United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R03-92/140
March 1992

EPA

Superfund Record of Decision:

Fike Chemical, WV

NOTICE

The appendices listed in the index that are not found in this document have been removed at the request of the issuing agency. They contain material which supplement, but adds no further applicable information to the content of the document. All supplemental material is, however, contained in the administrative record for this site.

50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO. EPA/ROD/R03-92/140	2.	3. Recipient's Accession No.
4. Title and Subtitle SUPERFUND RECORD OF DECISION Fike Chemical, WV Third Remedial Action - Interim			5. Report Date 03/31/92 6.
7. Author(s)			8. Performing Organization Rept. No.
9. Performing Orgainization Name and Address			10. Project/Task/Work Unit No. 11. Contract(C) or Grant(G) No. (C) (G)
12. Sponsoring Organization Name and Address U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460			13. Type of Report & Period Covered 800/000 14.

15. Supplementary Notes

PB93-963908

16. Abstract (Limit: 200 words)

The 11.9-acre Fike Chemical site is a former chemical manufacturing plant and associated wastewater treatment facility located in Nitro, West Virginia. Land use in the area is predominantly industrial, with the Kanawha River located approximately one-half mile from the site. The estimated 2,500 people who reside within 1 mile of the site obtain drinking water from a treatment plant located 15 miles upstream, which uses the Elk River as a source of water. The facility is situated on the site of a World War I munitions plant. In 1951, the original chemical plant was constructed and began operating. From 1978 to 1988, Fike Chemical manufactured more than 60 chemicals at the site and disposed of drummed and containerized wastes in pits and trenches located throughout the facility until the facility was abandoned in mid-1988. There are no known records regarding the contents of the drums and containers or details of their disposal at the site. As a result of previous state and federal environmental enforcement actions, EPA conducted numerous investigations that revealed VOCs, other organics, metals, and other inorganics in buried drums and containers. Previous RODs addressed the removal of bulk chemicals stored in surface drums and tanks as well as the dismantling, decontamination, and disposal of tanks, equipment, and structures

(See Attached Page)

17. Document Analysis a. Descriptors

Record of Decision - Fike Chemical, WV
Third Remedial Action - Interim
Contaminated Medium: debris
Key Contaminants: VOCs (xylenes, PCE, solvents), other organics (dioxins, pesticides, phenols), metals, other inorganics

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 56
	20. Security Class (This Page) None	22. Price

(See ANSI-Z39.18) *See Instructions on Reverse* OPTIONAL FORM 272 (4-77) (Formerly NTIS-35) Department of Commerce

Abstract (Continued)

located onsite. This interim remedy ROD addresses the removal of buried drums and containers as OU3 to eliminate future or continued contamination of soil, ground water, surface water, and the atmosphere. Future actions will address continued investigation and possible remediation of soil, ground water, surface water and the existing sewer system. The primary contaminants of concern in the buried waste pits are VOCs, including PCE and xylenes; other organics, including dioxins, pesticides, and phenols; metals; and other inorganics.

The selected remedial action for this site includes the excavation of between 7,000 and 17,000 buried drums and containers; use of a self-supported portable structure to enclose active excavation areas and to minimize organic vapor and dust emissions; and sampling, testing, repackaging, and shipping of drummed waste; offsite incineration or other equivalent treatment technologies for drums containing solids and liquids; onsite storage of dioxin-contaminated wastes; treatment of cylinders with a cylinder recovery vessel; and treatment of any ground water collected during the excavation at the cooperative sewage treatment plant. The estimated present worth cost for this remedial action is $16,059,000. There are no O&M costs associated with this remedy.

PERFORMANCE STANDARDS OR GOALS: Although this interim action does not provide for chemical-specific clean-up standards, it does provide for the removal of source contamination in accordance with state and federal requirements. Performance standards will be established in future OUs addressing site media contamination.

Record of Decision
Fike/Artel Chemical Site
Declaration

Site Name and Location

Fike/Artel Chemical Site
Nitro, West Virginia
Operable Unit Three

Statement of Basis and Purpose

This Record of Decision presents the selected remedial action for the buried drums and containers at the Fike/Artel Chemical Site in Nitro, West Virginia, chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (CERCLA), 42 U.S.C. Section 9601 et seq, and, to the extent practicable, the National Contingency Plan (NCP). This decision is based on the Administrative Record for this Site.

The State of West Virginia concurs with the selected remedy.

Assessment of the Site

Pursuant to the duly delegated authority, I hereby determine, pursuant to Section 106 of CERCLA, 42 U.S.C. Section 9606, that actual or threatened releases of hazardous substances from this site, as discussed in "Summary of Site Risks" on Pages 9 and 10, if not addressed by implementing the response action selected in this Record of Decision, may present an imminent and substantial endangerment to public health, welfare, or the environment.

Description of the Remedy

This interim remedy (Operable Unit Three) is the third major step toward the remediation of the Fike/Artel Chemical Site. Operable Unit Three (OU-3) will assure protection of human health and the environment from risks associated with buried 2drums and containers by excavating and removing them from the site. The objective of OU-3 is to eliminate future or continued contamination of soil, ground water, air and/or surface water from sources contained in the buried drums and containers; eliminate the potential for direct exposure of the public to contaminants contained in the buried drums and containers through subsurface collapses or future excavations; and eliminate risks associated with buried drums and containers for future site work. OU-3 does not address all risks associated with the Fike/Artel Chemical Site. Future actions will involve continued investigation and possible remediation of soil, groundwater, surface water, and a sewer system

underlying the site. Remedial actions for these areas will be presented in a future Record of Decision(s).

The Selected Remedy includes the following major components:

- Excavation of between 7,000 and 16,000 buried drums and containers
- Implementation of technologies to provide protection to the public health and environment, and to the workers during drum excavation and handling operations
- Use of a self-supported portable structure to enclose active excavation areas and to minimize vapor and dust emissions
- Treatment of organic vapor emissions with Granulated Activated Carbon
- Sampling, compatibility testing, and processing of the drummed waste before incineration
- Shipment of bulked or drummed waste by rail or truck
- Off site incineration of drums containing solids and liquids
- Use of more cost-effective treatment technologies that are equivalent (achieve remedial goals)to incineration where appropriate
- On site storage of dioxin-contaminated wastes
- Treatment of cylinders with a cylinder recovery vessel
- Treatment at the Cooperative Sewage Treatment Plant of ground water collected during drum excavation

Statutory Determinations

This interim action is protective of human health and the environment, complies with Federal and State applicable or relevant and appropriate requirements except for RCRA closure requirements which are hereby waived under the "interim remedy waiver" provisions of CERCLA Section 121(d) and is cost-effective. Although this interim action is not intended to address fully the statutory mandate for permanence and treatment to the maximum extent practicable, this interim action does utilize treatment and thus is in furtherance of that statutory mandate. The statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element, is partially addressed in this remedy and will be more fully addressed by the final response action. Subsequent actions are planned to address fully the

threats posed by the conditions at this Site. Because this remedy will result in hazardous substances remaining on site above health-based levels, a review will be conducted to ensure that the remedy continues to provide adequate protection of human health and the environment within 5 years after commencement of the remedial action. Because this is an interim action ROD, review of this site and of this remedy will be ongoing as EPA continues to develop final remedial alternatives for the site.

Bruce P. Smith for

Edwin B. Erickson
Regional Administrator
EPA Region III

3/31/92

Date

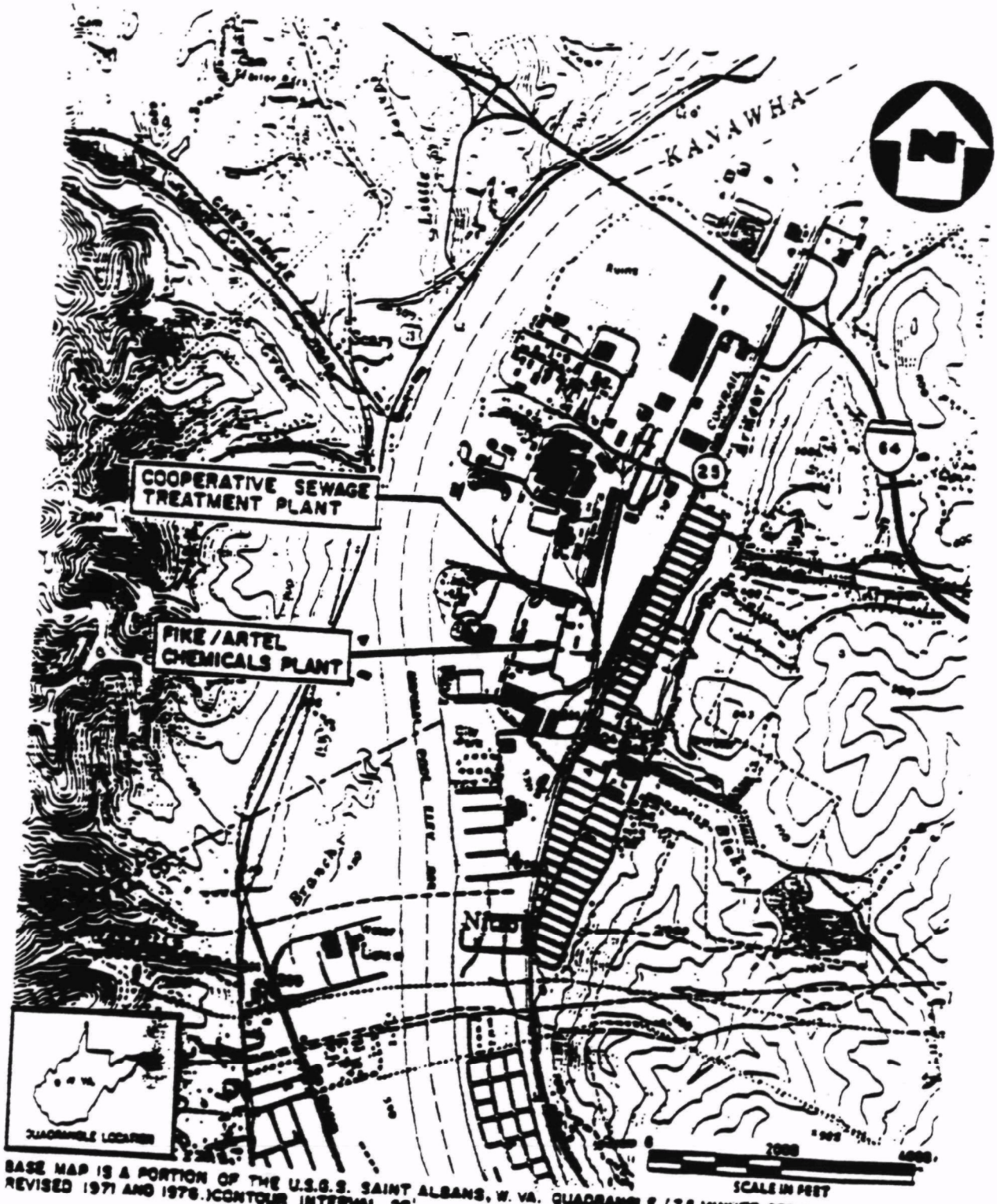
I. Decision Summary

Site Name, Location, and Description

The Fike/Artel Chemical Site (hereafter referred to as "the site") is located approximately 500 feet northwest of downtown Nitro, West Virginia in the Nitro Industrial complex (see Figure 1). The Site contains a former chemical manufacturing plant and an associated former waste-water treatment facility. Other areas found to have contamination associated with the former operations at the plant will also be considered as part of the site for purposes of remedial action. The Kanawha/Putnam County line bisects the site in an east-west direction. The site is located on an access roadway off of Viscose Road (also known as Plant Road), which is accessed from WV Route 25. The site occupies approximately 11.9 acres and is bounded to the north by Vimasco Corporation (a chemical manufacturer); to the east by Consolidated Rail Corporation (railroad switching and maintenance yard); to the south by an abandoned railroad siding; to the west, by Miller Transport, Inc. (on land owned by T.R. and C.L. Halloran), and also by Dana Container, Inc., both tank wagon maintenance and washing facilities (see Figure 2). The site is approximately 2,200 feet east of the Kanawha River. The Kanawha River, a major surface water system, has been categorized under West Virginia Water Quality Standards as suitable for water contact recreation; industrial and agricultural water supply; propagation and maintenance of fish; and transportation, cooling, and power. The Kanawha River is not used for public water supply downstream of Charleston, West Virginia. Public drinking water in the Charleston-Nitro area is provided by the West Virginia Water Company using the Elk River as a source. The confluence of the Elk and Kanawha Rivers is in Charleston, approximately 15 river miles upstream of Nitro.

The site is situated on the site of a World War I smokeless powder (munitions) plant. The original chemical plant on the site began operation in 1951 as the Roberts Chemical Company. In 1971, the name was changed to Fike Chemicals, Inc.("Fike"). In 1986, the name was changed to Artel Chemical Company ("Artel"). During plant operation, more than 60 different chemicals were produced, all by batch process on an as-needed basis, including fluoracetonitrile, ethyl fluoroacetate, sodium fluoroacetate, ethylene thiourea, diphenylamine, allyl cyanide, N, N'-diisopropyl carbodimide, fluoroacetamide, sodium amide, sodium ethylate, sodium methylate, sodium nickel cyanide, and thioacetamide. The facility was abandoned in June of 1988.

The chemical manufacturing plant consists of 14 production areas, in which various chemicals were manufactured; 39 buildings, which include offices, laboratories, warehouses, tanks; process reactors and process control equipment; 3 closed waste lagoons; and drum and waste burial areas.



BASE MAP IS A PORTION OF THE U.S.G.S. SAINT ALBANS, W. VA. QUADRANGLE (7.5 MINUTE SERIES 1958, PHOTO-REVISED 1971 AND 1976. CONTOUR INTERVAL 20'.

