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June 1988

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Superfund Record of Decision:

Goodrich, B. F., KY

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	14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

The B.F. Goodrich (BFG) site is a one-acre area consisting of a landfill and waste burn pits and is located outside the zoned area of Calvert City, Marshall County, Kentucky. The site is situated on the eastern edge of a heavily industrialized area. It is bordered on the east by the Airco NPL site, on the west by the B.F. Goodrich Company, on the north by the Tennessee River and on the south by a State highway. (The BFG site and the Airco site were studied as one site for the RI/FS and their remediation will be combined since they are located adjacent to each other and share a somewhat common history of use.) The landfill is a former creek channel made suitable for landfilling by the construction of dikes on the north and west sides. The B.F. Goodrich Company used the landfill between 1965 and 1973 to dispose of approximately 54,000 tons of construction-type waste and plant trash. The company also operated the burn pit area where several pits were used to burn approximately 2.6 million gallons of liquid chlorinated organics. Additionally, 370 yd^3 of salt-brine sludge was buried in an area near the burn pits. From 1973 to 1980, excavation dirt was the only waste disposed at the site. An inspection conducted by the Kentucky Department of Natural Resources and Environmental Protection in May 1980 revealed a leaching problem along the river side of the landfill, and instructed the B. F. Goodrich Company to correct the problem. (See Attached Sheet)

17. Document Analysis a. Descriptors

Record of Decision
Goodrich, B.F., KY
First Remedial Action - Final
Contaminated Media: gw, sediments, soil
Key Contaminants: organics (PCBs), VOCs (benzene, toluene)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 64
	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

16. ABSTRACT (continued)

The Company resolved the problem in June 1980. The site was placed on the NPL in September 1983. The primary contaminants of concern affecting the soil, sediments and ground water are VOCs including benzene, toluene and 1,2-dichlorethane (EDC), and other organics including PAHs.

The selected remedial action for this site includes: excavation and consolidation of approximately 5,000 yd^3 of contaminated soil and sediments within the dikes and around the landfill from both the BFG and Airco sites, with onsite disposal in the former burn pit area followed by construction of an organic vapor recovery system and a RCRA cap over the burn pit; reconstruction of the dikes surrounding the landfill for flood prevention; upgrading of the landfill caps and installation of a leachate extraction system with onsite treatment of the leachate and offsite discharge to the local river; pump and treatment at the BFG plant site of ground water using air stripping and biological treatment or activated carbon adsorption, and discharge to the local river; possible treatment of ground water with an oil/water separator if ground water contains significant oil, and temporary onsite storage of oil with transport offsite to an oil recycling facility; access restrictions; and institutional controls to prevent residential development. The estimated capital cost for this remedial action (including all costs related to the Airco site) is $6,090,000 with present worth O&M estimated to be $3,130,000.

RECORD OF DECISION

Remedial Alternative Selection

SITE NAME AND LOCATION

B.F. Goodrich
Calvert City, Marshall County, Kentucky

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the B.F. Goodrich Site, in Calvert City, Kentucky, developed in accordance with CERCLA, as amended by SARA, and, to the extent practicable, the National Contingency Plan. The following documents form the basis for slection of the remedial action:

- Remedial Investigation Report, B.F. Goodrich Site
- Endangerment Assessment Report, B.F. Goodrich Site
- Feasibility Study Report, B.F. Goodrich Site
- Summary of Remedial Alternative Selection
- Responsiveness Summary
- Staff Recommendations and Reviews

DESCRIPTION OF THE REMEDY

This remedy is the first and final remedial action for the site. The function of this remedy is to reduce the risks associated with exposure to contaminated on-site soils, sediments, and ground water.

The major components of the selected remedy include:

Ground Water

- Extraction of contaminated ground water
- Treatment of extracted ground water
- Discharge of treated ground water through a currently permitted KPDES outfall to the Tennessee River
- Imposition of deed restrictions to prevent residential development on the B.F. Goodrich-owned property

Soil

- Excavation of contaminated surface soils around portions of the landfill
- Placement of contaminated soils in the former burn pit area
- Construction of an organic vapor recovery system and RCRA cap over the burn pit.

Landfill

- Construction of a flood protection dike around the west and north side of the landfill
- Installation of a leachate extraction system
- Upgrading of the existing landfill clay cap

DECLARATION

The selected remedy is protective of human health and the environment, attains requirements that are applicable or relevant and appropriate, and is cost effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this site. However, because treatment of the landfill was not found to be practicable, this remedy does not satisfy the statutory preference for treatment as a principal element of the remedy. Waste volume and the lack of reliable technologies for site-specific contaminants preclude a remedy in which potential landfill contaminants could effectively be excavated and treated.

Because this remedy will result in hazardous substances remaining on-site above health-based levels, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

JUN 24 1988

Date

Greer C. Tidwell
Regional Administrator

RECORD OF DECISION
REMEDIAL ALTERNATIVE SELECTION

B.F. GOODRICH SITE
CALVERT CITY, KENTUCKY

PREPARED BY:
U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION IV
ATLANTA, GEORGIA

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

B.F. GOODRICH SITE
MARSHALL COUNTY, KENTUCKY

PREPARED BY:
U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION IV
ATLANTA, GEORGIA

