design work was halted and EPA and MDE agreed that EPA would conduct a Focused Feasibility Study (FFS) to reexamine the options.

The FFS was issued in February 1995. However, a cleanup alternative was not selected. Instead, a Superfund Program Proposed Plan was issued in March 1995. In the plan, EPA officials recapped information in the FFS and other related documents and indicated that thermal desorption was the Agency's "preferred remedial alternative." Costs associated with the excavation, thermal desorption, and backfilling of soils and sediments amounted to $31 million compared to $57 million (the Agency's new estimate) for incineration.

The proposed plan defined thermal desorption as:

The process by which contaminated soils/sediments are heated at low temperatures to volatilize water and organic contaminants. A carrier gas or vacuum system transports volatilized water and organics to a gas treatment system. The contaminants are not destroyed, rather they are physically separated from the soils and concentrated in a vapor treatment system before being disposed of properly.

EPA received public comment concerning the remedy from March 22 to April 21, 1995. As of July 24, 1995, the new ROD had not been issued; although the Agency planned to issue it by the end of summer 1995.

Current Status and Future Actions

As of July 14, 1995, over $30 million had been disbursed from the trust fund for the site since fiscal 1982. One removal and one remedial action have been completed. The second removal is virtually completed, aside from the continued operation of the water treatment facility.

As of July 5, 1995, the day of our site visit, the site had been stabilized and there was little activity on-site. The water treatment system was operating and being monitored by contractors. An EPA Region 3 official stated the remedial design for the new remedy would take approximately 1 year. Another official stated they should not have to start from the beginning because of the many similarities between incineration and thermal desorption. Construction completion was estimated to take another 2 to 3 years. However, the site deletion date was unknown.

COMMUNITY RELATIONS

There was significant community interest in this site even before the wood treating facility was built in 1965. Community members protested the construction of the facility because they preferred residential development of the land; however, the facility was built anyway. Later, the community members complained of creosote-like odors to Maryland county health officials. The county sampled the air quality, but the results were inconclusive. As stated earlier, Maryland state officials performed some testing and sampling and instructed the L.A. Clarke and Son, Inc., the owners of the facility, to clean up the site. L.A. Clarke and Son, Inc., took actions to clean up the site; however, the work performed did not effectively remediate the site. Consequently, EPA took a number of actions to contain the site contaminants.

Our review of the site administrative record files found a fairly consistent effort by EPA officials to maintain communications with the community regarding site activities. For example, an On-Scene Coordinator's report for the period March 15, 1985, through February 18, 1986, noted several public meetings and various television and newspaper reports. Sixty to 70 local residents attended a public meeting concerning the first removal on March 19, 1985. In addition, EPA officials notified the local press whenever an activity occurred at the site. On July 2, 1986, EPA completed a community relations plan for the site. The plan was based partly on interviews with local residents and state and local officials. The plan discussed activities that would occur during the RI/FS stage.

When the RI/FS was released in the spring of 1988, EPA also provided a proposed remedial action plan listing eight cleanup alternatives and the preferred remedy (incineration) to the **Enterprise**, a local newspaper. The plan announced a June 15, 1988, public meeting to discuss the remedy and obtain input from the public before EPA's final selection. Approximately 12 of 260 well water users in the community attended this meeting. Those in attendance appeared to find the remedy acceptable. An article in the **Enterprise** indicated that local health officials approved of incineration. There appeared to be no objection to incineration and, therefore, the ROD was signed on June 29, 1988.

Although only a limited number of residents attended the pre-ROD meeting, interest increased dramatically after the ROD was approved. Officials attributed this increased interest to an increase in the population from the time the ROD was signed to the completion of the remedial design in May 1992. This interest extended to a neighboring county in Virginia. The community formed groups such as the Southern Maryland Wood Treating Task Force and the Environmental Awareness Coalition (EAC). These groups were formed because of a concern for the community's well-being and a belief the they were receiving contradictory information from EPA. In April 1991, the EAC applied for a Technical Assistance Grant (TAG) to hire a technical consultant. In March 1992, a TAG was awarded.