FIGURE 1

SITE LOCATION MAP
FIKE/ARTEL SITE, NITRO, WV

POOR QUALITY ORIGINAL

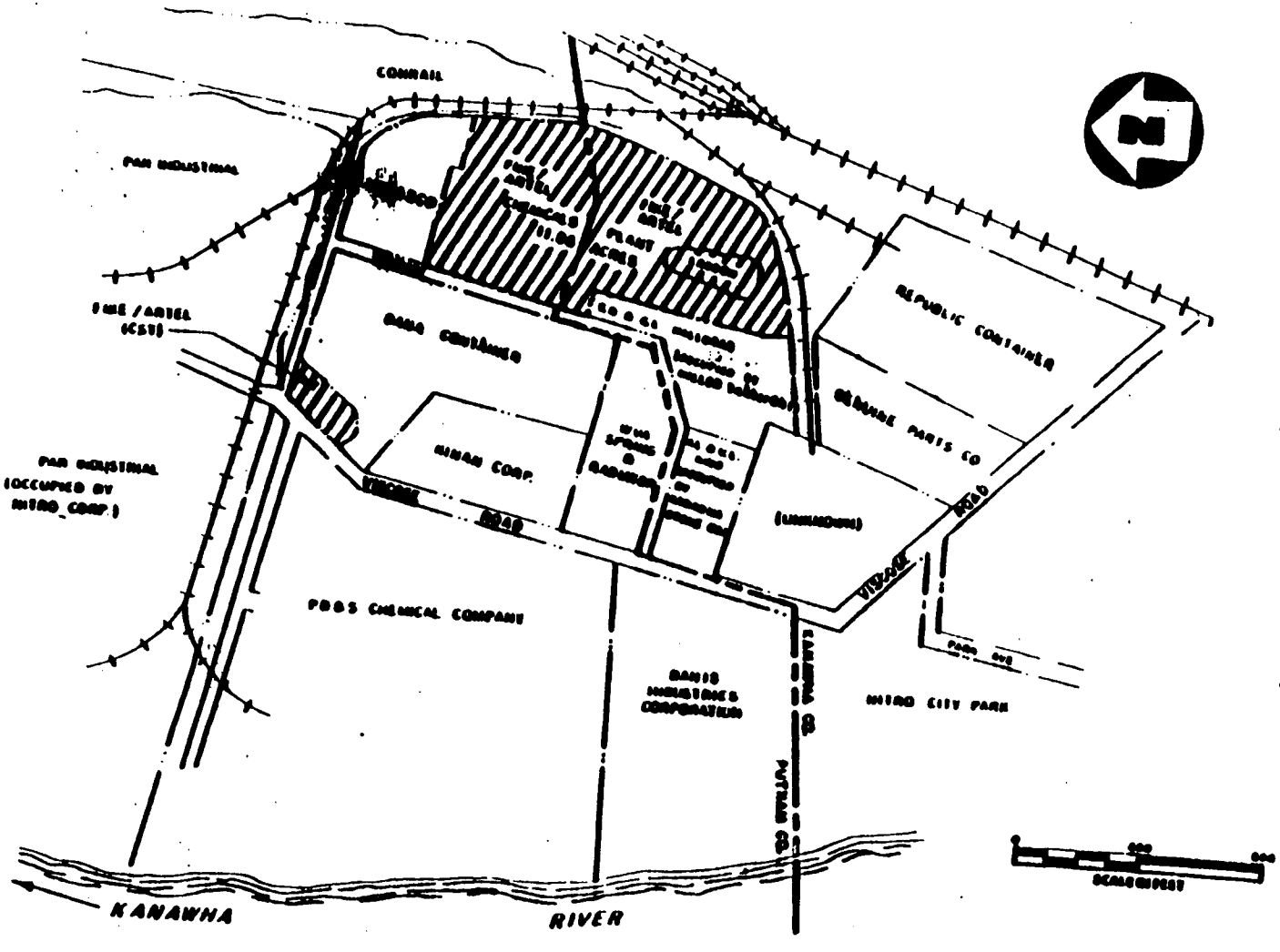


FIGURE 2

SITE LAYOUT
FIKE/ARTEL SITE, NITRO, WV

POOR QUALITY ORIGINAL

The Cooperative Sewage Treatment, Inc. (CST) facility was formed by Fike and a previous truck terminal operator (Coastal Tank Lines, Inc.) to treat sewage and industrial wastewater generated by the two operations. The CST plant occupies approximately 0.9 acres and is located on Viscose Road approximately 500 feet west of the chemical manufacturing facility. The site consists of both the chemicals plant and the treatment plant.

The CST plant consists of three treatment lagoons; a treatment control building; a sludge drying bed; and various wastewater treatment equipment and tanks. The CST plant was also abandoned by Artel in June 1988.

The topography of the site is generally flat, with local drainage controlled by a drainage ditch located along the east side of the plant and storm sewers located throughout the plant. These storm sewers, along with three sump pump systems, transfer drainage and process wastewater from the plant to the CST. Elevations throughout the plant range from 596 to 603 feet above mean sea level (amsl), which are above the Kanawha River 100-year flood plain elevation (586 feet amsl). The east drainage ditch discharges to a storm sewer beneath Viscose Road. The storm sewer eventually discharges into the Kanawha River downstream from the site.

The geology of the site and adjacent study area consists of alluvial deposits overlying predominantly shale and claystone bedrock. The observed depth to bedrock at the site ranges in depth from approximately 55 to 60 feet, indicating that the bedrock surface is relatively flat lying, with minor local variations.

Four lithologic units were identified within the unconsolidated deposits throughout the study area. In descending order, the deposits consist of an upper noncontinuous layer of fill materials composed of sands, silts, and clay; a second layer which is described as silty clay; a third layer consisting of mostly a fine silty sand; and a basal unit consisting of a fine- to medium-grained sand. These units were identified based on samples obtained during monitoring well and soil boring drilling operations.

The aquifer systems present at the site consist of an unconfined alluvial aquifer and a semiconfined to unconfined bedrock aquifer. The alluvial aquifer is composed mainly of fine-to medium-grade sand with some silt, and has a saturated thickness of 29 to 40 feet. The dominant flow path is in a northwesterly direction toward the Kanawha River. The alluvial aquifer is in direct hydraulic connection with the Kanawha River. Hydraulic conductivity values for the alluvial aquifer range from 0.027 ft/day to 530.6 ft/day with an average value of 71 ft/day. The hydraulic conductivity values for the bedrock aquifer range from 2.8×10^{-3} to 9.8×10^{-2} ft/day. The

hydraulic gradient for the alluvial aquifer, measured parallel to the direction of groundwater flow, is 0.004 ft/ft.

The bedrock aquifer is a very tight formation composed of a competent siltstone. The thickness of this formation was not determined during this investigation. The bedrock aquifer groundwater flow direction is to the west, toward the Kanawha River.

Nitro, WV has a population of approximately 9,500. An estimated 1,500 to 2,500 people reside within a 1 mile radius of the facility. In addition, the municipal swimming pool, ball fields, and the local junior and senior high schools are situated within 1/2 mile of the site.

Site History and Enforcement Activities

The earliest documented enforcement action was resolved in a September 12, 1978, consent decree filed by the state of West Virginia and Artel, Coastal Tank Lines, and CST, requiring lining of the treatment basins at the CST. Subsequent court findings indicate that Artel did not complete the actions required by the consent decree in the time allowed.

In March of 1982, EPA issued a National Pollutant Discharge Elimination System (NPDES) permit for wastewater discharges from the CST plant.

In 1982, the site was evaluated via the Hazard Ranking System Model to determine if the site should be placed on the National Priorities List (NPL) established under Section 105 of CERCLA, 42 U.S.C. Section 9605. The resulting score was 36.3. The site was proposed for addition to the NPL in December 1982. In September 1983, the site was promulgated as an NPL site.

Fike was sued by the EPA pursuant to the Clean Water Act (CWA) and the Resource Conservation and Recovery Act (RCRA) for its discharges to the Kanawha River and disposal of hazardous wastes on site, resulting in a Consent Decree entered into in November of 1982, between the U.S., Artel, and the now defunct Coastal Tank Lines, Inc. This Decree required the defendants to perform diking and paving of process areas, covering of principal waste disposal sites, and the pumping and treating of contaminated groundwater. Artel did not comply with the terms of the Decree.

In June 1983, an EPA Region III Field Investigation Team (FIT) sampling survey was conducted to collect soil samples for dioxin analysis, (2,3,7,8-TCDD). Based on the results of this initial screening, additional dioxin sampling and analysis was required. In March 1984, EPA issued an order requiring dioxin sampling and analysis to determine the extent of contamination

at the site. Fike claimed to be unable to afford this work. Consequently, EPA FIT performed the sampling of concern. Results of this sampling revealed low to moderate levels of 2,3,7,8- TCDD at the site.

In 1983, the West Virginia Department of Natural Resources (WVDNR) issued Administrative Order No. 829, directing Fike to stop placing waste in Lagoon 3, a waste evaporation lagoon located in the south end of the chemicals plant.

The Fike chemical manufacturing plant (plant) and Fike's CST treatment facility for this waste are situated on noncontiguous pieces of property and are therefore subject to seperate RCRA permitting requirements.

In May of 1984, EPA issued an Administrative Complaint, Compliance Order and Notice of Opportunity Hearing for the Fike plant. The complaint cited violations of RCRA and specifically required that Fike cease acceptance and storage of containers of hazardous waste not included in the RCRA Part A Permit Application for the plant; cease storage of containers of hazardous waste in areas other than those designated in the plant's Part A Permit Application; remove hazardous wastes not specified in the plant's Part A Application; comply with operating record requirements; and obtain a certificate of liability insurance.

Fike filed a RCRA Part B Permit Application for the CST facility in December of 1984. A Notice of Deficiency (NOD) was returned to Fike for CST in March of 1985. Fike responded to the CST NOD in June of 1985. EPA issued a public notice on November 29, 1985, of its intent to deny a Part B Permit for the CST facility, as a result of the failure of Fike to correct deficiencies in the CST Part B Application. The EPA ultimately denied the permit on March 14, 1986, and terminated the facility's interim status. The CST permit application was subsequently withdrawn by Artel. No Part B Permit Application was ever submitted for the Fike chemicals plant and RCRA interim status for this facility was also terminated by EPA on March 14, 1986.

The Fike Chemical Company changed its name to the Artel Chemical Company in 1986.

In January 1987, WVDNR issued an Order to Artel to specify RCRA hazardous waste materials accepted by the plant; manage containers properly; submit site plans, develop a plan to mark containers for identification purposes; and submit an amended Part A Hazardous Waste Permit Application for the plant.

The chemicals plant was abandoned by Artel in June of 1988. Since that time, an EPA Emergency Response Team (ERT) has been on site performing work to control, stabilize, and/or eliminate immediate hazards to the public health and the environment. On September 29, 1988, a Record of Decision for the site was

signed, authorizing EPA to utilize remedial funds to control, stabilize, and/or eliminate such hazards (Operable Unit One or OU-1). In August of 1989, an Explanation of Significant Differences was issued by EPA, modifying the scope of work described in the Record of Decision dated September 29, 1988. The major modification was a decision not to bulk package the contents of drums on site for disposal. In addition, it was determined that asbestos removal would be conducted under a subsequent remedial action. The focus of the ongoing remedial action remained the removal of bulk chemicals stored in tanks and drums. Upon the planned completion of OU-1, tanks formerly storing bulk chemicals would remain on site and (with several exceptions) contain residual chemicals which await decontamination and disposal as part of OU-2.

The CERCLA Remedial Investigation was initiated in March of 1988. The field activities included sampling of sludges from CST lagoons and onsite storage tanks; sampling of residuals accumulated within the sewer system; installation of groundwater monitoring wells; collection of samples from existing and newly installed wells; collection of soil samples from background areas, areas adjacent to the CST and the chemicals plant, and from the soil in the process area of the chemicals plant; and an evaluation of process and storm sewers used to convey wastewater and stormwater to the CST. In addition, a comprehensive evaluation and inventory of tanks, equipment, process lines, structures, and concrete pads was conducted. This evaluation of the plant and other field work of concern was completed by December of 1989. Data from the investigation of the chemical plant components forms the basis of a Focused Feasibility Study (FFS) for the Tanks, Equipment, and Structures, completed in July of 1990 for OU-2. On September 28, 1990 a second Record of Decision was signed calling for the dismantling and decontamination of all tanks, all equipment, and the majority of the buildings located on-site with subsequent disposal off-site. It also calls for the removal of asbestos associated with these items as well as treatment of all decontamination fluids through the CST. In September of 1991 a Consent Decree was signed by EPA and thirteen of the Potentially Responsible Parties to conduct the Remedial Design and Remedial Action for the OU-2 work. Additional Remedial Investigation/Feasibility Study activities are underway at this time.

Approximately 200 letters have been issued to parties associated with the site pursuant to Section 104(e) of CERCLA. Twenty-six (26) parties have been notified of their potential liability under CERCLA for past potential future actions taken at the site. These parties were notified through general Notice Letters issued in 1990. Twenty-two (22) of the parties are generators and four (4) are owner/operators.

Highlights of Community Participation

Public participation activities have been conducted since the commencement of the ERT work in June of 1988. Public meetings were held on a weekly basis at the municipal building in downtown Nitro to update the citizens on the progress of the cleanup actions. A public meeting was held in August 1988 before finalizing the Operable Unit #1 Record of Decision for the removal of surface drums and contents of tanks and to plan for the destruction of a cyanide gas cylinder on site (OU-1). A public meeting was held on August 6, 1990, at the Nitro Senior High School specifically for eliciting public comments on the proposed plan for Operable Unit #2 that addresses the tanks, equipment, and structures (OU-2). The proposed plan for addressing buried drums and containers at the site was presented at a public meeting held on December 9, 1991, at the Nitro Senior High School.

Scope and Role of Action

OU-1 addressed the removal of surface drums and wastes contained in tanks while OU-2 will address removal tanks, equipment, and structures at the site. The objective of this remedial action is to mitigate risks to public health and the environment associated with buried drums and containers at the site. This remedial action serves as a necessary, next step toward the remediation of the site and represents OU-3. OU-3 addresses a principal threat at the site—the contents of the buried drums and containers. Additional site features expected to be addressed under future Operable Units include soil, groundwater, sludges, and the sewer system.

Characteristics of Buried Drums and Containers

As reported in interviews with former plant personnel, still bottoms and various reaction by-products, both liquids and solids, were placed in drums and stockpiled or buried onsite in the waste disposal area covering the southern half of the site. The oldest and most worn drums were used for waste disposal. The standard procedure for drum burial was to excavate a pit in the southern half of the site and dump the drummed waste into the pit.

Facility personnel indicated that it was common for drums to be disposed of without tops or bungs and those that were covered often ruptured when they were dropped into the pits. Sometimes, after a pit was filled, a bulldozer was used to crush the drums and backfill the pit with a final soil cover. A daily soil cover was not used. Many drums containing waste would rust or break open before final backfilling and allow wastes to flow into the pit (NEIC, 1980, p. 10).

Subsurface waste disposal reportedly ceased in 1978 (NEIC, 1980, p. 20). Surface stockpiling of drummed waste apparently continued until the facility was closed down in 1988. A total of 5,778 surface drums were inventoried and removed from the site by EPA between 1988 and 1990.

As part of the FFS for buried drums and containers, a review of available information was performed to identify the most likely locations of buried drums, estimate the volume or number of buried drums, and provide some insight as to their possible contents. Potential drum burial locations were identified through a review of aerial photographs, interviews with persons familiar with the facility, and geophysical and magnetometer surveys.

Figure 3 shows the potential subsurface disposal areas indicating the probability of each containing buried drums. Each resulting potential subsurface disposal area has been numbered and rated as either 1 (possible), 2 (probable), or 3 (highly probable), pertaining to the likelihood of the presence of buried drums. The rating is based on the number and quality of sources used to identify a potential buried drum area as outlined below.