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1.0 INTRODUCTION

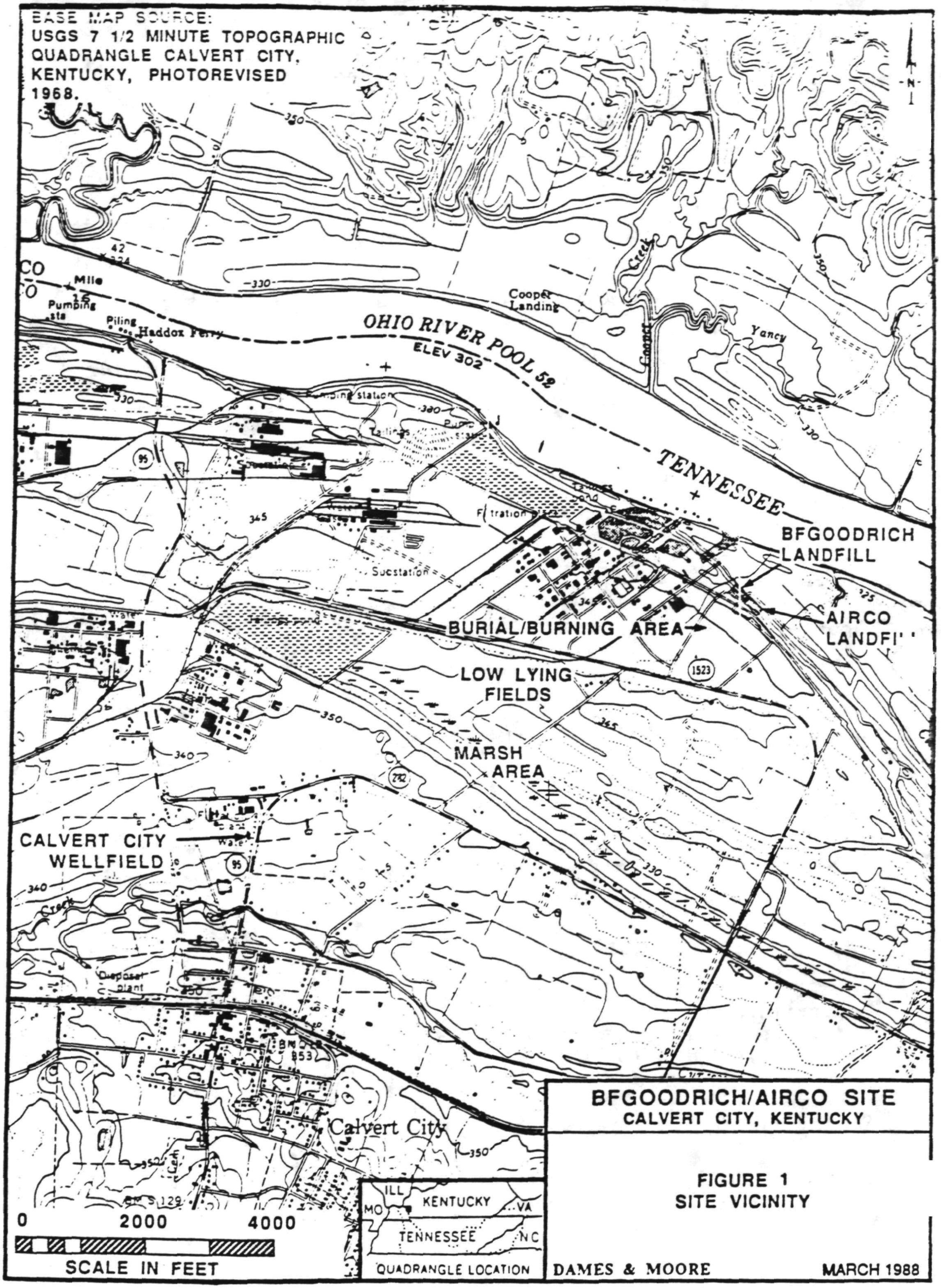
The B.F. Goodrich site was included on the National Priorities List (NPL) in September 1983, and has been the subject of a Remedial Investigation (RI) and Feasibility Study (FS) performed by the B.F. Goodrich Company and The BOC Group, Inc. (formerly Airco). The B.F. Goodrich site and the Airco NPL site were merged and studied as one for the RI/FS since they are located adjacent to each other and share a somewhat common history of use. Regulatory direction has been provided by Region IV throughout the RI/FS. The RI Report, which examines air, sediment, soil, surface water, and ground water contamination at the site, was issued March 15, 1988. The FS, which develops and examines alternatives for remediation of the site, was issued in draft form to the public on March 15, 1988.

This Record of Decision has been prepared to summarize the remedial alternative selection process and to present the recommended remedial alternative.

1.1 Site Location and Description

The B.F. Goodrich site is located in Marshall County, Kentucky, approximately two miles northeast of Calvert City, Kentucky near the southern bank of the Tennessee River, 18 river miles upstream of its confluence with the Ohio River (Figure 1). The site is situated on the eastern edge of a heavily industrialized area, including seven major industrial plants, in north Calvert City that was developed in the early 1950s. The site is bordered on the east by the Airco NPL site; on the west by the B.F. Goodrich Company; on the north by the Tennessee River; and on the south by State Route 1523. Calvert City, Kentucky is the only municipality within the area that has a zoning ordinance. The B.F. Goodrich site is located outside the zoned area of Calvert City. Figure 2 depicts land use patterns in the vicinity of the B.F. Goodrich site.