Affected community members and the Potomac River Association expressed their concern to Senator Mikulski and the Administrator, respectively. The overwhelming consensus of the community was that incineration was neither a safe nor effective remedy and they wanted EPA to cancel plans for incineration and seek other remedies. EPA officials stated they would review and consider any proposed remedy until the construction

contract was awarded. Senator Mikulski subsequently contacted the Administrator to voice the community's concern about the health risks of an incinerator at the site.

Senator Mikulski also contacted the Agency for Toxic Substances and Disease Registry (ATSDR) and requested an assessment of the site. The request specifically asked that ATSDR evaluate the health effects of soil incineration and analyze the effects of on-site incineration. ATSDR issued a Petitioned Public Health Assessment report on November 9, 1992 that concluded the public health hazards were indeterminate because of inadequate information. However, ATSDR made several recommendations, including the following:

-- collect additional ground water and air data,

-- ensure that residents do not expose themselves to surface water and sediment in Old Tom's Run, and

-- examine storage tanks to determine if other storage options were required.

EPA acted on some of the recommendations listed in ATSDR's report by improving site conditions and mitigating possible threats to the public and the environment.

ATSDR did not perform an analysis of the effects of on-site incineration, because of EPA's apparent compliance with public demand. EPA officials determined that: (1) a re-evaluation of the remedy was needed, and (2) new alternatives to remediate the site should be identified. ATSDR stated in its report that they would evaluate other forthcoming remediation alternatives as they developed.

Community representatives continued to closely monitor EPA's progress. In April 1993, EPA distributed a draft FFS for public comment. MDE and the community officials commented on the document. An August 1994 letter from the St. Mary's County Commissioners to EPA Region 3, notified EPA that two alternatives from the FFS were deemed acceptable, thermal desorption and bioremediation. However, incineration was not acceptable and St. Mary's County officials requested that the remedy be removed from the list of alternatives. In November 1994, a draft final FFS was circulated. In February 1995, the final FFS was released, and in March 1995, a proposed plan for the preferred remedial alternative was published.

We met with representatives from the Task Force and the EAC in June 1995, to obtain their perspectives on the barriers to successful cleanups of Superfund sites and their perceptions of the problems and ultimate solutions at this site. The community representatives expressed their concern that, at least initially, EPA officials were not as cooperative as they should have been and they were not always as well informed as they should have been. For example, one representative stated they were not informed that the selected remedy was incineration until 1990. Before then, they were told that the remedy was "thermal treatment." However, based on the information in the 1988 ROD, which included a draft responsiveness summary, at least one resident present questioned the use of on-site incineration. EPA officials then addressed the resident's concerns regarding incineration. Community officials also believed EPA was going to implement the remedy without considering the community's concerns. Therefore, they contacted Senator Mikulski to express their concerns and frustrations. The group believed the senator's office was very responsive and worked effectively with EPA and the community. Also, members of the community educated themselves about the Superfund program, their site, similar sites, and EPA technologies.

Another reason the community representatives distrusted EPA was that supposedly knowledgeable EPA officials could not answer their questions. For example, the community representatives claimed that the RPM assigned to the site in January 1990 could not answer technical questions about the site. The representatives believed EPA placed a person in the position who may not have had the necessary experience.

The representatives also believed that communication was not only poor between EPA and the community, but also within EPA. The representatives stated that employees in the different divisions of the Agency did not

communicate with each other regarding the site. They claimed there were contradictions between what the RPM said and what EPA guidance stated. Also, there did not appear to be good communication between regions. Community representatives also stated they found calculation errors in information EPA used to support the remedy decision.

Community representatives also believed that EPA was unable to monitor its contractors. For example, EPA promised the community that the FFS would be completed on a certain date; however, the FFS was provided late. EPA told them that delays in getting the products to them were caused by inadequate products being provided by the contractor. They pointed out to us that if the contractor was providing insufficient or inadequate work, then the contractor should not be working for EPA. They told us they believe that contractors cause the most delays and the RPMs are not able to manage or control the contractors.