- 1 (possible): The area was indicated as a potential drum burial area by <u>one</u> of the following sources:
  - Geophysical data from 1988 survey
  - Geophysical data from 1990 magnetometer survey
  - Geophysical data from 1990 EM-31 survey
  - A single interviewee
  - An aerial photograph
- 2 (probable): The area was indicated as a potential drum burial area by <u>two</u> or more of the sources listed in 1 above.
- 3 (highly probable): The area was indicated as a potential drum burial area by <u>three</u> or more of the sources listed in 1 above, including two geophysical sources.

The quantity of buried drums at the site was estimated based on the information available and several assumptions. These assumptions are detailed in the FFS. Using these assumptions and the potential buried drum rating system discussed above, a range of estimates of the number of buried drums at the site was established. The low estimate assumes that 100 percent of the subsurface disposal areas ranked as "highly probable" contain drums and no other areas contain any drums. This method produced an estimate of 7,500 full drums and 14,900 empty, crushed drums. The maximum estimate assumes that 100 percent of all identified subsurface disposal areas contain drums. This method produced an estimate of 16,300 full drums

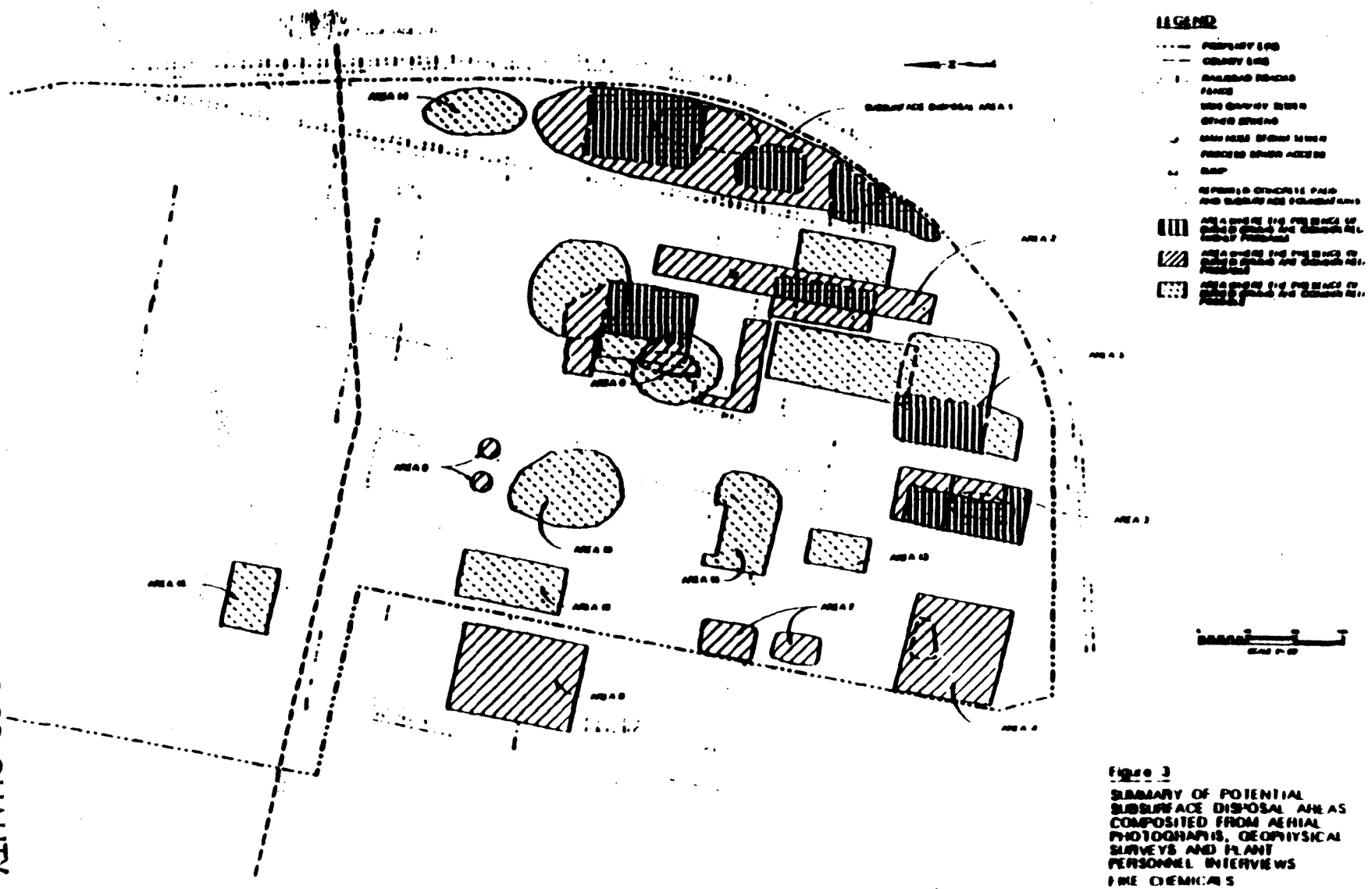


Figure 3

SUMMARY OF POTENTIAL SUBSURFACE DISPOSAL AREAS COMPOSITED FROM AERIAL PHOTOGRAPHS, GEOPHYSICAL SURVEYS AND PLANT PERSONNEL INTERVIEWS

FINE CHEMICALS

POOR QUALITY ORIGINAL

and 34,000 empty, crushed drums. A weighted average estimate assumes that 100 percent of the subsurface disposal areas rated as "highly probable" contain drums, 67 percent of the area rated as "probable" contain drums, and 33 percent of the areas rated as "possible" contain drums. The estimate produced by this method is 12,600 full drums and 25,100 empty, crushed drums.

There are no known records regarding the contents of drums and containers or the details of their disposal at the site. No manifests or files have been located, nor has any documentation been reported that may have recorded information regarding the number, time, location, or contents of drums buried at the site. Information concerning the contents of buried drums and containers at Fike has been gained through interviews with former facility personnel and review of EPA removal files.

During the period of August 22 to 25 in 1977, NEIC personnel conducted interviews with Elmer A. Fike, president of Fike Chemicals, Inc. The focus of the interview was the different processes employed to generate the products manufactured at the site. The raw materials used, byproducts generated, and method of disposal associated with each process were identified. Mr. Fike indicated that some of the byproducts and even raw materials were disposed of underground. These products and their associated raw materials and by-products are presented in Table 1. The NEIC report does not specify whether underground disposal involves drum burial or simply dumping the waste directly onto the ground. Underground disposal was reportedly terminated shortly after the NEIC interview.

Interviews with former facility personnel conducted by NUS in 1989 provided minimal information regarding burial areas for specific chemicals. Several sources indicated that sodium was disposed of in Drum Burial Area No. 8. The main trench in Drum Burial Area No. 2 was identified as a disposal area for alcohols. A portion of Drum Burial Area No. 6 may contain gas cylinders of hydrogen sulfide and phosgene. Drum Burial Area No. 12 was identified by one source as a disposal area for drums of orthobenzophenol.

Materials found in above-ground drums removed from the site by the EPA may provide possible insight as to the type of materials contained in buried drums and containers at the site. EPA removal files include drum log data which tabulates the results of compatibility testing performed on the above-ground drums. These results are summarized in Table 2.

NEIC investigation reports indicate that drum burial ceased in 1977 in accordance with requests made by the EPA as a result of that investigation. At approximately this time Fike ceased to manufacture 27 of the 50 chemical products and added 12 new chemical products. These changes were also in response to EPA requests regarding the reduction of priority pollutant discharges to the CST. Eight of the eliminated products

Table 1
SUMMARY OF PRODUCTS AND ASSOCIATED RAW MATERIALS AND BYPRODUCTS DISPOSED OF UNDERGROUND AT THE SITE

Product	Raw Material or Byproduct	Disposal
N-acetyl ethanolamine	heptane	Underground and CST
Allyl cyanide[a]	still residues	Underground
Aminoethyl Sulfuric Acid	methanol	Underground
	sulfuric acid	Underground
	perchloroethylene	Air and underground
o-Benzi Phenol (OBP)[a,b]	p-toluene sulfonic acid	Underground
	p-benzyl phenol	Underground
	di-benzyl phenol	Underground
Bis isopropyl xanthogen (PXD)[a,b]	xylene	Underground
Sodium butyl o-phenyl phenol (RWA-50)[a,b]		CST and underground
	ethanol	CST and underground
	o-phenyl phenol	CST and underground
	sulfa Floc	Underground
	sodium sulfate	Underground
Sodium fluoroacetate	methanol	Evaporation lagoon and underground
	ethanol	Evaporation lagoon and underground
N methylene piperidinium cyclopenta-methlene dithiocarbamate (R-2 crystals)[b]		Underground
	paraformaldehyde	Underground
	piperdine	Underground
	carbon bisulfide	Underground
	methanol	Underground
Methoxytriglycol acetate		Underground
	methoxy triglycol	Underground
	acetic anhydride	Underground
	p-toluene sulfonic acid	Underground
	acetic acid	Underground
1,3-propanedithiol	polysulfides	Underground
Dimethylaminoethoxydiphenylmethane[a,b] (Bristamine Base)	residue	Buried
Dimethyloxadiazene thione (R-240)	heptane	Air and CST and underground

Table 1
SUMMARY OF PRODUCTS AND ASSOCIATED RAW MATERIALS AND BYPRODUCTS DISPOSED OF UNDERGROUND AT THE SITE

Product	Raw Material or Byproduct	Disposal
Ethyl fluoroacetate (EE_1)[a]	ethyl chloroacetate	Evaporation lagoon and underground
Fluoroacetamide (rat poison)	ethyl fluoroacetate	Air and underground
	methanol	Air and underground
Diethyl oxadiazene thione (R-235)	heptane	Air and CST and underground
Benzyl mercaptan		Underground and air and evaporation lagoon
	dibenzyl sulfide	Underground
Butyl phenyl phenol sodium sulfonate[a,b] (RWA-375)	sodium hydroxide	Underground
	sodium sulfate	Underground
	salka floc	Underground
Chloromaleic Anhydride (CMA)[b]		Underground and CST
	maleic anhydride	Underground and CST
	ferric chloride	Underground
Thioacetamide, technical toxic[b]		Underground
	acetonitrile	Underground
	isopropanol	Underground and air
	dimethyl cyclohexylamine	Underground
Zinc dibutyldithiocarbamate (Butyl Ziram)		Underground
	carbon bisulfide	Underground
	methanol	Underground
	zinc oxide	Underground
	dibutyl amine	Underground

[a]Major pr[illegible]
[b]Manufac[illegible] of product discontinued in 1977
Source: [illegible], February 1978, pp. 20-27
[illegible], June 1980, p. 11

POOR QUALITY ORIGINAL

Table 2
SUMMARY OF DRUM LOG DATA

Compatibility Characteristic	Number of Drums Testing Positive	Percent of Total Number of Drums Sampled
Solids	2,513	46
Liquids	2,945	54
Organics	1,850	34
Chlorinated Organics	612	11
Acidic Solids (pH<4)	439	8
Acidic Liquid (pH<4)	129	2.4
Base Neutral Solid	642	11.8
Base Neutral Liquid	604	11
pH < 6	2,094	38
pH > 8	1,260	23
Soluble in Water	3,561	64
Insoluble in Water	2,001	36
Soluble in Hexane	2,098	37
Insoluble in Hexane	3,468	63
Soluble in Benzene	144	2.6
Insoluble in Benzene	734	13
Soluble in Dichloromethane	1,657	30
Insoluble in Dichloromethane	1,608	29
Peroxide	47	0.9
Oxidizer	182	3.3
Cyanide	817	15
Sulphur	197	3.6
Beilstein Test	1,885	35
Flashpoint	1,290	24
Reaction with Water	63	1.2
Shock Sensitive	32	0.6
Reaction with Water and Shock Sensitive	4	0.07

Source: O.H. Materials, 1988 to 1990

POOR QUALITY
ORIG

generated waste that reportedly was buried underground (see Table 1). Investigation reports also indicate that a majority of the drums removed from above ground storage areas at the site in 1988 to 1990 had been placed in those storage areas since 1977. Therefore, their contents may not be representative of what is contained in the buried drums and containers.

Over 300 drums and 1,500 5-gallon pails containing sodium metals were found in concrete bunkers located in the waste disposal area at the site by the EPA. Sodium metal presents a severe fire and explosion risk when introduced to water and dry air and when heated is a strong caustic irritant to tissue. During an NEIC inspection conducted in 1977 a reported 2,300 to 4,600 kilograms of sodium metal were stored in the concrete bunkers in drums. During an NEIC investigation in August 1977, sodium metal lying on the ground in the waste disposal area reportedly exploded only 10 minutes after NEIC personnel left the area.

Summary of Site Risks

Based on observations made during the FFS, the hazards and risks associated with buried drums and containers at the site have been identified by EPA as follows:

- Contaminant sources contained in buried drums and containers may continue or begin to contaminate soil, groundwater, surface water, and the atmosphere.

- Contaminant sources contained in buried drums and containers present a risk of direct contact to the public through subsurface collapses or future excavations.

- Buried drums and containers are obstacles preventing the subsurface investigation of the waste disposal area. Without removal of buried drums and containers a comprehensive investigation of contamination in these areas cannot be performed.

A list of substances that could be found at the site based on interviews and past surface removal includes perchloroethene which is considered to be a probable carcinogen by the Agency. This substance is mobile in the environment and could compromise the water quality of any impacted aquifer. Carbon bisulfide is a very toxic liquid which is also very mobile and could compromise the integrity of the aquifer. Also, some very dangerous gasses such as phosgene, hydrogen sulfide, and chlorine were reported to be buried at this facility. These gasses are capable of causing death with even very short exposures to sufficient concentrations that could occur if the containers were somehow caused to leak or rupture.

Ethyl fluoroacetate is an ethyl ester and sodium fluoroacetate is a salt of fluoroactic acid and are part of a family of rodenticides that are very toxic and must by handled with extreme caution. They are also very water soluble and will impact water systems if given the opportunity. Fluoroacetamide is also a derivative of fluoroacetic acid and is also very toxic.

Zinc dibutyldithiocarbamate (Butyl Ziram) is used as a seed fungal protectorant. It is moderately toxic and there are two reports in the scientific literature that this substance caused tumors in laboratory animals (mice). It has also been reported to be a mutagen. It is currently under test by the National Toxicology Program and appears to be suspected of having a carcinogenic potential.

In addition to the substances listed above, many other substances may be present that could present risks to human health and the environment. Other hazards such as fire, explosion, and other chemical reactions exist at the site in its present state.

Although removing the buried drums from the subsurface provides a significant short term risk it will reduce significantly long term risks as well as preventing short term risks which could arise in the future due to possible chemical reactions involving the more volatile, explosive, and/or toxic chemical which may be buried at the site.

Remedial Action Objectives

The remedial action objectives for buried drums and containers at the site are to:

- Eliminate future or continued contamination of soil, groundwater, surface water, and the atmosphere from sources contained in the buried drums and containers

- Eliminate the potential for direct exposure of the surrounding population to hazardous substances contained in buried drums and containers (from subsurface collapses or future excavations)

- Remove buried drums and containers to facilitate future site investigation and remediation.