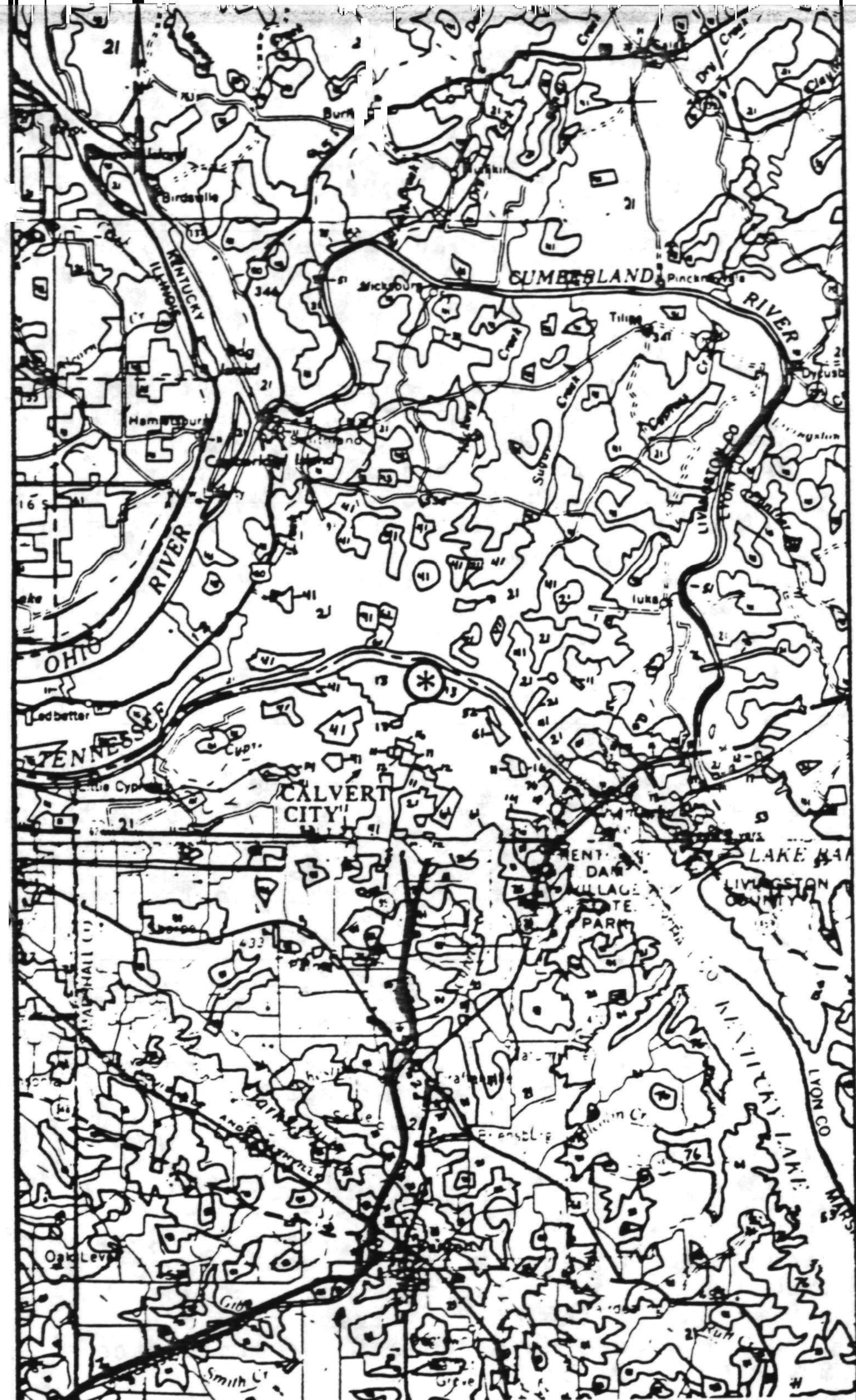
The B.F. Goodrich landfill occupies approximately one acre directly west of the Airco landfill. It is located in a former creek channel made suitable for landfilling by the construction of dikes on the north and west sides. An area south of the B.F. Goodrich landfill was used to burn chlorinated hydrocarbons in pits. Approximately 2.6 million gallons of liquid organics were burned during the years 1965 to 1968. Another area adjacent to the burn pit area was used to bury approximately 370 cubic yards of salt-brine sludge during a one-time disposal event in 1972. A portion of the land beneath the B.F. Goodrich site was conveyed to B.F. Goodrich by Airco in 1964. B.F. Goodrich began using the



BFGOODRICH/AIRCO SITE
CALVERT CITY, KENTUCKY

FIGURE 1
SITE VICINITY

DAMES & MOORE MARCH 1988



LEGEND:

URBAN OR BUILT-UP LAND

- 11 Residential
- 12 Commercial and Services
- 13 Industrial
- 14 Transportation, Communications, and Utilities
- 16 Mixed Urban or Built-up Land
- 17 Other Urban or Built-up Land

AGRICULTURAL LAND

- 21 Cropland and Pasture

FOREST LAND

- 41 Deciduous Forest Land

WATER

- 52 Lakes

WETLAND

- 61 Forrested Wetland
- 62 Nonforrested Wetland

BARREN LAND

- 76 Transitional Areas

(*) BFGOODRICH/AIRCO SITE

SCALE: 1"= 4 MILES

BASE MAP SOURCE:
USGS Land Use and Land Cover, Paducah, Kentucky; Illinois; Missouri; Indiana, 1973 and USGS Land Use and Land Cover, Dyersburg,Tennessee; Illinois; Kentucky; Missouri, 1973.

BFGOODRICH/AIRCO SITE
CALVERT CITY, KENTUCKY

FIGURE 2
LAND USE MAP

DAMES & MOORE MARCH 1988

landfill in 1965. An approximate total of 54,000 tons of construction-type waste and plant trash was reportedly disposed of until 1973. The landfill was closed in 1980 with a clay cap and vegetative cover in accordance with a State-approved closure plan.

1.2 Site History

From its start-up in 1965 until 1968, before Kentucky instituted a solid waste management program, the B.F. Goodrich disposal area was an unregulated industrial waste landfill. In August 1968, B.F. Goodrich submitted an application to the Kentucky Department for Natural Resources and Environmental Protection (KDNREP) for a Solid Waste Disposal Permit. The application identified the types of wastes that were to be disposed of in the landfill, and also described the construction of a compacted fill dike between the disposal area and the Tennessee River to prevent the flow of leachate and erosion of the fill cover.

On April 15, 1969, KDNREP approved the B.F. Goodrich permit application under the following conditions:

- A drainage ditch was to be constructed on the south side of the disposal area to divert rainfall runoff around the site;

- Disposal of refuse in the Tennessee River floodplain was to cease; and

- Putrescible wastes were no longer to be disposed of at the site.

Operation of the B.F. Goodrich landfill continued under the permit, as qualified, until 1973 when industrial waste disposal at the site was curtailed. From 1973 to 1980, the B.F. Goodrich site was used solely for the dumping of excavation dirt.

In 1978, the B.F. Goodrich site was included on the Eckhardt List of potential hazardous waste sites in the United States. KDNREP and Region IV EPA personnel inspected the site several times in 1980. In a May 30, 1980 inspection, state personnel noted an apparent "leaching problem" along the north (river) side of the landfill, and instructed B.F. Goodrich personnel to correct the problem. In June 1980, B.F. Goodrich used clay to seal the north face and to cap the disposal area, and graded the site to promote rainfall runoff drainage to the west and away from the Airco property. In September 1980, the site was revegetated to control erosion.

An area south of the B.F. Goodrich landfill (Figure 1) was used for the burning and burial of wastes. Approximately 2.6 million gallons of liquid chlorinated organics were burned in pits between 1965 and 1968. Another area adjacent to the burn pit area was used to bury approximately 370 cubic yards of salt-brine sludge during a one time disposal event in 1972. From 1970 to 1983, scrap lumber and fuel oil were burned in this area two to three times per year for fire-training.

In 1984, the EPA's nationwide program to rank abandoned or uncontrolled hazardous waste sites under mandate of CERCLA initially ranked the site. As a result of that ranking, a RI/FS was initiated to ascertain the potential threat to human health and the environment posed by the B.F. Goodrich site.

In June 1986, B.F. Goodrich and The BOC Group, Inc. initiated RI field activities. Additional field work, as part of Phase IIb of the RI, commenced in July 1987; completion of this phase coincided with submittal of the draft RI report in January 1988. The draft FS, final RI, and Endangerment Assessment reports were submitted in March 1988. EPA, with the assistance of the Field Investigation Team (FIT), the NUS Corporation, provided oversight for all RI/FS tasks.