According to the representatives, EPA was resistant to new or different ideas. For example, during the processing of the FFS, the Potomac River Association proposed another alternative to incineration. In a letter dated March 23, 1992, the Potomac River Association informed MDE that thermal distillation (thermal desorption) could be a feasible alternative to incineration. According to the community representatives, EPA officials argued that alternatives to incineration were hard to find. However, EPA was already aware of thermal distillation and had been involved in pilot tests of the technology at another site. Community representatives believed that EPA changed the remedy and took other various actions only as a result of pressure from them and Senator Mikulski.

From the Agency's perspective, their goal was always to keep the community informed and aware of the conditions on the site and the proposed remedies. We met with the Community Involvement Facilitator (CIF) for this site in June 1995 to discuss the Agency's version of the events at this site. This official stated that EPA had spent a significant amount of resources trying to mitigate the tension surrounding the site. At one time, this was one of the most contentious sites in the region. Every issue had to be presented to the community and there were comment periods on just about every document.

The CIF believed the most important issue to the community was to be assured that the health and safety of the community and the environment were being adequately protected. He believed that this community wanted a voice in deciding on actions occurring in the community. They did not believe that EPA had been forthright and honest with them. He indicated that EPA had an adversarial relationship with the community. To help improve this relationship, he began holding monthly conference calls starting in September 1992, and the calls continued every month thereafter, until about March or April 1995.

The official stated that in retrospect, concern among the community may have started with the 1988 ROD meeting. Perhaps too little information was provided. He also noted that the poor attendance at this meeting may have been indicative of too little community awareness. According to the CIF, EPA officials were under pressure to clean up sites faster. This, at times, may have prompted them to take action without allowing sufficient time to inform the community. Today, he believed that EPA was doing more to obtain community acceptance of cleanup remedy. Realistically, however, if a community wanted to stop a remedy they could do so even though EPA had met all the requirements in the law.

CONCLUSIONS

EPA discovered this site in December 1981. More than 13 years have elapsed since then, and over 10 years of tests, studies, and designs have been performed. Although several actions have been completed, the site remedy is not operational and the site is still not cleaned up.

The activities at this site clearly show how dramatically the community can affect the progress at a Superfund site. In this case, they stopped the selected remedy and forced the Agency to adopt a new remedy. The impacts

on cleanup costs and time were significant. Although community involvement is important and necessary, it appears significant involvement has the potential to increase the time, and possibly the cost, of site cleanups.

It would be speculation to conclude that an earlier, and more intensive effort by EPA to include the community in the decision-making process would have substantially shortened the time involved. However, it is not speculative to conclude that involvement by the community may slow the process, sometimes dramatically. However, considering what is at stake in the community, it only makes sense for EPA to continue and improve efforts to obtain effective community involvement.

Review of Barriers to Superfund Site Cleanups

APPENDIX I

NOTE: Appendix I (p. 75 - 81) includes the Agency's written comments, which were not transmitted electronically. To obtain a copy of these comments, contact EPA's Office of Solid Waste and Emergency Response.

APPENDIX II

AGENCY COMMENTS AND OIG EVALUATION

In its response to our draft case studies dated October 19, 1995, the Office of Solid Waste and Emergency Response (OSWER) indicated that the context of developing the case studies and how the three sites were selected was unclear. We inserted a paragraph on page 3 of the opening memorandum to the case studies which explains how we selected the sites for review, and according to the information obtained during our review, the sites selected were not considered to be outliers.

OSWER's response recommended that the summaries and conclusions contained within our report must be identified as deriving only from the three case studies. We have added the additional sources of information used to develop conclusions regarding the overall Superfund program on pages 3 and 4 of the opening memorandum. For example, we reviewed prior Superfund program studies and interviewed state and major trade association officials during our field work.