Potential releases of hazardous substances from the buried drums and containers, if not addressed by implementing this ROD, may present an imminent and substantial endangerment to public health and the environment.

Description of Alternatives

In the FFS, remedial technologies applicable to the remedial action objectives are identified and screened for suitability based on effectiveness, implementability, and cost. Remedial alternatives are developed by combining those technologies selected in the screening process. These alternatives are further evaluated based on overall protection of human health and the environment; compliance with ARARs; long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; cost; and state and community acceptance. A total of nine alternatives were developed in the FFS; four of the alternatives were eliminated because they did not meet some critical evaluation criteria and five of these nine were selected for detailed evaluation. Therefore, using the same numbering system used in the FFS, the selected alternatives include 1, 5, 7, 8, and 9 and are described below.

Alternative 1—No Action

Under this alternative, no containment, removal, or treatment of the buried drums would be performed. The drums would remain in place and any discharge of contaminants to the soil and groundwater would continue unmitigated. Buildings and equipment that exist on site would be removed under the OU-2 remedial action since there would be no interference with the OU-3 activities.

This alternative would include continuance of the present site security, which consists of a perimeter fence and sign posting. Deed restrictions would be employed to restrict future use of the site. The no-action alternative would also include long-term monitoring consisting of annual site inspections and sampling of water from the existing wells at the site.

Under this alternative, contaminants would remain onsite and the site data would be reviewed every 5 years pursuant to CERCLA Section 121, 42 U.S.C. SECTION 9621. If justified by the 5 year reviews, remedial actions could be taken in the future to remove or contain the buried drums.

Alternative 5—Containment With a RCRA Cap and Slurry Wall

This alternative does not involve the removal of buried drums and containers but instead is designed to protect human health and the environment by containing the wastes. Components of Alternative 5 consist of a RCRA cap placed over the waste disposal area and a slurry wall constructed around its perimeter. The slurry wall would be constructed *in situ* and would tie into the RCRA Subtitle C cap and the claystone bedrock roughly 60 feet below grade. This alternative would include demolition of bunkers and other buildings, and removal of the railroad tracks and sludge storage tanks, within the proposed cap area. The resulting demolition debris would be mixed with imported fill and used for rough grading for the

area to be capped. In order to provide an adequate base for the cap and eliminate voids that would result in future settling, the debris would have to be reduced to a specified minimum size, mixed thoroughly with fill soil, and spread flat. The top 2 feet of base material would be void of debris to prevent damage to the clay-synthetic cap. The cap would be revegetated with a healthy stand of grass to minimize soil erosion. Existing sub-surface sewer lines would be filled with grout, and water would be used for dust control during construction. Stormwater management and erosion control process options would be used as needed. Access restrictions and administrative controls would be used, and a groundwater monitoring program using existing and new wells would be established. Buildings and equipment left on site under this alternative would be addressed under the OU-2 remedial action since there would be no interference with the OU-3 remedial action.

A groundwater monitoring/pumping well would be constructed within the perimeter of the containment area near the northwest (downgradient) corner. This well would be used to monitor the groundwater level within the containment area and ensure that a positive inward gradient is maintained. If pumping is necessary to maintain an inward flow, the extracted water would be characterized and discharged to the CST or shipped off-site for treatment.

Alternative 7—Removal and Off-site Incineration

This alternative consists of the excavation and onsite processing of the buried drums followed by incineration of the wastes contained in the drums at an off-site incinerator. Due to the possibility of interference with the OU-2 remedial action because of the possibility that the implementation of the OU-2 and OU-3 remediation may overlap on a portion of the south process area of the site, any buildings or equipment which cannot be removed in the OU-2 action because of those actions taken for OU-3 will be removed in a subsequent action. The key components and procedures incorporated into this alternative are shown in Figure 4 and are discussed in detail below.

Drum Removal and Processing. The excavation and processing of the buried drums would be conducted using standard state-of-the-art drum removal, handling and processing equipment, and procedures, and also employs a self-supported portable structure to enclose active excavation areas and to control vapor and dust emissions. The specific procedures that would be followed for drum removal, drum processing, and related activities are described below.

- Confirmation of drum locations—The potential subsurface disposal areas indicated in the FFS would be staked out and test pit(s) would be excavated as

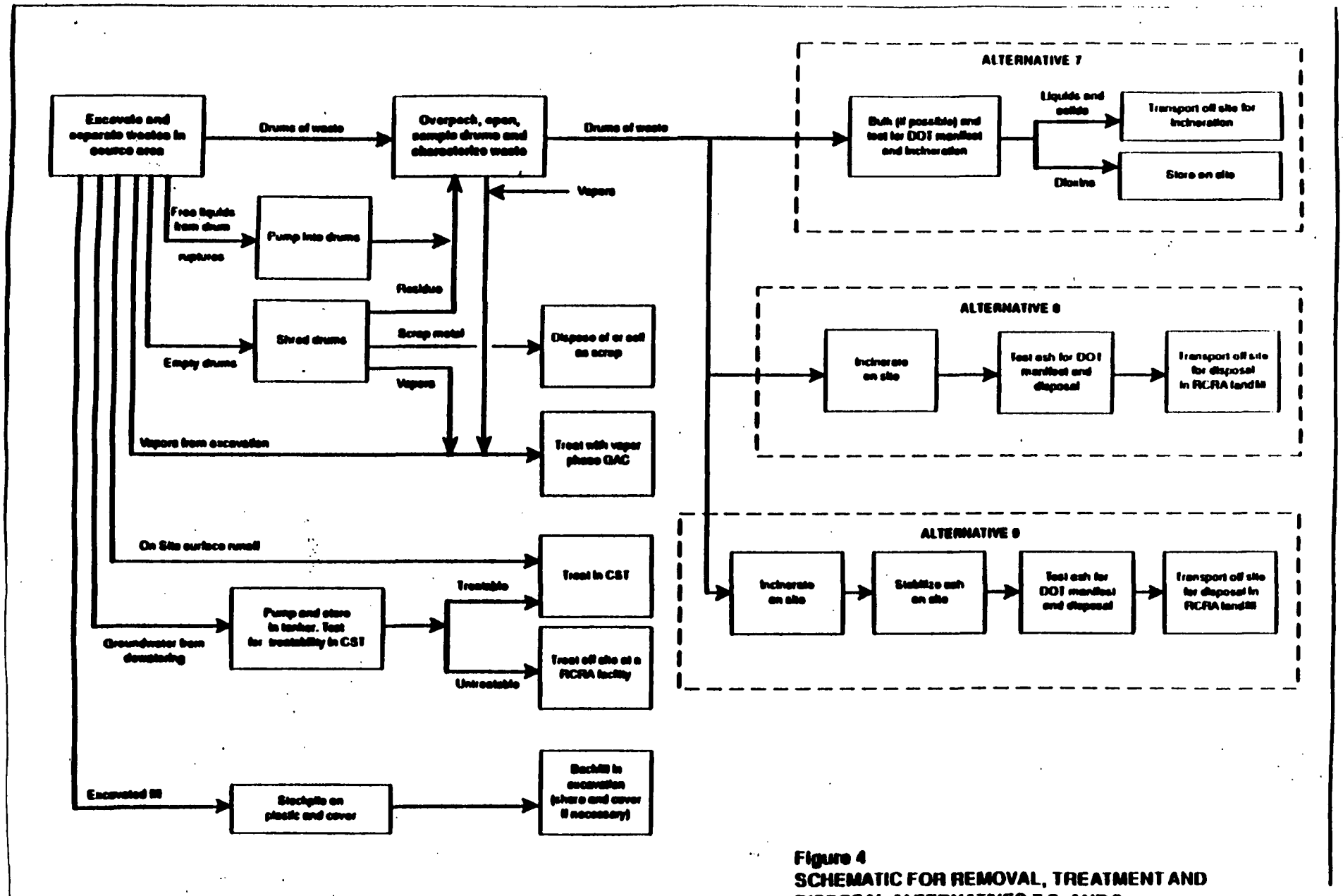


Figure 4
SCHEMATIC FOR REMOVAL, TREATMENT AND DISPOSAL ALTERNATIVES 7,8, AND 9
FIKE CHEMICALS
Nitro, West Virginia

needed at each area to confirm the existence or absence of buried drums. Test pits would be dug with a track hoe equipped with the protective apparatus discussed below.

- Excavation of fill—Cover and backfill soil would be excavated from around the areas determined to contain buried drums. Excavation would be conducted with standard track-mounted hydraulic hoes. The hoes would be equipped with the appropriate explosion and fire protection/prevention equipment. Hoe arms would be a minimum of 25 feet long. Delicate excavation around buried drums would be performed using a high-powered vacuum truck (vector) capable of excavating solids. Earth would be moved using front-end loaders and dump trucks. Excavated soil would be stockpiled. Surface soils that had been found to contain dioxin during previous soil investigations would be segregated. An estimated 26,000 cubic yards of combined drums and soil would require excavation.

- Excavation of drums and containers—Buried drums would be excavated with standard, track-mounted hydraulic hoes with drum grappler attachments. In some instances, drum-lifting attachments requiring manual assistance could be required. Excavated drums would immediately be placed in overpacks. Contents from drums with extremely poor integrity would be placed in new metal or fiber drums. Empty drums would be placed in roll-off containers for future scrapping. An estimated 12,000 drums of waste and 25,100 empty drums would be evaluated.

- Excavation of drums on Holloran property—Potential Subsurface Disposal Area 8 is located beneath a section of the existing Miller Transportation Garage on the Thomas Holloran property. This area reportedly was used for the disposal of drums of sodium metal. Further investigation during the Remedial Design phase must be done to verify the prescence of these drums. The appropriate action will be taken after the investigation has been completed. If drums are determined to be present they will most likely be removed from under the property .

- Drum transfer and staging—Overpacked drums would be staged for opening, sampling, and temporary storage using forklifts with drum grippers or backhoes with drum grapplers. Existing buildings located in the process area, as well as new temporary storage areas would be used. Because all drums would be over-packed, secondary containment areas would not be required.

- Drum opening and sampling—Drums would be opened using a remote, nonsparking, hydraulic drum plunger attached to a backhoe arm. Drum contents would be sampled using a sample thief for liquids and a coring tool for solids, and drums would be resealed. Overpressurized drums would be opened and sampled using a tube and spear device.

- Gas cylinder opening, sampling, and disposal—Using a Cylinder Recovery Vessel (CRV), gas cylinders would be sampled and identified, and gases would be treated onsite by the CRV if possible or placed in new containers for off-site disposal.

- Compatibility testing—Compatibility tests would be performed on samples from each drum using an onsite analytical laboratory. Compatible drums would be stored together. Drum contents will also be analyzed for dioxins.

- Empty drum scrapping—Empty drums would be shredded within the encapsulated area, vapors will be treated by carbon absorption and residue would be collected for treatment, decon fluids will be sent to the CST, and decontaminated metal would be disposed of offsite as scrap. An estimated 25,000 drums would be shredded.

- Free liquids removal and dewatering—Free liquids and groundwater encountered during drum removal activities would be removed from excavations by positive displacement pumps. Free liquids would be placed in drums and treated with other drummed waste. The volume of free liquids encountered during excavation is expected to be minimal. If groundwater is encountered it would be collected for treatability testing prior to discharge to the CST. If analytical results indicate that contaminant concentrations exceed the treatment capabilities of the CST, the groundwater would be shipped to a RCRA-permitted treatment facility. If the amount of water to be treated by the CST causes a possible exceedance of capacity for the sludges generated then those sludges will be removed and treated or stored to allow the CST to continue operation.

- Dust and vapor control and treatment—During remedial activities, dust and vapor emissions from the site would be controlled. Water would be applied periodically to surface soils to suppress dust. Plastic covers or tarps would be placed on stockpiles of excavated soil to control both vapors and dust emissions. Vapor and dust emissions from active excavations would be controlled by encapsulating the

active excavations and work areas and by treating exhaust air for particulates and organic vapors.

A self-supported, portable structure would be constructed on the site. This structure would be large enough to enclose the largest anticipated excavation. Upon completion of drum excavation in one area, the excavation would be backfilled and the structure would be moved to the next location. All activities potentially involving significant releases of organic vapors would be conducted within the structure. This structure would be operated under negative pressure and would be equipped with an air filter and vapor phase granular activated carbon (GAC) treatment system to remove dust and organic vapors from air before it is discharged. Contaminated GAC and air filters will be incinerated off-site.

- Air monitoring—Continuous, real-time monitoring of air for vapors and particulates would be provided in all work areas. Monitoring instruments would include combustible gas indicators, oxygen meters, toxic gas analyzers, and opacity meters and standard meteorological equipment. Up- and down-wind conditions would be monitored on a 24-hour basis and would be documented regularly by collecting and analyzing air samples for vapors and particulates.

- Stormwater management and erosion control- off-site surface water will be diverted from the site by diversion dikes and ditches installed around the perimeter of the site. Onsite surface water will be collected in ditches and diverted to the existing site storm sewer system. Soil erosion control measures will be used to minimize sediment transport to the sewer system. The CST currently treats surface runoff from the site. Additional runoff is not be expected as a result of Alternative 7 activities.

- Management of open excavations—Completed excavations will be backfilled with the excavated soil. Soils known to be contaminated with dioxin will be kept segregated. Where there is insufficient backfilling soil, the excavations will be shored if necessary and covered. Contaminated soil will be handled in a future operable unit. An interim waiver will be invoked for RCRA closure requirements.

- Explosion and fire prevention/protection—Explosion and fire hazards may exist and all activity must be performed with appropriate health and safety requirements.

- Access - Access restricrtions will be placed around the site to deter trespassing during and after remedial action.

Treatment of Wastes. After the drums of waste have been sampled and characterized, they would be transported off-site for treatment by incineration. Any wastes encountered that may pose a problem for off-site treatment or disposal will be stored on site until a future response action. Off-site incineration would involve the following procedures.

- Waste manifesting and bulking—If possible, wastes would be bulked for transportation. Compatible liquid wastes would be placed in tanker trucks, and solids would be placed in roll-off containers. Wastes would be bulked within the encapsulated area or other location where vapors could be contained. Wastes that cannot be bulked would be segregated according to compatibility, overpacked, and shipped together. Before bulking and/or shipping, composite waste samples from each proposed truckload will be collected and analyzed for dioxins and other parameters required to characterize wastes for transportation manifests and incineration.

- Neutralization of acid wastes—Acidic wastes will be pretreated if necessary by neutralizing with lime before sending off-site for incineration. Neutralization may also be used as a sole treatment in instances where acidic wastes are determined to contain no other contaminants of concern.

- Off-site incineration—Wastes will most likely be shipped to an off-site incinerator by truck unless there is a direct rail line to the accepting facility.

- Treatment of dioxin-contaminated wastes—Drums found to contain wastes contaminated by dioxins would be stored at the site for future treatment. Such treatment would likely occur along with the remediation of dioxin-contaminated soils and sludges presently on the site. Currently, no incinerators in the United States are permitted to handle dioxin-contaminated wastes; however, this may not be the case at the time of remedial action implementation. If permitted, drums containing dioxins would be incinerated off-site with other wastes.