2.0 Enforcement Analysis

The B.F. Goodrich and Airco sites were included on the National Priorities List (NPL) in September 1983 and September 1984, respectively. EPA assumed lead responsibility for the sites at those times.

EPA has determined that three potentially responsible parties used the B.F. Goodrich/Airco site areas for waste disposal: the B.F. Goodrich Company (B.F. Goodrich), Air Products and Chemicals, Inc. (Air Products), and Airco Chemicals and Plastics Division (Airco).

Airco (now known as The BOC Group, Inc. [BOC]) and B.F. Goodrich elected to conduct and finance the RI/FS, but Air Products declined to participate. An Administrative Order on Consent was entered into between B.F. Goodrich and BOC and EPA on November 27, 1985 to conduct the RI/FS. The B.F. Goodrich and Airco sites were merged and studied as one site for the RI/FS since they are located adjacent to each other and share a somewhat common history of use. Further, EPA has determined that a single RI/FS would be more technically and scientifically sound as well as cost-efficient.

Currently, EPA and BOC and B.F. Goodrich are in the final stage of settlement negotiations on a Consent Decree for a Remedial Design/Remedial Action (RD/RA) at the site. If agreement can be reached, the Consent Decree will be signed by the parties shortly after approval of this Record of Decision and will be submitted to the appropriate federal district court for entry. Air Products has declined to participate in the RD/RA.

From 1971 to 1980, Air Products used the landfill to dispose of approximately 14,000 tons (dry basis) of ashes from coal operated boilers, off-grade or non-processible polyvinyl chloride solids, ferric hydroxide sludges from a wastewater treatment plant, and a small amount of non-combustible construction wastes. Air Product's waste contained low levels of arsenic, lead, zinc, silver, nickel, copper, chromium, and cadmium which are hazardous substances under CERCLA. Thus far, Air Products contends that the low levels of inorganic compounds in the waste they disposed of do not constitute CERCLA hazardous substances; for this reason, Air Products contends, they should not be considered a potentially responsible party. The RI detected inorganic compounds in ground water downgradient of the B.F. Goodrich/Airco landfills that were identical to those reported in Air Products' waste streams. Two compounds exceeded the primary drinking water standards.

EPA has concluded that Air Products' waste contained CERCLA hazardous substances. EPA may issue an Administrative Order to Air Products under Section 106 of CERCLA.

3.0 Current Site Status

3.1 Hydrogeologic Setting

The site is within the Jackson Purchase area of Kentucky, as defined by the boundaries of the Ohio, Tennessee, and Mississippi Rivers. The Purchase area forms a distinct physiographic province characterized by gently rolling uplands and wide shallow valleys of low relief.

The B.F. Goodrich/Airco site is located near the northern edge of the Mississippi Embayment, a southerly trending syncline filled with Cretaceous to Holocene-aged unconsolidated to partially consolidated sediments. These sediments are underlain unconformably by Paleozoic limestones, dolomites, cherts, and shales which dip gently northeastward, towards the Illinois Basin. In the site vicinity, Cretaceous through Tertiary-aged sediments have been partially or totally removed from the underlying Palezoic rocks due, in part, to erosion by the Tennessee River. Previous tectonic uplifting of the area has also allowed partial removal of these sediments by continental-type erosion. These combined erosive forces have produced a bedrock surface which can be characterized as very irregular on a local scale.

The area has a history of seismic activity. The New Madrid earthquake of 1811-1812 was centered 80 miles southwest of Calvert City. Since 1812, many minor earthquakes have been felt in this region. These minor earthquakes are caused by movement associated with faults in the bedrock, which are common in this region. However, the New Madrid earthquake has not been related to faulting in the Calvert City area.

Vertical and horizontal cavities within the upper zones of the bedrock (Warsaw Formation) have been noted to occur in the Tennessee River valley region. A possible cavity was encountered northeast of the B.F. Goodrich/Airco landfill on the floodplain. This cavity, should it exist, is not in the path of contaminant plume migration and, therefore, should not serve as a conduit for contaminant migration. The majority of bedrock, however, found at the site is massive and unfractured.

The unconsolidated sediments found at the B.F. Goodrich/Airco site consist of layers of sand, silt, clay, and gravel deposited by the Tennessee River as it meandered over its floodplain. In particular, the site rests upon a massive sequence of point bar deposits, commonly found on the inside bank of meandering river systems. The layers are laterally discontinuous across most of the site except in the southern and northern-most areas. At the site, these deposits are characterized in general as (from uppermost to lowermost): Unit 1 - sandy and silty clays (ranging from 5-20 feet thick); Unit 2 - interbedded clays, silts, and sand (averaging 15 feet thick); Unit 3 - silty sand and fine sand (averaging 40 feet thick); Unit 4 - sand and gravel (averaging 35 feet thick); and Unit 5 - a sandy or gravelly clay (averaging 10 feet thick) immediately overlying the bedrock.

The uppermost bedrock units beneath the site are the Warsaw Formation and the Fort Payne Formation, both Mississippian-age limestones. Numerous northeast-southwest trending normal faults are noted to cross-cut these units in the region, although the Warsaw and Fort Payne Formations appear to be structurally undisturbed beneath the site.

The middle sand and basal sand and gravel units comprise the uppermost aquifer at the site. In the terrace area, the aquifer thickness ranges from approximately 80 feet near well GA-6 (Figure 3) to approximately 50 feet beneath the landfills. On the floodplain, the aquifer thickness decreases due to the absence of the upper sand unit and an increase in bedrock surface elevation. The upper sandy clay and interbedded sand, silt, and clay units confine the groundwater, creating slightly artesian conditions in most parts of the aquifer.

Estimates of hydraulic conductivity were made from data generated during slug tests conducted in select wells. Based on the tests that were conducted at the site, the mean horizontal hydraulic conductivity of the alluvial aquifer is 1.5×10^{-3} cm/sec. The primary direction of groundwater flow within B.F. Goodrich/Airco property is north towards the Tennessee River. During flood stage conditions, the aquifer beneath the site is recharged by the river through bank storage.