OSWER did not understand the significance of the statement that "the OIG did not measure the surveyed offices' performance against the standards established by the National Contingency Plan (NCP)", because we concluded that certain legislative requirements consume significant time and resources. This statement is a disclaimer which was developed jointly by the Office of Enforcement and Compliance Assurance and the OIG. Such a disclaimer is included in all Superfund audit reports which have potential Superfund enforcement impact.

OSWER, in responding to the OIG finding that study and design of remedies comprised the majority of time spent on the sites since discovery, indicated that the immense task of site cleanup required development of a **prioritization** for addressing sites, resulting in some sites being in inactive phases after discovery. At the very outset of our review, we requested a site prioritization list from OSWER, but were informed that there was no prioritization available.

OSWER's response indicated that site **construction completion** is a much better and more tangible indicator of site cleanup progress than **site deletion**, because of the many aspects associated with deletion. The OIG disagrees. We consider deletion to be a critical measure of site cleanup success, the point where a site no longer poses a threat to human health and the environment. Construction completion, while an important milestone, represents the completion of remedy construction. Since both construction completion and site deletion have value in indicating site cleanup progress, we have revised our report to include both measures.

OSWER noted that OIG characterization of the original Wasatch site removal action as inadequate because a second removal action was required, was inaccurate and inappropriate. We amended the language on page 58 of the case study to reflect that the second removal was conducted because the planned remedial action did not occur on time.

In its response, OSWER indicated that it was unfair to characterize the weather-related delay as the only delay outside of EPA's control. On page 4 of our opening memorandum, we added additional factors outside of the Agency's control which can delay site cleanup progress, such as community and PRP objections to selected remedies.

OSWER noted that high turnover of RPMs has been an ongoing problem for EPA. We agree that as long as staff can find satisfying jobs with better pay in the private sector, turnover will be a problem. However, it should be noted that most of the RPMs who have been involved with the three sites we reviewed, never left the Agency.

OSWER disagreed that the Superfund process drives program officials rather than the goal of cleaning up sites. We amended the appropriate paragraph on page 4 of the opening memorandum to indicate how legislative requirements and how the laws are implemented can result in more focus on achieving process steps than on accomplishing end results. We eliminated references to Superfund program officials.

In its response, OSWER was concerned that the OIG drew conclusions based solely on information obtained from the three Superfund site studies. We added the additional sources of information used to develop conclusions regarding the overall Superfund program on pages 3 and 4 of the opening memorandum. These included reviewing prior Superfund program studies (e.g., National Academy of Public Administration and Congressional Budget Office reports) and interviewing state and major trade association officials.

Whitmoyer Laboratories Case Study

OSWER's response stated that the vault removal probably did not occur because of the large scale of the action. We interviewed numerous EPA regional officials responsible for the site. During these interviews we specifically asked why the vault was not handled as a removal. The large scale of the action was never mentioned by any regional officials as a reason for not removing the vault contents.

The OSWER response indicated that the remedial action to address the vault was valued at $18 million which would be a very significant percentage of the removal budget. Further, the response notes that it was unclear if the $3 million estimate was realistic. We agree that $18 million would be a significant portion of the removal budget. However, the point is not that the removal would cost $18 million, rather it was estimated to cost $3 million. In response to whether the $3 million dollar estimate is realistic, 1) the $3 million was a formal estimate provided by an outside contractor to EPA, 2) the $3 million request was the estimate used in the proposed removal request, and 3) according to an EPA official responsible for the removal, the removal action on the vault could have probably been completed for half of the $3 million estimate.

Another reason provided by OSWER as to why the vault was not removed revolves around the application of Land Disposal Restrictions (LDR) as Applicable or Relevant and Appropriate Requirements (ARARs). OSWER's response states that removal actions must meet ARARs, such as LDRs to the degree practicable. Further, removals that exceed the $2 million level must be consistent with remedial actions and therefore LDRs would have to be met, which would significantly increase the estimate of the cost of the action. **Since the restrictions related to LDRs were known before promulgation, these levels were treated as ARARs**, which the action would have to meet. The OSWER response concluded that the delays in addressing the vault and the increased cost can therefore be directly related to the statutory requirements related to meeting ARARs.