- Treatment of sodium metal waste—Drums found to contain sodium metal waste would require repackaging before being shipped off-site for incineration. Because of its extremely reactive characteristics, sodium metal waste would be repackaged in 1-quart containers (or smaller) and immersed in an oil such

as diesel fuel. Repackaging would be performed in an inert nitrogen atmosphere to prevent ignition. Site drum removal records stated that approximately 5 percent of the drums found aboveground contained sodium metal. However, a large amount of this material was left over from the Fike manufacturing operation. It is assumed that the relative volume of waste sodium metal would be much less. One percent has been used for estimating purposes. This amounts to an estimated 126 drums. Based on employee interviews, it is assumed that the majority of these drums are buried beneath the garage on the Holloran property.

- Recycling—All chemicals contained in drums that can be recycled cost-effectively will be considered for recycling.

- Alternative treatment technologies—Following the excavation, removal, and characterization of wastes contained in buried drums and containers, other treatment technologies capable of achieving treatment levels equivalent to the best demonstrated available technology under 40 CFR Part 268 (Land Disposal Restrictions) and that will meet ARARs more cost-effectively, will be considered by EPA. However, alternative treatment technologies will only be employed at the site with EPA approval and authorization.

Alternative 8—Removal and Onsite Incineration With Off-site Disposal

This alternative consists of the excavation and onsite processing of the buried drums followed by incineration with an onsite rotary kiln incinerator. Incinerator ash would be disposed of off the site at a RCRA-permitted landfill. The key components and procedures incorporated into this alternative are shown in Figure 4 and are discussed in detail below. Any buildings or equipment that could not be removed in OU-2 because of this action will be removed at the appropriate time under this action.

Drum Removal and Processing. The excavation and processing of the buried drums would be performed as outlined in Alternative 7. The methods outlined in Alternative 7 would also be used to handle and treat free liquids, groundwater, surface water, excavated soil, vapor and dust emissions, and empty drums.

Treatment and Disposal of Wastes. After the drums have been excavated and processed, the wastes would be incinerated as discussed below.

- Onsite incineration—During compatibility testing, wastes would be analyzed for Btu content and classified for incineration. Incineration could be performed using a mobile two-chamber rotary kiln. Exhaust gases from the incinerator would be cooled and scrubbed before exiting the stack. The incinerator would oxidize organic contaminants. However, the waste ash would have to meet TCLP requirements or would require disposal in a RCRA Subtitle C-permitted facility.

- Neutralization of acidic wastes—Acidic wastes would be neutralized if necessary as discussed in Alternative 7.

- Treatment of dioxin-contaminated waste—The onsite would be capable of reducing dioxin concentrations to below land disposal restriction concentrations.

- Waste manifesting—Incinerator waste ash would be sampled and analyzed for transportation and disposal requirements.

- Transportation and disposal—Waste ash would be shipped to an off-site RCRA Subtitle C permitted landfill in bulk by truck unless there is a direct rail line to the disposal facility.

- Treatment and disposal of sodium metal waste—Sodium metal waste would be treated and disposed of as outlined in Alternative 7.

Alternative 9—Removal And Onsite Incineration and Stabilization With Off-site Disposal

This alternative consists of the excavation and onsite processing of the buried drums followed by onsite incineration using a mobile incinerator. Incinerator ash would then be stabilized at the site with pozzolanic reagents prior to disposal at an off-site RCRA Subtitle C permitted landfill. The key components and procedures incorporated into this alternative are shown in Figure 4 and are discussed in detail below. Any buildings or equipment which cannot be removed under the OU-2 remedial action because of those actions under this operable unit will be dealt with under this action at the appropriate time.

Drum Removal and Processing. The excavation and processing of the buried drums would be conducted as outlined in Alternative 7. The methods discussed in Alternative 7 would also be used to handle and treat free liquids, groundwater, surface water, excavated soil, vapor and dust emissions, and empty drums.

Treatment and Disposal of Waste. Onsite incineration and treatment of dioxin-contaminated waste and sodium metal waste would be conducted as discussed in Alternative 8. After incineration, the resulting ash would be stabilized as described below.

- Stabilization treatability tests—Incinerator ash would be analyzed for inorganic content. If stabilization was determined to be necessary or advantageous, the ash would undergo treatability tests to determine the reagent dosages and to predict performance.

- Pozzolanic stabilization—Pozzolanic stabilization would be used to chemically stabilize insoluble metal complexes, inorganic compounds, and some soluble inorganic compounds. If the results of treatability tests indicate that it would be effective and economically feasible, the incinerator ash would be stabilized. Because dust and vapor emission would be a concern during this operation, stabilization would be performed within an enclosed area such as the portable structures that would be used during excavation and incineration activities.

After stabilization is complete, the stabilized ash would be manifested and transported off the site for disposal as outlined in Alternative 8.

Summary of Comparative Analysis of Alternatives

The five alternatives were compared on the basis of the nine evaluation criteria to identify the relative benefits of each alternative. These nine criteria are listed and defined below:

- Overall protection of human health and the environment—This is a check to assess whether an alternative meets the requirement that it be protective of human health and the environment. The overall assessment of protection is based on a composite of factors assessed under other evaluation criteria, especially long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs.

- Compliance with ARARs—This criterion gauges the degree of compliance of each alternative with applicable or relevant and appropriate federal and state requirements, as defined in CERCLA Section 121.

- Long-term effectiveness and permanence—This criterion gauges results of a remedial action in terms of how

much risk remains at the site after response objectives have been met. The focus of this evaluation is on the effectiveness of the controls in managing risks posed by treatment residuals or untreated wastes.

- Reduction of toxicity, mobility, and volume—This criterion reflects statutory preference for remedies that permanently and significantly reduce toxicity, mobility, or volume of the hazardous substances. This preference is satisfied when treatment reduces the principal threats at the site through destruction of toxic contaminants, irreversible reduction in contaminant mobility, or reduction of total volume of contaminated media.

- Short-term effectiveness—This criterion gauges the impact an alternative will have during construction and implementation, up until the time remedial response objectives are met. Under this criterion, alternatives are evaluated with respect to their effects on human health and the environment during implementation of the remedial action and until protection is achieved.

- Implementability—This criterion gauges technical and administrative feasibility of implementing an alternative and the availability of various services and materials required during its implementation. It also evaluates the compatibility of the alternative with potential future actions to be implemented at the site that address other areas or sources of contamination.

- Cost—This criterion gauges the capital costs, annual operation and maintenance (O&M) costs, and total present worth of each alternative. The cost estimates are considered order-of-magnitude level and are expected to be accurate within +50 to -30 percent for the identified scope of the remedial action. A cost sensitivity analysis may be performed to reflect the uncertainties in estimating particular parameters.

- State acceptance—This criterion takes into consideration the position and key concerns of the state regarding the preferred alternative and other alternatives and the state's comments on ARARs or the proposed use of waivers.

- Community acceptance—This criterion gauges support, opposition, and reservations of interest persons in the community to components of the remedial alternatives.

These nine criteria fall into three general categories as outlined below:

- Threshold factors:
  - Overall protection of human health and the environment
  - Compliance with ARARs
- Primary balancing factors:
  - Long-term effectiveness and permanence
  - Reduction of toxicity, mobility, or volume through treatment
  - Short-term effectiveness
  - Implementability
  - Cost
- Modifying considerations:
  - State acceptance
  - Community acceptance

The threshold factors, overall protection of human health and the environment, and compliance with ARARs were evaluated on a yes/no basis. The primary balancing factors were evaluated as a comparative analysis. The modifying considerations, state and community acceptance, were fully evaluated following receipt of comments on the Proposal Plan.

A comparative analysis of the five alternatives is discussed for each of the nine evaluation criteria.

Overall Protection of Human Health and the Environment

Alternative 1 (no action) would not protect human health and the environment. Therefore, it is not considered any further in this analysis. Alternative 5 (containment with a RCRA cap and slurry wall) would eliminate any existing risk of direct contact with the waste and reduce the migration of the contaminants by significantly restricting infiltration and by containing contaminants horizontally within an *in situ* slurry wall. However, percolation of any free phase liquids, possibly existing in the drums, into the bedrock aquifer would not be eliminated by this alternative. This alternative would not reduce the volume or toxicity of the waste. Alternatives 7 (removal and off-site incineration), 8 (removal and onsite incineration), and 9 (removal and onsite incineration and stabilization) all would provide long-term protection to human health and the environment at the site by removing the waste.

Compliance With ARARS

Alternative 1 does not meet ARARs pertaining to land disposal of solid or hazardous waste. The other four alternatives are expected to meet all ARARs. The ARARs identified for these alternatives are presented below. Three classifications of ARARs are defined by EPA: chemical-specific, location-specific, and action-specific. ARARs included for each classification are presented below.

Chemical-Specific ARARs

Chemical-specific ARARs regulate the release of hazardous substances to the environment having certain chemical or physical characteristics or materials containing specified chemical compounds. They are important in determining the extent of soil, sediment, and groundwater remediation as well as determining the residual levels allowed for hazardous substances after treatment.

Chemical-specific ARARs associated with these alternatives are concerned with acceptable discharge concentrations to the air and surface water during remedial action. Clean-up standards for groundwater, surface water, and soil are not ARARs because the remedial objectives of OU-3 only address the removal or containment of a potential source of contamination and hazard and not the remediation of contaminated media.

National Ambient Air Quality Standards. The Clean Air Act (CAA) governs air emissions resulting from remedial actions. Pursuant to the CAA, EPA promulgated the National Ambient Air Quality Standards (NAAQS) (40 CFR Part 50). NAAQS are available for six pollutants, including airborne particulates (see Table 3). The sources of the contaminants and the routes of exposure were considered in the formulation of the standards. These standards do not consider the costs of achievement or the feasibility of implementation. The NAAQS allow for a margin of safety to account for unidentified hazards and effects. The NAAQS apply for remedial actions involving direct or indirect emissions to the atmosphere.

National Emission Standards for Hazardous Air Pollutants. Pursuant to Section 112 of the CAA, EPA has promulgated National Emission Standards for Hazardous Air Pollutants (NESHAPS) (40 CFR Part 61). Significant sources of hazardous air pollutants listed as hazardous may be subject to NESHAPS. Performance standards for incinerators are set forth in 40 CFR Part 60, Subpart E, and apply to actions involving onsite incineration.

Federal agencies are required to comply with federal, state, and local requirements (especially with State Implementation Plans, or SIPs), for control and abatement of air pollution. If a proposed EPA action may adversely affect air quality, the

Table 3
FEDERAL AND STATE AMBIENT AIR QUALITY STANDARDS

	National Ambient Air Quality Standards		West Virginia Ambient Air Quality Standards	
Parameter	Primary Standard ($\mu g/m^3$)	Secondary Standard ($\mu g/m^3$)	Primary Standard ($\mu g/m^3$)	Secondary Standard ($\mu g/m^3$)
Carbon monoxide	10,000 (8-hour)(1) 40,000 (1-hour)(1)	None	10,000 (8-hour) 40,000 (1-hour)	None
Lead	1.5 (90-day)(2)	Same as primary	None	None
Nitrogen oxides	100 (1-year)(3)	Same as primary	100 (1-year)(3)	None
Nonmethane hydrocarbons	None	None	160 (3-hour)(1) (6 a.m. to 9 a.m.)	None
Ozone	235 (1-hour)(1)	Same as primary	235 (1-year)(1)	None
Particulate matter (expressed as PM-10)	150 (24-hour)(1) 50 (1-year)(3)	Same as primary	150 (24-hour)(1) 50 (1-year)(3)	Same as primary
Sulfur dioxide	80 (1-year)(3) 365 (24-hour)(1)	1,300 (3-hour)(1)	80 (4-year)(3) 365 (24-hour)(1)	1,300 (3-hour)(1)

Primary - protection of public health.
Secondary - protection of public welfare.

(1) Maximum concentration not to be exceeded more than once per year.
(2) Maximum arithmetic mean averaged over a calendar quarter.
(3) Annual arithmetic mean.

responsible EPA official is required to consult with appropriate state and local agencies to determine whether the action conforms to the SIP.

West Virginia Ambient Air Quality Standards. West Virginia Ambient Air Quality Standards (West Virginia Code of State Regulations; Title 45; Series 8, 9, and 12) have been developed for sulfur dioxide, particulate matter, carbon monoxide, ozone, nonmethane hydrocarbons, and nitrogen dioxide (see Table 4). These standards are similar to the Federal NAAQS and apply for remedial actions involving direct or indirect emissions to the atmosphere.

West Virginia Air Pollution Control Regulations. West Virginia Air Pollution Regulations (WVCSR 45-15 and 45-16) also include emission standards for hazardous air pollutants (same as 40 CFR, Part 61-NESHAPS) and standards for performance of new stationary sources (same as 40 CFR, Part 60). These regulations apply for remedial actions involving emissions to the atmosphere.

West Virginia Pollutant Discharge Elimination System Regulations. The West Virginia Department of Natural Resources (WVDNR) has imposed effluent limits for the Cooperative Sewage Treatment (CST) plant, which discharges to the Kanawha River. The influent to the CST plant originates from the process area of the Fike Chemicals site as surface water runoff and groundwater infiltration into the sewer network. Discharge limits are presented in Table 4. Many of the discharge limits are based on West Virginia Water Quality Standards (WVCSR 46-1). The discharge limits apply to remedial actions that involve treatment of wastes at the CST plant.

Location-Specific ARARs

Location-specific ARARs are restrictions placed on the concentration of hazardous substances or the conduct of activities solely because they are in specific geophysical locations. Some examples of special locations include floodplains, wetlands, historic places, and protected habitats. No known location-specific ARARs exist for this phase of the remedial activities at the site. The site is not located in floodplains, wetlands, protected habitats or areas of scientific, historic, or archeological significance.

Action-Specific ARARs

Action-specific ARARs are requirements that are triggered by specific remedial actions implemented at the site. Important action-specific ARARs that may affect the development and conceptual arrangement of remedial alternatives for the buried drums at the site are discussed below. Potential action-specific ARARs are summarized by remedial technology in Table 5.