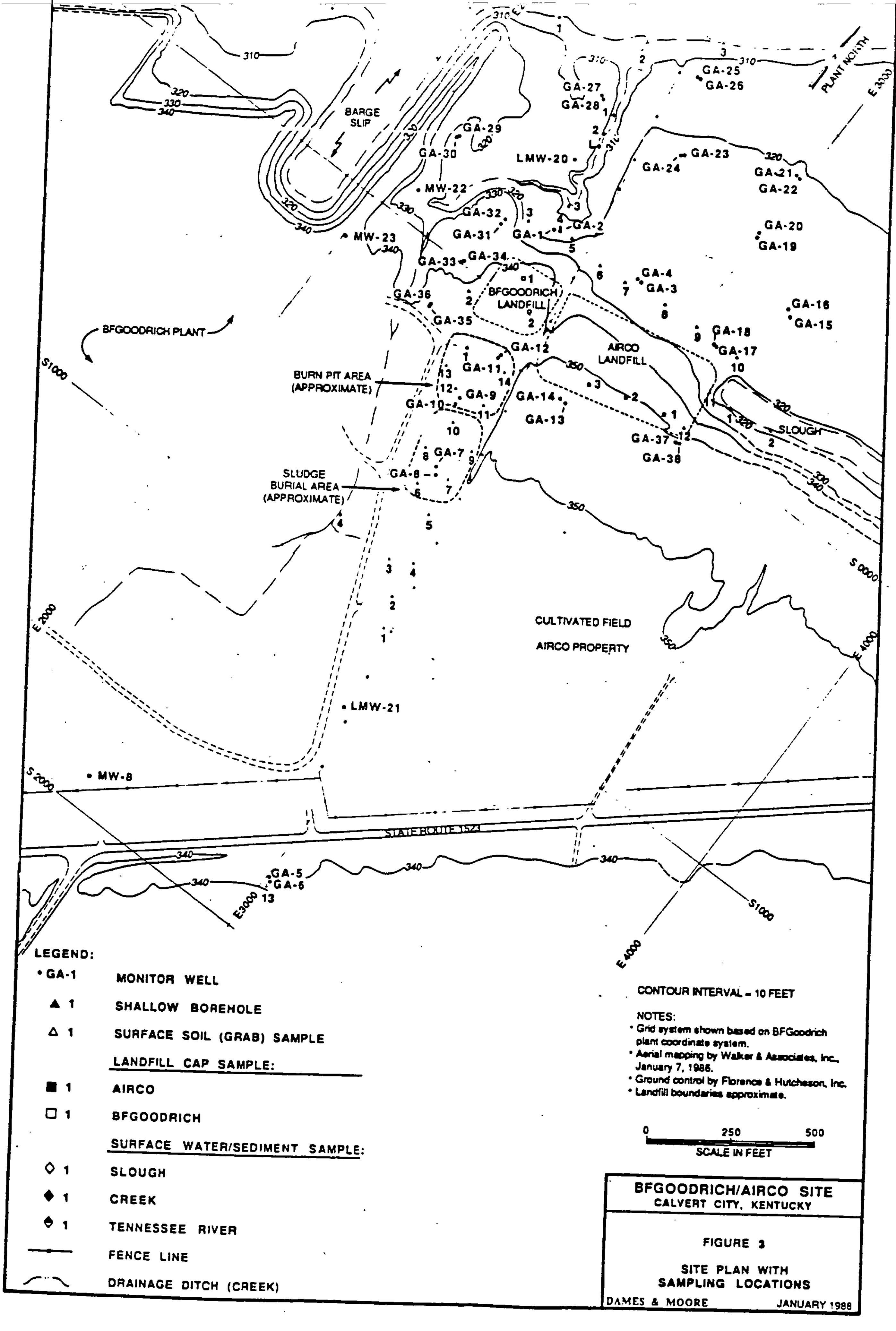


FIGURE 3
SITE PLAN WITH SAMPLING LOCATIONS

An abundant source of ground water for municipal and industrial purposes is available from the sand and gravel alluvial aquifer in the Tennessee River valley. Reported yields for large-diameter wells are 500 gallons per minute (gpm) and 200 gpm for small-diameter wells. Ground water quality in the aquifer is generally hard (121-180 mg/L carbonate) with high concentrations of iron (as much as 36.0 mg/L).

The alluvial aquifer of the general area is recharged by flow from adjacent aquifers in the highlands and infiltration and provides water for municipal, industrial, and commercial uses in the upgradient Calvert City area.

3.2 Ground Water Contamination

Numerous monitor well clusters were installed at the site to sample ground water in the shallow and deep zones of the alluvial aquifer and to define the vertical extent of the contaminant plume (Figure 3).

Ground water monitoring wells were sampled on four different occasions at the site during two different river stage conditions - low stage and high stage. These sampling events revealed the presence of contaminants in both the shallow and deep zones of the aquifer.

Samples from the upgradient wells at the site and the Calvert City wells were not found to be contaminated during any sampling. Approximately two - thirds of the downgradient wells indicate contamination by total VOCs ranging from 0.0012 mg/L to 4,017 mg/L; semi-volatile compounds ranging from 0.002 mg/L to 7.8 mg/L; and low levels of inorganics. The types of contaminants detected in the ground water include aliphatic compounds (alkanes and alkenes), aromatics, and PAHs. The detected compounds are generally similar in all affected wells, although the concentrations vary considerably. Table 1 summarizes those organic compounds detected in the ground water along with minimum, maximum, and mean concentrations. Of the aliphatics, 1,2-Dichloroethane (EDC) is the most commonly detected constituent and present at the highest concentrations. Of the PAHs, naphthalene is the most commonly detected constituent and present at the highest concentrations.

Of the inorganics detected in downgradient wells, two compounds, cadmium and selenium, exceeded the primary drinking water standard of 10 mg/L with concentrations of 11 ug/L and 14 mg/L respectively.

In order to relate the nature of contaminants to potential source areas at the site, a review of background information regarding historical waste practices was conducted in light of the findings of the RI. This review indicated that approximately 124,000 lbs. of EDC are present at the site.