Given the above scenario, LDRs, which place more stringent controls over the disposal of waste, would have to be met. However, as the Agency acknowledges, restrictions were known, yet were not promulgated at the time of the removal. Rather, the Agency decided to **treat** them as ARARs, although it was not required that the Agency apply them as ARARs. According to the OSC, state officials, and PRP representatives, the removal action was scheduled to be completed before promulgation of LDRs. Further, the proposed removal request specifically stated that one of the reasons **in favor** of conducting an immediate removal was because of the

approaching LDRs "which would force the Superfund remedial section to utilize some costly alternative technology on the vault contents."

Wasatch Chemical Case Study

OSWER noted that the second removal action would not have been necessary at the Wasatch site if the planned remedial action had occurred on time. Since it did not, for a number of reasons, the subsequent removal action was necessary. As indicated previously, we rephrased the appropriate paragraph on page 59 of the Wasatch Chemical case study to reflect that the second removal was conducted at the site because the planned remedial action did not occur on time.

Southern Maryland Wood Treating Case Study

OSWER indicated that there was no documentation in the draft case study to support the assertion that community involvement will likely increase the time, and possibly the cost of site cleanups. OSWER recommended that the case study be revised to acknowledge that effective community involvement requires resources and time and may slow the cleanup process, but not necessarily. We amended the case study on page 73 to indicate that increased community involvement has **the potential to** increase the time and cost of cleanups.

In its response, OSWER also noted that the report would be of better use if we identified the barriers at the site which resulted from community involvement. OSWER believed that the primary barriers to cleanup of the site should not be attributed to the community, but to other technical and administrative issues. As indicated in the **Summary of Barriers** to the case study, on page 60, we focused our analysis of the Southern Maryland Wood Treating Site on community concerns and involvement. Community involvement, itself, was the potential delaying factor examined during this particular site study. We wanted to determine how community involvement and EPA's response to community concerns can play a role in slowing down the decision-making and cleanup process. However, for consistency with the other two case studies, we have included additional information on other aspects/phases of cleanup at the site on pages 65 through 69 of the Southern Maryland Wood Treating Site case study.

APPENDIX III

List of Acronyms

ATSDR: Agency for Toxic Substances and Disease Registry

CDC: Centers for Disease Control

CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act of 1980

CERCLIS: CERCLA Information System

DSA: Drum Storage Area

ERB: Emergency Response Branch

EPA: Environmental Protection Agency

ERT: Emergency Response Team

ESD: Explanation of Significant Differences

HRS: Hazard Ranking System

ISV: In-Situ Vitrification

LDR: Land Disposal Restrictions

MCL: Maximum Contaminant Level

MSTP: Myerstown Sewage Treatment Plant

NPL: National Priorities List

ORC: Office of Regional Counsel

OSC: On-Scene Coordinator

OU: Operable Unit

PA: Preliminary Assessment

PADER: Pennsylvania Department of Environmental Resources

ppb: Parts Per Billion

ppm: Parts Per Million

PRP: Potentially Responsible Party

RCRA: Resource Conservation and Recovery Act

RAMP: Remedial Action Master Plan

RD/RA: Remedial Design/Remedial Action

RI/FS: Remedial Investigation/Feasibility Study

ROD: Record of Decision

RPM: Remedial Project Manager

SI: Site Investigation

SMWT: Southern Maryland Wood Treating

TAT: Technical Assistance Team

TCDD: Tectrachlorodibenzo-p-dioxins

USGS: United States Geological Survey

VOC: Volatile Organic Compound

WCC: Wasatch Chemical Company

2,4-D: 2,4-Dichlorophenoxyacetic Acid

2,4,5-T: 2,4,5-Trichlorophenoxyacetic Acid

APPENDIX IV

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