Table 4
CST PLANT DISCHARGE LIMITATIONS
THE SITE
NITRO, WEST VIRGINIA

	Quantity (lbs/Day)		Concentration (mg/L)[1]	
Parameter	Average Monthly	Maximum Daily	Average Monthly	Maximum Daily
BOD-5	8	21	45.7	119.9
Total Suspended Solids	1	3	5.7	17.1
Oil & Grease	5	8	28.5	45.7
Phenol	0.003	0.005	0.017	0.029
2,4-Dichlorophenol	0.007	0.02	0.040	0.114
2,4-Dimethylphenol	0.003	0.006	0.017	0.034
2-Nitrophenol	0.007	0.012	0.040	0.069
4-Nitrophenol	0.013	0.022	0.074	0.126
2,4-Dinitrophenol	0.013	0.022	0.069	0.126
2-Chlorophenol	0.005	0.017	0.029	0.097
Total Phenolics	0.05	0.104	0.285	0.594
Toluene	0.005	0.014	0.029	0.080
Benzene	0.006	0.024	0.034	0.137
Cyanide, Total	0.074	0.21	0.423	1.199
Lead, Total	0.056	0.121	0.320	0.691
Chromium, Total	0.194	0.485	1.108	2.769
Hexavalent Chromium	--	--	--	0.010
Copper, Total	0.254	0.592	1.450	3.380
Nickel, Total	0.296	0.697	1.690	3.980
Zinc, Total	0.184	0.457	1.051	2.609
Arsenic, Total	--	--	--	0.44
Cadmium, Total	--	--	--	0.049
Iron	--	--	--	8.5
Manganese, Total	--	--	--	1.0

Table 4
CST PLANT DISCHARGE LIMITATIONS
THE SITE
NITRO, WEST VIRGINIA

	Quantity (lbs/Day)		Concentration (mg/L)[1]	
Parameter	Average Monthly	Maximum Daily	Average Monthly	Maximum Daily
Mercury, Total	--	--	--	0.0002
Selenium, Total	--	--	--	0.035
Silver, Total	--	--	--	0.043
Chloride	--	--	--	1,800
Total Residual Chlorine	--	--	--	2.0
Nitrate (as N)	--	--	--	1.0
Ammonia (as N)	--	--	--	40
Total Organic Carbon	--	--	--	100
Chemical Oxygen Demand	--	--	--	100
Dissolved Oxygen	--	--	--	100

-- No limitation
[1]Based on a flow rate of 21,000 gallons per day
Source: Ebasco, 1990

Table 5
POTENTIAL ACTION-SPECIFIC ARARs FOR THIS SITE

Actions	Requirement	Prerequisites	Citation	ARARs Status	Comments
Capping (See also Closure with Waste in Place for additional associated requirements)	Proper closure, post-closure maintenance, and monitoring requirements.	No RCRA or West Virginia Hazardous Wastes disposed of in the unit after November 1980 and wastes are not disturbed.	WV Solid Waste Regulations (WVCSR Title 47-38)	Applicable	Implementation of capping is a possible action. If no hazardous wastes have been disposed of in the area after November 1980, the Solid Waste regulations may apply.
	Placement of a cap over hazardous waste (e.g., closing a landfill, or closing a surface impoundment or waste pile as a landfill, or similar action) requires a cover designed and constructed to: • Provide long-term minimization of infiltration of liquids through the capped area • Function with minimum maintenance • Promote drainage and minimize erosion or abrasion of the cover • Accommodate settling and subsidence so that the cover's integrity is maintained • Have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present.	RCRA waste in unit. Significant management (treatment, storage, or disposal) of hazardous waste will make requirements applicable; capping without disturbance will not make requirements applicable unless hazardous wastes were disposed of after November 1980. Technical requirements are likely to be relevant and appropriate.	40 CFR 265.310 (Landfills) WV Haz. Waste Regulations WVCSR Title 47-35-11.3.4	Relevant and Appropriate	RCRA capping requirements could be relevant and appropriate to capping hazardous wastes in place. RCRA is generally considered relevant if it can be verified, through review of records, interviews, or other means, that the landfill accepted RCRA wastes prior to November 1980. The appropriateness of RCRA requirements is based also on each requirement's technical merit in a given situation. If a groundwater containment problem exists, a RCRA cap would serve to isolate and contain landfill solids and contaminated soils and limit infiltration of precipitation. EPA guidance on RCRA caps for new RCRA landfill cells includes multibarrier caps of clay and liners.
	Post-closure maintenance		WVCSR 47-35-11.3.4 40 CFR 265.117 to 265.120	Applicable	Excavation and reconsolidation of the onsite wastes, in a location outside of the current area of contamination, or disposal of RCRA wastes in the unit after November 1980 would make these requirements, as well as the landfill construction and operation requirements applicable for wastes that can be designated as hazardous. If the wastes are excavated and reconsolidated in their current location, the capping requirements apply. The major determining factors are the location of the final disposal and the classification of the waste materials.
Waste Pile	Stockpiling of contaminated soil and debris Constitutes a waste pile	Stockpile contains hazardous waste	WVCSR 47-35-8.10 40 CFR 264.250 to 264.259	Relevant and Appropriate	These requirements may be relevant and appropriate for any non-hazardous waste.
	Closure		WVCSR 47-35-8.6 40 CFR 264.110 to 264.120	Applicable	These requirements may be applicable for any hazardous waste.
Storage of LDR Waste	Storage of LDR waste in drums or tanks in accordance with standards	Stored waste are LDR waste	40 CFR 268.50	Relevant and Appropriate Applicable	These requirements may be relevant and appropriate for non-hazardous waste. These requirements may be applicable for LDR wastes.
Generation of Hazardous Waste	Meets standards for generators of hazardous waste including hazardous waste determination, manifesting, and pretransport requirements	Generation of wastes that are hazardous	WVCSR 47-35-6 40 CFR 262	Relevant and Appropriate Applicable	These requirements may be relevant and appropriate for non-hazardous waste. These requirements may be applicable for LDR wastes.
	Perform LDR waste analysis	Generation of wastes that are hazardous	40 CFR 268.7(a)	Applicable	

TABLE 5
POTENTIAL ACTION-SPECIFIC ARARs FOR THE SITE

Actions	Requirement	Prerequisites	Citation	ARARs Status	Comments
Offsite shipment of Hazardous Waste	Meet LDR standards for offsite shipment (notification)	Hazardous waste subject to LDR	40 CFR 268.7(a)	Relevant and Appropriate Applicable	These requirements may be relevant and appropriate for hazardous waste not subject to LDR. These requirements may be applicable for hazardous wastes subject to LDR.
	Meet manifest and offsite transport (See Generation of Hazardous Waste)	Waste is hazardous waste	WVCSR 47-35-6 40 CFR 262 (Subparts B & C)	Relevant and Appropriate Applicable	These requirements may be relevant and appropriate for non-hazardous waste. These requirements may be applicable for hazardous waste.
	Meet standards for transporters	Offsite transportation of hazardous waste	WVCSR 47-35-5 40 CFR 263	Applicable	These requirements may be applicable for hazardous waste.
Placement of LDR Wastes	Placement of excavated materials to locations beyond Area of Concern (AOC) or replacement (backfilling) of contaminated material from AOC (stockpiling) may trigger LDR	Contain hazardous waste subject to LDR	40 CFR 268	Relevant and Appropriate Applicable	These requirements may be relevant and appropriate for hazardous waste not subject to LDR. These requirements may be applicable for hazardous wastes subject to LDR.
Container Storage (Onsite)	Containers of hazardous waste must be: • Maintained in good condition • Compatible with hazardous waste to be stored • Closed during storage (except to add or remove waste) Inspect container storage areas weekly for deterioration. Place containers on a sloped, crack-free base and protect from contact with accumulated liquid. Provide containment system with a capacity of 10 percent of the volume of containers or free liquids. Remove spilled or leaked waste in time to prevent overflow of the containment system. Keep containers of ignitable or reactive waste at least 50 feet from the facility's property line. Keep incompatible materials apart. Separate incompatible materials stored near each other with a dike or other barrier. At closure, remove all hazardous waste and residues from the containment system and decontaminate or remove all containers and liners.	RCRA hazardous waste (listed or characteristic) held for a temporary period before treatment, disposal, or storage elsewhere (40 CFR 264.10) in a container (i.e., any portable device in which a material is stored, transported, disposed of, or handled).	WVCSR 47-35-8.7.2 40 CFR 264.171 WVCSR 47-35-8.7.3 40 CFR 264.172 WVCSR 47-35-8.7.4 40 CFR 264.173 WVCSR 47-35-8.7.6 40 CFR 264.174 WVCSR 47-35-8.7.7 40 CFR 264.175 WVCSR 47-35-8.7.8 40 CFR 264.176 WVCSR 47-35-8.7.9 40 CFR 264.177 WVCSR 47-35-8.7.10 40 CFR 264.178 40 CFR 264.110 to 264.116 WVCSR 47-35-8.6	Relevant and Appropriate Applicable	These requirements would be relevant and appropriate for any non-hazardous waste that might be contaminated and stored on the site before treatment or final disposal. If any of the wastes are determined to be classified as hazardous wastes, the requirements would apply. Contaminated hazardous substances or hazardous wastes must be stored while on the site in a structure that is designed, operated, and maintained in accordance with 40 CFR 264.171-178.

Table 5
POTENTIAL ACTION-SPECIFIC ARARs FOR THE SITE

Actions	Requirement	Prerequisites	Citation	ARARs Status	Comments
Excavation	Manage hazardous waste in accordance with standards.	Soil/debris being managed as RCRA hazardous waste. Management of RCRA hazardous wastes in landfills.	WVCSR 47-35-11.3.4 40 CFR 265.300 to 265.317	Relevant and Appropriate Applicable	If wastes are not hazardous, requirements are relevant and appropriate. If a landfill is used to manage a hazardous waste, these requirements apply to construction, operation, and maintenance of the landfill.
	Closure and post-closure care of excavated areas	RCRA hazardous waste disposal in excavated areas	WVCSR 47-35-11.3.4 40 CFR 265.110 to 265.120, 265.310	Relevant and Appropriate Applicable	If contaminated materials that are not hazardous wastes are excavated from the site during remediation, the RCRA requirements for disposal and site closure (of the excavated area) may become relevant and appropriate. See discussions under Capping, Clean Closure, Closure with Waste In-Place, etc. If the excavated materials can be classified as hazardous wastes, the disposal and closure requirements would apply.
	Movement of excavated materials to a previously uncontaminated onsite location and placement in or on land may trigger land disposal restrictions.	Materials containing RCRA hazardous wastes subject to land disposal restrictions.	40 CFR 268 (Subpart D)	Relevant and Appropriate Applicable	The land disposal restrictions restrict disposal of certain hazardous wastes. Some landfill wastes may be derived from or may be sufficiently similar to restricted wastes to make the land disposal restrictions relevant and appropriate. For wastes that can be classified as restricted hazardous wastes, land disposal is prohibited unless they are treated to defined standards. Chemical characterization of the wastes will be necessary to determine the applicability or relevance of this requirement.
	Develop fugitive and odor emission control plan for this action if existing site plan is inadequate.		CAA Section 101[a] WVCSR 45 40 CFR 52[a]	Applicable	Odor regulations are intended to limit nuisance conditions from air pollution emissions. Fugitive emission controls are one feature of the state implementation plan used to achieve/maintain the ambient air quality standards for particulate matter.
	File an Air Pollution Emission Notice (APEN) with state to include estimation of emission rates for each pollutant expected.		WVCSR 45 40 CFR 52[a]	Applicable	State will have particular interest in emissions for compounds on their hazardous, toxic, or odorous list. Preliminary meeting with state prior to filing APEN is recommended in the regulation. Meeting would identify additional issues of concern to the State.
	Include with the filed APEN the following: • Modeled impact analysis of source emissions • A Best Available Control Technology (BACT) review for the source operation	This additional work and information normally applies to sources meeting the "major" criteria and/or to sources proposed for nonattainment areas.	WVCSR 45 40 CFR 52[a]	Relevant and Appropriate	State may identify further requirements for permit issuance after first review. These provisions follow the federal Prevention of Significant Deterioration (PSD) framework with some modifications. Additional requirements could include ambient monitoring and emission control equipment design revisions to match Lowest Achievable Emission Requirements (LAER). While a permit is not required for an onsite CERCLA action, the substantive requirements identified during the permitting process apply.
	Predict total emissions of volatile organic compounds (VOCs) to demonstrate emissions do not exceed 450 lb/hr, 3,000 lb/day, 10 gal/day, or allowable emission levels from similar sources using Reasonably Available Control Technology (RACT).	Source operation must be in an ozone nonattainment area.	WVCSR 45 40 CFR 52[a]	Applicable	The control technology review for this regulation (RACT) could coincide with the BACT review suggested under the PSD program.
Excavation (cont.)	Verify through emission estimates and dispersion modeling that hydrogen sulfide emissions do not create an ambient concentration greater than or equal to 0.10 ppm.		40 CFR 61[a] WVCSR 45	Applicable	

Table 5
POTENTIAL ACTION-SPECIFIC ARARs FOR THIS SITE

Actions	Requirement	Prerequisites	Citation	ARARs Status	Comments
	Verify that emissions of mercury, vinyl chloride, asbestos, and benzene do not exceed levels expected from sources in compliance with hazardous air pollution regulations.		40 CFR 61[a] WVCSR 45	Relevant and Appropriate	Any source emitting the regulated compounds is subject to this regulation. Some specific regulations further restrict scope of applicability.
Gas Collection	Design system to provide odor-free operation.		CAA Section 101[a] 40 CFR 52[a] WVCSR 45	Applicable	See comments under Excavation.
	File an Air Pollution Emission Notice (APEN) with state to include estimation of emission rates for each pollutant expected.		40 CFR 52[a] WVCSR 45	Applicable	See comments under Excavation.
	Include with the filed APEN the following: • Modeled impact analysis of source emissions • A Best Available Control Technology (BACT) review for the source operation	This additional work and information is normally applicable to sources meeting the "major" criteria and/or to sources proposed for nonattainment areas.	40 CFR 52[a] WVCSR 45	Relevant and Appropriate	See comments under Excavation.
	Predict total emissions of volatile organic compounds (VOCs) to demonstrate emissions do not exceed 450 lb/hr, 3,000 lb/day, 10 gal/day, or allowable emission levels from similar sources using Reasonably Available Control Technology (RACT).	Source operation must be in an ozone nonattainment area.	40 CFR 52[a] WVCSR 45	Applicable	See comments under Excavation.
	Verify through emission estimates and dispersion modeling that hydrogen sulfide emissions do not create an ambient concentration greater than or equal to 0.10 ppm.		40 CFR 61[a] WVCSR 45	Applicable	
	Verify that emissions of mercury, vinyl chloride, asbestos, and benzene do not exceed levels expected from sources in compliance with hazardous air pollution regulations.		40 CFR 61[a] WVCSR 45	Relevant and Appropriate	See comments under Excavation.
Incineration (Onsite)	Analyze the waste feed. Dispose of all hazardous waste and residues, including ash, scrubber water, and scrubber sludge. No further requirements beyond 40 CFR 264.341 and 264.351 apply to incinerators that only burn wastes listed as hazardous solely by virtue of the characteristic of ignitability, corrosivity, or both; or the characteristic of reactivity if the wastes will not be burned when other hazardous wastes are present in the combustion zone; and if the waste analysis shows that the wastes contain none of the hazardous constituents listed in Appendix VIII which might reasonably be expected to be present.	RCRA hazardous waste.	W.V. Administrative Regulations, Air Pollution Control Commission, Chapters 16-20 and 20.5E 40 CFR 264.341 40 CFR 264.351 40 CFR 264.340 (Subpart O)	Relevant and Appropriate Applicable	If incineration is selected as one of the remedial alternatives for the remediation, these requirements may be relevant and appropriate to the disposal by incineration of potentially nonhazardous site wastes. The wastes would have to be analyzed prior to incineration to ensure that the wastes cannot be classified as hazardous wastes. If wastes to be incinerated can be classified as hazardous wastes, the requirements of 40 CFR 264.341, 351, and 340 would apply.