TABLE 1

B.F. GOODRICH/AIRCO SITE
GROUND WATER ORGANICS STATISTICS

Organic Compound	Number of Detections	Mean Concentration (ug/L)	Maximum Concentration (ug/L)	Minimum Concentration (ug/L)
1,2-Dichloroethane (EDC)	23	310,551	3,600,000	ND
1,1-Dichloroethane	20	15,356	120,000	ND
Chloroform	16	12,224	130,000	ND
1,1,2-Trichloroethane	13	7,953	55,000	ND
Benzene	21	6,695	47,000	ND
Chlorobenzene	20	3,752	34,000	ND
Vinyl chloride	15	2,765	30,000	ND
trans-1,2-Dichloroethene	17	2,548	23,000	ND
Carbon tetrachloride	6	1,669	16,000	ND
Chloroethane	14	1,304	15,000	ND
Napthalene	14	866	4,100	ND
Trichloroethene	14	536	4,600	ND
Tetrachloroethene	9	495	3,700	ND
1,1,2,2-Tetrachloroethane	4	337	5,200	ND
1,2-Dichloroebenzene	12	284	1,900	ND
1,1-Dichloroethylene	10	242	3,300	ND
Toluene	14	144	1,700	ND
bis(2-Chloroethyl) ether	10	142	940	ND
2-Methylnaphthalene	11	85	710	ND
Acenaphthylene	7	55	540	ND
Phenanthrene	5	41	380	ND
Fluorene	8	40	280	ND
1,4-Dichlorobenzene	10	20	71	ND
Acenaphthene	6	19	180	ND
1,3-Dichlorobenzene	10	16	53	ND
2-Chloronaphthalene	6	13	83	ND
Styrene	4	13	170	ND
Anthracene	4	12	150	ND
bis(2-ethylhexyl) phthalate	2	11	150	ND
Pyrene	4	11	120	ND
Ethyl benzene	8	10	77	ND
Fluoranthene	4	7	80	ND
Total xylenes	2	5	97	ND
Carbon disulfide	1	3	73	ND
Benzo(a)anthracene	4	2	30	ND
Chrysene	3	2	27	ND
Benzo(k)fluoranthene	2	1	16	ND
Benzo(b)fluoranthene	2	1	16	ND
cis-1,3-Dichloropropene	1	1	30	ND
Benzo(a)pyrene	2	1	14	ND
Isophorone	1	0.65	11	ND
1,2,4-Trichlorobenzene	2	0.53	7	ND
Benzoic acid	1	0.25	4.2	ND
Nitrobenzene	1	0.21	3.6	ND
1,1,1-Trichloroethane	1	0.21	5	ND
Pentachlorophenol	1	0.20	3.4	ND
Di-n-butylphthalate	1	0.18	3	ND
Indeno(1,2,3-cd)pyrene	1	0.12	2	ND

ND - Below standard instrument detection limits

Isoconcentration maps of the organics found in ground water samples at the site all show the highest concentrations in shallow wells north and northwest of the burn pit.

There are two plausible scenarios for the source of contamination. The source could theoretically be the landfills, with the contaminants (which have a density greater than water) sinking downward and spreading out radially. The separation of the deeper plume around a bedrock high supports this scenario, as does the radially symmetric shape of the shallow plume.

Alternatively, and more likely in light of the waste disposal history, the burn pit could have been the source of contaminants. The "slug" of contaminants thus introduced into the ground water would be moving toward the river with the natural ground water flow. The radial appearance of the plume could be due to the effects of mechanical dispersion, geologic heterogeneities, and bank storage from the river during high water conditions.

The phenomenon of bank storage was studied with several years of available ground water level data, and it was determined that the contaminant plume movement is not affected except on a very localized level; therefore, on-site contaminants should not create a threat to the Calvert City wellfield.

It is considered unlikely that migration of the plume across the river is occurring because the river serves as an hydraulic "sink" which is fed by groundwater flowing towards it from both the north and south.

3.3. Surface Water and Sediment Contamination

Three surface water features were investigated for releases related to the site: the slough east of the Airco landfill, the drainage ditch on B.F. Goodrich property, and a portion of the Tennessee River adjacent to the site (Figure 3).

No organic contamination was found in any of the slough water or sediment samples. A few inorganics were detected in the slough at concentrations above background, but do not appear to be associated with the site.

Drainage ditch water and sediments reflect some organic and inorganic contamination. VOCs were detected in ditch sediment samples at levels up to 28 mg/kg. A PAH compound was detected in one ditch sediment sample at Ø.682 mg/kg. The sample location is far enough away from the site that it is unlikely that the PAH presence is related to the landfills or former burning area. Ditch sediment samples contained PCB compounds at estimated concentrations of 4.520 and 0.186 mg/kg. The source of the PCB compound is unknown. Elevated levels of metals (arsenic, chromium, iron, mercury, and vanadium) were detected in one ditch sediment sample. Cyanide was detected in low levels in all ditch sediment samples. The presence of contaminants is most likely related to the permitted storm water discharged from the B.F. Goodrich plant.

Traces of a few organic compounds were detected in the Tennessee River sediment samples (Figure 3). Low levels of VOCs were detected in an upriver location and therefore do not appear to be associated with releases from the site. Semi-volatiles were detected in the sample where the ditch enters the river but were not detected in any of the ditch samples. Therefore, organic contaminants found in the river sediment samples do not appear to be associated with the site.

Inorganics detected in the river samples are comparable to background or reflect the influence of discharges from the drainage ditch.

3.4 Soil Contamination

Airco landfill cap samples were described as orange-brown silty clay to sandy silt. An average coefficient of permeability of 4.4 x 10^{-8} cm/sec was reported for the cap samples.

B.F. Goodrich landfill cap samples were described as brown clayey to silty sand. An average coefficient of permeability of 8.6 x 10^{-8} cm/sec was reported.

Contamination of the surface soil around the landfills was found at the western and northern boundaries of the B.F. Goodrich landfills, and the northwestern edge and southeastern corner of the Airco landfill (Figure 3). Table 2 summarizes statistics on the surface soil contaminants.

All of the detected VOCs are alkanes and alkenes except for toluene and chlorobenzene, which are aromatic hydrocarbons. All of the semi-volatiles are aromatic or poly-aromatic hydrocarbons (PAHs). EDC was the most prevalent organic compound and was also detected at the highest concentration. Its presence can be associated with the burn pit wastes. It is possible that some of the soils surrounding the landfills became contaminated during the closure activities in the early 1980s. Based on knowledge of the waste types handled at the site and the types of contaminants found in site media, the presence of a PCB compound in a single sample does not appear to be associated with site activities. The source of the PCB is unknown.