Table 5
POTENTIAL ACTION-SPECIFIC ARARs FOR THE SITE

Actions	Requirement	Prerequisites	Citation	ARARs Status	Comments
Incineration (Onsite) (cont.)	Performance standards for incinerators: • Achieve a destruction and removal efficiency of 99.99 percent for each principal organic hazardous constituent in the waste feed and 99.9999 percent for dioxins. • Reduce hydrogen chloride emissions to 1.8 kg/hr or 1 percent of the HCl in the stack gases before entering any pollution control devices. Monitoring of various parameters during operation of the incinerator is required. These parameters include: • Combustion temperature • Waste feed rate • An indicator of combustion gas velocity • Carbon monoxide Closure		40 CFR 264.343 40 CFR 264.342 40 CFR 264.343 WVCSR 47-35.8.6 40 CFR 264.110 to 264.116		
Surface Water Control	Prevent run-on, and control and collect runoff from a 24-hour, 25-year storm (waste piles, land treatment facilities, landfills).	Land-based treatment, storage, or disposal units.	WVCSR 47-38 WVCSR 47-35-8.10.2 40 CFR 264.251(c)(d) WVCSR 47-35-8.11.2 40 CFR 264.301(c)(d)	Applicable Relevant and Applicable Applicable	Requirements will apply to remedial measures of nonhazardous waste sites. The requirements for control of run-on and runoff will be relevant and appropriate to all remediation alternatives that manage nonhazardous waste and include onsite land-based treatment, storage, or disposal. The requirements will apply to any remediation measures that include land-based treatment, storage, or disposal of hazardous waste.
	Existing effluent limitations for treatment of site surface runoff at the CST plant.	All site surface water regardless of remedial alternative.	WVCSR 46-2 (WVPDES permit for CST)	Applicable	Requirements will apply for all site runoff treated in the CST facility.
Tank Storage (Onsite) and/or treatment	Tanks must have sufficient shell strength (thickness), and, for closed tanks, pressure controls, to assure that they do not collapse or rupture. Waste must not be incompatible with the tank material unless the tank is protected by a liner or by other means. Tanks must be provided with secondary containment to prevent releases. Tanks must be provided with controls to prevent overfilling and sufficient freeboard maintained in open tanks to prevent overtopping by wave action or precipitation.	RCRA hazardous waste (listed or characteristic) held temporarily in a tank before treatment, disposal, or storage (40 CFR 264.10).	WVCSR 47-35-8.8.2 40 CFR 264.191 WVCSR 47-35-8.8.3 40 CFR 264.192 WVCSR 47-35-8.8.4 40 CFR 264.193 WVCSR 47-35-8.8.5 40 CFR 264.194	Relevant and Appropriate Applicable	These requirements would be relevant and appropriate to the onsite construction, operation, and maintenance of tanks for the storage or treatment of nonhazardous wastes or waste treatment effluents. These requirements would apply to the onsite construction, operation, and maintenance of tanks for the storage or treatment of hazardous wastes or effluents from the treatment of hazardous wastes, or for the storage of hazardous substances used in treatment processes.

Table 5
POTENTIAL ACTION-SPECIFIC ARARs FOR THE SITE

Actions	Requirement	Prerequisites	Citation	ARARs Status	Comments
Tank Storage (Onsite) and/or treatment	Inspect the following: overfilling control, control equipment, monitoring data, waste level (for uncovered tanks), tank condition, above-ground portions of tanks (to assess their structural integrity), and the area surrounding the tank (to identify signs of leakage). Repair any corrosion, cracks, or leaks.		WVCSR 47-35-8.8.6 40 CFR 264.195 WVCSR 47-35-8.8.7 40 CFR 264.196		
	At closure, remove all hazardous waste and hazardous waste residues from tanks, discharge control equipment, and discharge confinement structures. Closure. Store ignitable and reactive waste to prevent the waste from igniting or reacting. Ignitable or reactive wastes in covered tanks must comply with buffer zone requirements in "Flammable and Combustible Liquids Code," Tables 2-1 through 2-6 (National Fire Protection Association, 1976 or 1981).		WVCSR 47-35-8.8.8 40 CFR 264.197 WVCSR 47-35-8.6 40 CFR 264.110 to 264.120 WVCSR 47-35-8.9 40 CFR 264.198 WVCSR 47-35-8.10 40 CFR 264.199		
	Design system to operate odor free.		CAA Section 101[a] 40 CFR 52[a] WVCSR 45	Applicable	See comments under Excavation.
	File an Air Pollution Emission Notice (APEN) with state to include estimation of emission rates for each pollutant expected.		40 CFR 52[a] WVCSR 45	Applicable	See comments under Excavation.
	Include with the filed APEN the following: • Modeled impact analysis of source emissions • Provide a Best Available Control Technology (BACT) review for the source operation	This additional work and information is normally applicable to sources meeting the "major" criteria and/or to sources proposed for nonattainment areas.	40 CFR 52[a] WVCSR 45	Relevant and Appropriate	See comments under Excavation.
	Predict total emissions of volatile organic compounds (VOCs) to demonstrate emissions do not exceed 450 lb/hr, 3,000 lb/day, 10 gal/day, or allowable emission levels from similar sources using Reasonably Available Control Technology (RACT).	Source operation must be in an ozone nonattainment area.	40 CFR 52[a] WVCSR 45	Applicable	See comments under Excavation.
	Verify through emission estimates and dispersion modeling that hydrogen sulfide emissions do not create an ambient concentration greater than or equal to 0.10 ppm.		40 CFR 61[a] WVCSR 45	Applicable	See comments under Excavation.
	Verify that emissions of mercury, vinyl chloride, asbestos, and benzene do not exceed levels expected from sources in compliance with hazardous air pollution regulations.		40 CFR 61[a] WVCSR 45	Relevant and Appropriate	See comments under Excavation.

Table 5
POTENTIAL ACTION-SPECIFIC ARARs FOR THIS SITE

Actions	Requirement	Prerequisites	Citation	ARARs Status	Comments
Treatment in miscellaneous units	Standards for miscellaneous units (long-term retrievable storage, thermal treatment other than incinerators, open burning, open detonation, chemical, physical, and biological treatment units using other than tanks, surface impoundments, or land treatment units) require new miscellaneous units to satisfy environmental performance standards by protection of groundwater, surface water, and air quality, and by limiting surface and subsurface migration.	Use of other units for treatment of hazardous wastes. These units do not meet the definitions for units regulated elsewhere under RCRA.	40 CFR 264 (Subpart X) (see also WVCSR 47-35)	Relevant and Appropriate Applicable	The requirement will be relevant and appropriate to the construction, operation, maintenance, and closure of any miscellaneous treatment unit (a treatment unit that is not elsewhere regulated) constructed on-site for treatment and/or disposal of nonhazardous wastes. These requirements would apply to the construction and operation of a miscellaneous treatment unit for the treatment and/or disposal of hazardous wastes.
	Treatment of wastes subject to ban on land disposal must attain levels achievable by best demonstrated available treatment technologies (BDAT) for each hazardous constituent in each listed waste.	Effective date for CERCLA actions is November 8, 1988, for F001-F005 hazardous wastes, dioxin wastes, and certain "California List" wastes. Other restricted wastes have different effective dates as promulgated in 40 CFR 268.	40 CFR 268 (Subpart D)	Potentially Applicable Relevant and Appropriate	These regulations apply to the disposal of any site waste that can be defined as restricted waste. These requirements are relevant and appropriate to the treatment before land disposal of any wastes that contain components of restricted wastes in concentrations that make the site wastes sufficiently similar to the regulated wastes. The requirements specify levels of treatment that must be attained before land disposal.
	Prepare fugitive and odor emission control plan for this action.		CAA Section 101[a] 40 CFR 52[a] WVCSR 45	Applicable	See comments under Excavation.
	File an Air Pollution Emission Notice (APEN) with state to include estimation of emission rates for each pollutant expected.		40 CFR 52[a] WVCSR 45	Applicable	See comments under Excavation.
	Include with the filed APEN the following: • Modeled impact analysis of source emissions • A Best Available Control Technology (BACT) review for the source operation	This additional work and information is normally applicable to sources meeting the "major" criteria and/or to sources proposed for nonattainment areas.	40 CFR 52[a] WVCSR 45	Relevant and Appropriate	See comments under Excavation.
	Predict total emissions of volatile organic compounds (VOCs) to demonstrate emissions do not exceed 450 lb/hr, 3,000 lb/day, 10 gal/day, or allowable emission levels from similar sources using Reasonably Available Control Technology (RACT).	Source operation must be in an ozone nonattainment area.	40 CFR 52[a] WVCSR 45	Applicable	See comments under Excavation.
	Verify through emission estimates and dispersion modeling that hydrogen sulfide emissions do not create an ambient concentration greater than or equal to 0.10 ppm.		40 CFR 61[a] WVCSR 45	Applicable	See comments under Excavation.
	Verify that emissions of mercury, vinyl chloride, asbestos, and benzene do not exceed levels expected from sources in compliance with hazardous air pollution regulations.		40 CFR 61[a] WVCSR 45	Relevant and Appropriate	See comments under Excavation.

Table 5
POTENTIAL ACTION-SPECIFIC ARARs FOR THE SITE

Actions	Requirement	Prerequisites	Citation	ARARs Status	Comments

Notes:
[a]All of the Clean Air Act ARARs that have been established by the federal government may be covered by matching state regulations. The state may have the authority to manage these programs through the approval of its implementation plans (40 CFR 52 Subpart O).

RCRA Solid wastes in the buried drums and other containers were generated and disposed of before the effective date of RCRA (November 1980). RCRA therefore does not apply unless the drums are excavated. RCRA requirements may be applicable if the wastes disposed of before November 1980 are RCRA hazardous waste or relevant and appropriate if they are sufficiently similar to RCRA hazardous waste.

RCRA Landfill Closure Requirements. RCRA requirements do not apply to existing drum burial areas, but they may be considered relevant and appropriate to remedial alternatives not involving excavation or management of soil or solid wastes. The more significant RCRA requirements include construction of a cover having a permeability less than or equal to the permeability of the underlying natural bottom materials present.

RCRA Land Disposal Restrictions. RCRA land disposal restrictions (LDRs), 40 CFR 268, prohibit land disposal of F006 listed wastes after August 8, 1988, unless constituents in the Toxicity Characteristic Leaching Procedure (TCLP) extract are below the maximum allowable concentrations. Land disposal of nonliquid materials is also prohibited if the materials contain halogenated organic compounds (HOCs) greater than 1,000 mg/kg (the California List solid wastes). Incineration is required as treatment for California List wastes before landfill disposal.

Other RCRA Requirements. RCRA Part 264 outlines requirements for remedial alternatives involving onsite treatment storage or disposal of hazardous wastes. RCRA Subtitle C requirements will be potential ARARs for remedial alternatives that involve transportation, treatment, storage, and/or disposal of hazardous wastes. The Hazardous and Solid Waste Amendments (HSWA) prohibit the continued land disposal of hazardous wastes without treatment beyond specified dates. Wastes treated in accordance with the treatment standards set by EPA pursuant to RCRA Section 3004(m) are not subject to the prohibitions and may be land-disposed.

DOT Regulations. Department of Transportation Rules for Hazardous Materials Transport (49 CFR Parts 107 and 171 through 179) regulate the transport of hazardous materials, including packaging, shipping equipment, and placarding. These rules apply to wastes shipped off the site for laboratory analysis, treatment, or disposal.

OSHA Regulations. Occupational Safety and Health Administration regulations (29 CFR Parts 1904, 1910, and 1926) outline requirements that apply to workers engaged in onsite investigative and remedial activities.

West Virginia Solid and Hazardous Waste Regulations. West Virginia Solid Waste Regulations (WVCSR 47-38) apply for onsite disposal of solid wastes and contain requirements for solid waste facilities, permits and applications, and minimum perfor-

mance standards. West Virginia Hazardous Waste Regulations (WVCSR 47-35) contain standards for generators; transporters; and treatment, storage, and disposal facilities. These regulations apply for remedial actions that involve the handling of hazardous waste and may be appropriate and relevant for handling nonhazardous waste.

West Virginia Pollutant Discharge Elimination System Regulations. West Virginia Pollutant Discharge Elimination System Regulations (WVCSR 46-2) contain procedures and rules pertaining to point source discharges of pollutants to surface water. The regulations govern permits, permit applications, permit conditions, and effluent limitations. These requirements apply if the direct discharge of pollutants into surface water is part of a remedial action.

West Virginia Air Pollution Control Regulations. West Virginia Air Pollution Control Regulations (WVCSR Title 45) contain rules pertaining to discharges of pollutants to the air including:

- Prevention and control of discharges of objectionable odors (Series 4)
- Prevention and control of particulate air pollution from materials handling and other sources of fugitive particulate matter (Series 17)
- Prevention and control of air pollution from hazardous waste TSD facilities, including performance standards for incinerators (Series 25)

Long-Term Effectiveness

Because OU-3 is an interim remedial action long-term effectiveness is not a necessary criteria. However, because long-term effectiveness is an important criteria for the overall plan for the site it is considered. Alternative 1 would provide no additional long-term protection from risks. The degree of long-term effectiveness provided by Alternative 5 would depend on the quality of the cap and slurry wall and would also rely heavily on future maintenance. Alternatives 7, 8, and 9 would eliminate all long-term risks associated with the drums, although dioxin-contaminated wastes and possibly some unknown wastes found in this action would be left at the site with Alternative 7. These wastes would be addressed in a subsequent ROD.

Reduction in Toxicity, Mobility, or Volume Through Treatment

Neither Alternative 1 nor Alternative 5 proposes any waste treatment and would therefore not reduce the toxicity, mobility, or volume through treatment.

Alternatives 7, 8, and 9 would reduce the volume and toxicity of organic contaminants in the excavated waste by oxidation through incineration. Alternative 9 would further attempt to reduce the mobility of any inorganic contaminants present in the ash through stabilization.

Short-Term Effectiveness

Alternatives 7, 8, and 9 would present short-term risks including direct contact, inhalation, fire, explosion and chemical reactions at the site because they present opportunities for exposure to the contaminants. Alternative 9, presents short-term risks during excavation, onsite incineration, and stabilization. Alternative 8 presents short-term risks during excavation and onsite incineration, while Alternative 7 presents short-term risks during excavation. However, the use of a portable structure to encapsulate the work area during excavation would effectively eliminate short-term risks to the community, and the proper use of safety equipment and personal protection gear would minimize risks to site workers.

Alternative 5 involves some risks at the initial phases of construction due to the dioxin contamination in the surface soils and its potential to become airborne in dust. The use of dust suppressants and site worker personal protection gear would minimize these risks.

Estimated construction times for each alternative are:

- No time is required for Alternative 1 (no construction)
- Approximately 6 months for Alternative 5
- Approximately 12 months for Alternative 7
- Approximately 18 months for Alternative 8
- Approximately 24 months for Alternative 9

Implementability

Alternatives 5, 7, 8, and 9 use well-developed technologies that would be readily available and should be effective in treating or containing the waste. Implementation problems could be encountered with Alternatives 8 and 9 due to the proposed use of an onsite incinerator and the anticipated variability and unknown quantity of the waste. In addition, the numerous requirements associated with onsite incineration necessary to comply with local, state, and federal requirements would significantly complicate the implementability of these alternatives. Implementation problems are anticipated with Alternative 7 due to the unknown volume, location, and characteristics of the waste. The coordination, planning, and costs of this alternative depends heavily on these parameters.

Alternative 5 presents the most favorable implementation scenario; however, significant quality control problems are anticipated with the construction of the 60-foot deep slurry wall due to the difficulty of verifying the correct placement of the slurry or breaches in the wall. This alternative would not be affected by the uncertainties regarding the volume, location, and type of waste.

Each of the five alternatives is anticipated to affect the implementation of future remedial actions at the site, particularly remediation of contaminated soils and groundwater. Alternative 5 would preclude any further action to remediate the contaminated soil and onsite groundwater at the south end of the site.

Alternatives 7, 8, and 9 would facilitate the implementation of future actions to remediate contaminated soil and groundwater at the site. Removal of the buried drums will significantly reduce the hazards associated with future work at the site.

Cost

Table 6 presents a comparison of the estimated capital, O&M, and present worth costs for each of the five alternatives.

Table 6
COMPARISON OF ESTIMATED COSTS FOR ALTERNATIVES 1,5,7,8,& 9

	Alternatives				
	1 No Action	5 RCRA Cap and Slurry Wall	7 Off-site Incineration	8 Onsite Incineration	9 Onsite Incineration and Stabilization
Estimated Capital Costs	$0	$3,699,000	$16,059,000	$20,105,000	$20,594,000
Estimated Annual O&M Costs	$36,000[1] $23,000[2]	$47,000[1] $31,000[2]	$0	$0	$0
Estimated Total Present Worth Costs	$410,000	$4,245,000	$16,059,000	$20,105,000	$20,594,000

[1]Annual O&M costs for first 5 years of monitoring
[2]Annual O&M costs for sixth through thirtieth year of monitoring

State Acceptance

The State of West Virginia has reviewed the Record of Decision and concurs with the selection of Alternative 7.

Community Acceptance

Based on comments received during the public comment period and at the public meeting, there is community support for the selection of Alternative 7. See Responsiveness Summary for a summary of public comments and the response of EPA to these comments.

Performance Standards

The selected remedy shall meet the following performance standards:

- All buried drums and containers at the site shall be excavated, staged, sampled, and treated.

- The remedial action shall be conducted so as to minimize risks to the community and onsite workers.

To implement the objectives previously set forth, on page 13, this action shall remove the buried drums from their present location and characterize the drums and their contents to an extent where they may then undergo treatment or disposal. The remedial technologies associated with this general response action include both excavation technologies and drum management technologies. All work to be done will comply with EPA's policy for Drum handling.

Confirmation of Drum Location in Remedial Design

Anticipated subsurface disposal areas have been identified through a number of sources with varying degrees of certainty. Before beginning full scale drum removal activities, the existence of drums in each of these areas shall be confirmed so that a comprehensive sitewide excavation plan can be established. Confirmatory methods including geophysical techniques capable of identifying the presence of drums with certainty, while also ensuring worker safety, shall be used.

Test pits shall be used to provide the required degree of confirmation. Test pit excavation equipment and fire and explosion prevention apparatus could be the same as that used for the actual soil and drum removal operation.

Construction of an Enclosed Structure to Control and Treat Dust and Vapors

Vapor and dust emissions from active excavations shall be controlled by encapsulating the active excavations and work areas and by treating exhaust air for particulates and

organic vapors to applicable federal and state standards. Prior to the start of excavation a self-supported portable structure will be constructed on-site to prevent releases of vapors to the environment. The size of the structure will be determined in the Remedial Design for this action. Any activities potentially involving releases of organic vapors or other emissions shall be conducted within this structure. This structure shall be equipped with an air filter and vapor phase granular activated carbon (GAC) treatment system to remove dust and organic vapors from air before it is discharged. This structure shall be operated under negative pressure.

Water shall be applied to surface soils periodically to suppress dust. Plastic covers or tarps shall be placed on stockpiles of excavated soil to control both vapor and dust emissions.

Free Liquids and Ground Water Removal and Dewatering

During excavation of the drums, free liquids and/or groundwater may be encountered in pockets within the disposal areas or may occur as a result of the rupture of drums containing waste. These liquids will be removed by using pumps or vacuums or similar equipment, characterized, and discharged to the CST in accordance with NPDES requirement or shipped offsite for management in accordance with applicable RCRA requirements .

Drum Transfer and Staging

After the drums have been removed from the excavation, they shall be recontainerized if leaking or in poor condition, overpacked, opened, sampled, possibly consolidated, and temporarily stored to await final treatment or disposal. These staging/storage areas will comply with all applicable RCRA storage requirements. Any cylinders found on-site will be removed, opened, and sampled using a cylinder recovery vessel.

Compatibility Testing

Compatibility testing will be performed on samples collected from excavated drums in order to broadly classify waste categories for disposal or treatment and determine which drums may be safety consolidated or stored together.

Storing, Bulking, and Recontainerizing Wastes

Empty and full drums, drum wastes, free liquids, pumped groundwater, and excavated soils will be bulked within the encapsulated area or other location where vapors could be contained and possibly recontainerized or consolidated before treatment or disposal. Any wastes which cannot be sent offsite for treatment or disposal will be staged on site and addressed under a future operable unit. Drums found to contain sodium metal waste shall be repackaged in 1-quart (or smaller) containers and immersed in oil before being shipped off-site for incineration. Repackaging shall be performed in an inert nitrogen atmosphere.

Management of Open Excavations

It is anticipated that the removal of buried drums will create a number of large excavations. These open excavations would expose a significant area of soil, potentially contaminated with VOCs, to the atmosphere, creating a source of vapor emissions. In addition, open excavations would present a safety problem at the site and complicate remedial work by limiting mobility and access around the site. The backfilling of excavations with the excavated soil shall be managed to effectively address emissions, safety and accessibility concerns. Although the backfilled soil is potentially contaminated it may be placed back into an excavation within the "area of contamination" on the site. Stockpiled soils shall be managed in accordance with applicable RCRA requirements for waste piles.

Empty Drum Scrapping

Empty drums that are excavated or generated during consolidation shall be crushed or shredded, decontaminated, and/or shipped offsite in accordance with applicable RCRA requirements.

Air Monitoring

Air monitoring for weather conditions, gases, vapors, and particulates shall be conducted during drum removal operations throughout the work area and around the perimeter of the site. Both continuous real time monitoring and periodic sampling shall be implemented.

Stormwater Management and Erosion Control

Surface water, erosion control, and sedimentation measures shall be implemented during removal operations to reduce erosion, prevent contaminated sediment and runoff from leaving the site or off-site surface water from entering the site, and to keep surface water from entering open excavations. Onsite surface water will be collected and diverted to the existing site storm sewer system and discharged to the CST in accordance with NPDES requirements.

Explosion and Fire Prevention/Protection

Analyses of the contents of surface drums found at the Site indicate the presence of sodium metal and other explosive, ignitable, and reactive wastes. These types of wastes may be encountered during buried drum removal operations.

For this reason, a primary site safety concern is the prevention of and protection from fires and explosives. A number of standard tools, accessories, and technologies are available and are regularly used at hazardous waste sites. All appropriate measures shall be taken to ensure prevention of and protection from fires and explosives.

Thermal Treatment of Drummed Waste

Drummed wastes and residues contained in excavated drums shall be treated using off-site incineration. The anticipated high organic content of the drummed wastes is amenable to incineration. Incineration would also be a favorable technology, considering the lack of analytical data on the drummed waste and the anticipated wide variety of organic and inorganic compounds.

Raw untreated Site waste shall be transported off-site to a permitted incineration facility that meets any applicable RCRA requirements. Waste shall be processed, mixed with other wastes if necessary, and incinerated.

Prior to acceptance by an incineration facility, the waste stream shall be characterized and must meet certain requirements dependent on the receiving facility's operating permit limitations. Waste characterization shall be performed at the site. Waste characterization shall be combined with compatibility testing. Any waste which cannot be shipped off site for treatment or disposal will be staged on site for a future action.

All Site wates shall be incinerated off-site with the exception of dioxin-containing waste. Currently no facility within the United States is permitted to accept dioxin-contaminated wastes. All actions taken at the site will comply with EPA's off-site policy and other applicable requirements.

Chemical Treatment

Simple chemical treatment technologies, such as neutralization, shall be used as a treatment for acidic wastes that do not contain other contaminants or as pretreatment prior to incineration for acidic wastes containing other contaminants.

Treatment of Free Liquids and Groundwater

Free liquids and groundwater generated during drum removal may require treatment. Based on interviews with former plant employees some apparent drum burial areas are below the water table. Consequently dewatering of excavation pits during removal may contaminate groundwater. Free liquids leaking from drums during removal may also enter the groundwater. Groundwater and free liquids may contain organics and some metals. Process options considered for treatment include discharge to the CST, discharge to publicly owned treatment works (POTW), granular activated carbon (GAC), in exchange, air stripping, and precipitation or any other required treatment.

Disposal

Contents of excavated drums and drummed wastes shall be incinerated or disposed of after treatment. Demolition debris that contains hazardous waste shall be disposed of off-site in accordance with applicable RCRA requirements.

Transportation

Off-site disposal or incineration will require transportation of treated or untreated drummed wastes. Wastes will be transported by rail or by truck. Hazardous wastes transported off-site shall be transported in accordance with West Virginia's authorized hazardous waste transporter and generator requirements and Department of Transportation regulations. Hazardous waste shall be manifested in accordance with authorized generator standards. Land disposal restricted waste shall be shipped with notifications required by 40 C.F.R. Section 268.7(a).

Recycling

All wastes contained in drums that can be recycled cost-effectively shall be considered for recycling.

Access

Access restrictions shall be placed around the site to deter trespassing during and after remedial action.

Selected Remedy

Section 121 of CERCLA, 42 U.S.C. Section 9621, as amended by SARA, and the National Contingency Plan (NCP) establish a variety of requirements relating to the selection of remedial actions. The selected remedy for remediating the buried drums and containers at the site is Alternative 7—Removal and Off-site Incineration. The estimated present worth of this remedy is $16,059,000. Based on current information, this alternative would appear to provide the best balance of trade-offs among the alternatives with respect to the nine criteria that EPA uses to evaluate each alternative.

This alternative includes removal of all buried drums and containers. The removal of buried drums and containers features standard state-of-the-art drum removal, handling and processing equipment, and procedures, and also employs a self supported portable structure to enclose active excavation areas controlling vapor and dust emissions. Excavated drums will be treated thermally in an off-site incinerator. Drums containing acidic wastes will be neutralized onsite. Drums containing wastes contaminated with dioxins will be stored onsite for future remediation that would occur with the remediation of the dioxin-contaminated soils and sludges found on the site. Currently, no incinerators in the U.S. are permitted for dioxin-contaminated wastes; however, this may not be the case at the time of remedial action implementation. If possible, drums containing dioxins will be incinerated with other wastes. Any material that will meet a RCRA contaminated Debris definition will be treated as a debris and not as a listed or characteristic waste. Buried cylinders will be handled onsite with the CRV. Organic vapor emissions generated during drum or cylinder removal, sampling, storage, or treatment will be suppressed or captured and treated with vapor phase GAC.

Contaminated GAC will be incinerated off-site. Groundwater generated from excavation dewatering will be collected and discharged to the CST. However, the groundwater will be sampled before discharge to the CST. Any generated sludges would be treated and disposed of in a subsequent operable unit. If the quantity of sludge generated exceeds the storage capacity of the CST, the sludge will need to be removed and treated or stored so it will not jeopardize the operation of the CST. If analytical results indicate contaminant concentrations exceed the treatment capabilities of the CST, the groundwater will be shipped to a RCRA-permitted wastewater treatment facility.

Drums will be transported off the site by truck or rail, whichever is most appropriate and acceptable at the time of remedial action. Drums will either be shipped in bulk or separate overpacks, depending upon compatibility test results. Access restrictions will be placed around the site to deter trespassing during and after remedial action.

Statutory Determinations

Alternative 7 will protect human health and the environment by excavating, removing and treating the buried drums and containers at the site. Because the waste will be removed from the site, the risks of exposure from direct contact or the risk of off-site migration of releases from the drums will be eliminated. Waste treatment by incineration will oxidize a large percentage of organic compounds, which are anticipated to be the main contaminants in the waste. Residual hazardous waste in the resulting incinerator ash will be contained by disposal in a RCRA Subtitle C-permitted landfill. Potential short-term threats to human health and the environment during onsite drum removal and handling activities are significant. Potential exposure pathways are air emissions, surface water discharges, direct contact, fire, explosion, and other chemical reactions. Under this alternative, a significant number of protection, prevention, and containment measures will be employed to eliminate or reduce all perceived short-term exposure risks to an acceptable level. No unacceptable short-term risks or contamination of other media will be caused by implementing this remedy.

This action is not the final action for the site and does not attempt to ensure compliance with ARARs for the entire site. It will be consistent, however, with those action-specific ARARs addressing excavation, treatment, and disposal of buried drums and containers containing RCRA hazardous wastes (or sufficiently similar materials).

Alternative 7 will comply with all ARARs with the exception of RCRA closure requirements. The RCRA Part 264 Closure Requirements are applicable for the excavation/stockpile area. Since this is an interim action operable unit and further remediation will be conducted in this area under a separate operable unit, this closure requirement will be waived in accordance with the interim measure waiver provisions set forth in CERCLA Section 121(d). This type of waiver may be used whan an interim measure that does not attain an ARAR is expected to be followed by a complete measure that will attain such ARAR.

Transportation of hazardous wastes will be in accordance with RCRA and DOT requirements. Land disposal restrictions will be addressed by incinerating the waste and meeting applicable treatment standards or prohibition levels before disposal. The off-site incineration facility receiving the tank wastes must be in compliance with applicable state and federal permit requirements relevant to hazardous waste incineration facilities.

No location-specific ARARs have been found to pertain to this site.

The selected remedy is protective of human health and the environment. This remedy is cost-effective because the overall effectiveness of this remedy is proportional to the projected costs and provides the best balance of trade-offs among the alternatives with respect to the evaluation criteria. Of these criteria, overall protection of human health and the environment; reduction of toxicity, mobility, and volume through treatment; compliance with ARARs; implementability; and long-term effectiveness are best satisfied by the selected remedy. The local community and the State of West Virginia are in support of the selected remedy.