TABLE 2

B.F. GOODRICH/AIRCO SITE
SURFACE SOIL ORGANIC STATISTICS

Organic Compound	Number of Detections	Maximum Concentration (ug/kg)
1,2-Dichloroethane (EDC)	5	360,000
Acenaphthene	2	329,000
Naphthalene	1	262,000
1,1,2-Trichloroethane	1	250,000
Phenanthrene	4	159,000
2-Methylnaphthalene	2	121,000
Fluorene	2	65,800
1,1,2,2-Tetrachloroethane	1	57,000
Chlorobenzene	1	54,000
Pyrene	4	28,800
Fluoranthene	3	23,800
Tetrachloroethene	1	23,000
Chloroform	1	22,000
2-Chloronaphthalene	1	18,500
Benzoic acid	1	16,800
1,2-Dichlorobenzene	1	16,000
Acenaphthylene	1	12,500
Hexachlorobenzene	1	10,130
Carbon tetrachloride	1	9,800
Toluene	1	7,000
1,4-Dichlorobenzene	1	3,770
1,3-Dichlorobenzene	1	3,280
Anthracene	3	2,220
bis(2-ethylhexyl) phthalate	1	1,220
Benzo(a)anthracene	2	1,120
Chrysene	2	1,022
Di-n-butylphthalate	3	256
Butyl benzyl phthalate	2	160

The presence of elevated zinc concentrations in surface soil samples north of the Airco landfill may be related to the operation of the landfill. Zinc does not appear to be a problem in other site media.

The following four areas were investigated for shallow subsurface soil contamination:

- Salt-brine sludge burial area
- Liquid organics burn pit area
- Area north of the B.F. Goodrich landfill
- Area north of the Airco landfill

No evidence of the salt-brine sludge disposal area was found. Mercury concentrations were comparable to background levels for the area.

Evidence of the liquid chlorinated organics that were burned in pits, the oily sludge disposal, and the fuel oil used for fire-training activities, was found in numerous samples. The heaviest contamination was encountered in the burn pit area borings.

The organics that were detected were very similar to those detected in one of the surface soil samples: alkenes were found in higher concentrations relative to the aromatics and PAHs.

A perched water table in the vicinity of well GA 9/10 (Figure 3), at approximate depths of 12 to 20 feet below the ground surface, appears to be where most of the contamination is concentrated.

3.5 Receptors

Exposure pathways for potential receptors were evaluated for two land use scenarios - current use and future use.

Because the landfills are closed and most of the site is fenced, access by the public is unlikely. However, unauthorized access is possible, and therefore, potentially complete exposure pathways under the current use scenario were defined as dermal and incidental ingestion by exposures to the surface soils and sediments at the site. Although also unlikely, a potential future use scenario for the site was defined as possible residential development in the area south of the landfills.

The Remedial Investigation identified 110 chemicals at the site. Due to the large number of chemicals, indicator chemicals, those that pose the greatest potential risk, were selected. Selection of indicator chemicals was based on measured concentrations, toxicity, mobility, and persistence. Table 3 presents the indicator chemicals selected for the site.

TABLE 3

B.F. GOODRICH/AIRCO SITE

INDICATOR CHEMICALS
1,2-Dichloroethane (EDC)
Carbon tetrachloride
Chloroform
1,1,2-Trichloroethane
Benzene
Polynuclear aromatic hydrocarbons (PAHS)
Tetrachloroethene
1,1,2,2-Tetrachloroethane
Trichloroethene
Chlorobenzene
1,1-Dichloroethane
bis(2-chloroethyl) ether
polychlorinated biphenyls (PCBs)

Potential human health risks associated with current exposure by ingestion of surface soil and ditch sediment contaminants at the site are outside the target risk range (10^{-4} to 10^{-7}) in absence of remediation. The worst case current-use scenario total risk is estimated to be 2.3 x 10^{-3}. The primary contributors to the worst case risk are PAHs. The incidence of exposure to contaminated surface soil and ditch sediments would increase if the Airco-owned property immediately south of the Airco landfill were used for residential development.

Although unlikely in light of Kentucky statutes that preclude residential land use on floodplains, it was assumed that residential development of a 40-acre area of Airco - owned property south of the landfills could potentially occur. In this scenario, exposure would be from domestic use of ground water for drinking, bathing, and cooking should private ground water wells be installed on the Airco - owned property. Potential human health risks associated with future exposure to ground water by ingestion at the site are outside the target risk range.

The only private domestic wells in the area are likely to predate the present municipal supply system and are likely no longer in use. However, if any of the wells are still in use, they are located upgradient or lateral to the B.F. Goodrich/Airco site. There are no known permitted users of ground water for commercial food preparation or agricultural irrigation in the immediate area.

Table 4 summarizes the findings and conclusions of the Endangerment Assessment, providing total carcinoginic risk and the hazard index for various site media under the worst and most probable case.

4.0 CLEANUP CRITERIA

The extent of contamination was defined in Section 3.0, CURRENT SITE STATUS. This section examines the relevance and appropriateness of water quality criteria under the circumstances of potential release of contaminants at this site. Based upon criteria found to be relevant and appropriate, the minimum goals of remedial action at this site have been developed.

4.1 Ground Water Cleanup Criteria

Section 121(d) of the Superfund Amendments and Reauthorization Act of 1986 (SARA) requires that the selected remedial action establish a level or standard of control which complies with all "applicable or relevant and appropriate requirements" (ARARs).

At the B.F. Goodrich/Airco site, ground water discharges into the Tennessee River and therefore beyond the boundaries of the site. Applicable statutory language concerning clean-up standards under

TABLE 4

ENDANGERMENT ASSESSMENT SUMMARY
B.F. GOODRICH/AIRCO SITE

EXPOSURE MEDIUM	TOTAL CARCINOGENIC RISK		HAZARD INDEX		CONCLUSION
Current Use:	Most Probable	Worst Case	Most Probable	Worst Case	
Drainage ditch-surface water	2.40E-07	2.20E-05	0	0	Within target risk range; no action required
sediment	2.00E-09	1.80E-06	0	0	Within target risk range; no action required; however remediation of PCB-contaminated sediments will be performed
Slough-surface water	0	0	0	0	No indicator chemicals detected; no action required
sediment	0	0	0	0	No indicator chemicals detected; no action required
Tennessee River-surface water	0	0	0	0	No indicator chemicals detected; no action required
sediment	1.06E-08	6.40E-06	0	0	Within target risk range; no action required
Surface soil	9.90E-07	2.20E-03	5.50E-07	6.30E-04	Worst case exceeds target target risk range; remediation required
Subsurface soil	0	0	0	0	No human exposure to subsurfacesoils.
Future Use:					
Groundwater	0.8	1	3.2	5.8	Both cases exceed target risk range; remediation required

CERCLA is found in Section 121 (d)(2)(B)(ii) of SARA. The point of human exposure may not be assumed to be beyond the boundaries of the site unless:

- There are known and projected points of entry of contaminated ground water into surface water;
- There will be no measured or projected increase of contaminants from the ground water in the surface water at the point of entry, and;
- There are institutional controls that preclude human exposure to the ground water

Section 121 of SARA does not allow any increase in contaminants in off-site surface water. Since clean-up goals must be based on some finite number, the reduction calculation that reflects the large dilution factor in the Tennessee River is based on two criteria. These are the water and fish ingestion Ambient Water Quality Criteria (AWQC) and Maximum Concentration Limits (MCLs).

Development of ground water cleanup criteria involves identification of specific contaminants of concern. Of the 110 chemicals detected on-site, the potential number of contaminants for which specific cleanup levels are needed ranges from one to the total number present, depending on factors such as contaminant concentration, distribution, and allowable levels for various receptor scenarios.

The approach utilized involves an evaluation of contaminant concentrations relative to available health-based standards. MCLs and Ambient Water Quality Criteria for indicator chemicals are presented in Table 5.

To relate health-based standards for contaminant concentrations to potential receptors, a current-use scenario was employed. Under an evaluation of the current-use scenario, there are no direct receptors of ground water downgradient of the site. Rather, the closest potential receptors are associated with surface water use at a location where affected ground water discharges to the Tennessee River.

To calculate probable Alternate Concentration Limits (ACLs) for the various contaminants in the ground water system, a relatively straightforward mass-balance approach was used. The analysis involves an initial assumption that observed levels of contaminants will remain constant as ground water flows from the source area to a discharge zone at the Tennessee River. This assumption is considered conservative, in that dispersion, dilution, retardation, adsorption, or other physical/chemical processes are not taken into consideration. Such processes would generally act to decrease

TABLE 5

B.F. GOODRICH/AIRCO SITE
MCLs AND AWQC FOR INDICATOR CHEMICALS

Chemical	Criterion or Standard	Value of Criterion or Standard (mg/L)
1,2-Dichloroethane (EDC)	MCL	0.005
	AWQC	*
Carbon tetrachloride	MCL	0.005
	AWQC	0.00042
Chloroform**	MCL**	0.1
	AWQC	0.00019
1,1,2-Trichloroethene	MCL	*
	AWQC	0.0006
Benezene	MCL	0.005
	AWQC	0.00067
Polynuclear aromatic hydrocarbons (PAHs)	MCL	*
	AWQC	0.000031
etrachloroethene	MCL	*
	AWQC	0.00088
1,1,2,2-Tetrachloroethane	MCL	*
	AWQC	0.00017
Trichloroethene	MCL	0.005
	AWQC	0.0028
Chlorobenzene	MCL	*
	MCLG	0.060
1,1-Dichloroethane	MCL	*
	AIC	0.0042
bis(2-Chloroethyl)ether	MCL	*
	AWQC	0.00003

* None available
** Total Trihalomethanes

contaminant concentrations along ground water flow paths.

A second assumption is that contaminated groundwater enters the surface water regime in the Tennessee River and undergoes a process of dilution in a mixing zone. Mixing of the two sources of water is assumed to occur instantaneously throughout the entire volume of the mixing zone, resulting in an output flow and concentration that can be calculated based on a continuity, or mass balance approach.

The average annual discharge in the Tennessee River is reported to be on the order of 65,000 cubic feet per second (cfs), with an average annual low flow of approximately 19,000 cfs. For this conservative analysis, which considers the potential for long-term exposure, it is assumed that the mixing zone is represented by one-third of the total discharge in the Tennessee River under low flow conditions. Thus, the volumetric flow rate of water entering the mixing zone is estimated to be 6,333 cfs. It should be noted here that the Tennessee Valley Authority (TVA) has no written committment to maintain any given level of discharge if there is a need to conserve water upstream and if navigable elevations in the tailwater are being maintained by operation of Ohio River Lock and Dam 52 downstream. The use of an average low flow of 19,000 cfs in the dilution/ mixing zone calculations does take into consideration the three percent of the time for the period 1958 to 1986 where discharge rates fell below 19,000 cfs and seven 2-day periods or longer of zero discharge from Kentucky Dam. Therefore, use of a 19,000 cfs. discharge rate is appropriate.

Based on ground water analytical data obtained at the site during the RI, it is apparent that the primary contaminants of concern in the ground water are volatile organic compounds (VOCs). In particular, EDC is present at the greatest concentrations and occurs most extensively.

As an example of the detailed ACL calculations performed on each contaminant of concern, the following analysis utilizes concentration, distribution, and health-based standards associated with EDC as a basis for developing probable ground water cleanup strategies. Using this approach, the calculated ACL for EDC would be:

$$ACL_{EDC} = (1.7 \times 10^5)\ MCL_{EDC}$$

$$= (1.7 \times 10^5)(0.005 \text{ mg/L})$$

$$= 850 \text{ mg/L}$$

The value utilized here is the MCL for EDC, as defined by the NPDWR. The 1.7×10^5 multiplier contained in the above mass balance equation was derived by dividing the total mixing zone volume (the sum of river mixing zone and ground water input to the mixing zone volumes) by the ground water input to the mixing zone.

A one-hundredfold safety factor is then applied to the ACL for each indicator chemical to include an allowance for other contaminants (i.e., VOCs, semivolatile organics), produce an additional factor of safety in the analysis (aside from conservative assumptions previously discussed), and to take into consideration the uncertainties inherent in ground water velocity equations. Thus, the ACL for EDC becomes 8.5 mg/L. ACLs for all indicator chemicals are listed in Table 6.

4.2 Surface Soil/Sediment Cleanup Criteria

Contamination of the surficial soils surrounding the landfills was found at the western and northern boundaries of the B.F. Goodrich landfill, and the northwestern edge and southeastern corner of the Airco landfill. Low levels of PCBs were detected in ditch sediment samples north of the landfills.

Since limited access is possible to the site, use of the field and ditch area by trespassers may result in potential exposure. These activities could result in exposure to ditch sediment and surface soil contaminants.

Under the worst case evaluation, the risk level from this potential exposure is 2.3 x 10^{-3} - outside the target risk range of 10^{-4} to 10^{-7}.

Remediation of the drainage ditch north of the B.F. Goodrich/Airco landfills will be removal of the contaminated sediments.

4.3 Subsurface Soil Cleanup Criteria

Remediation of subsurface soils of the burn pit area will be accomplished by the stripping action of soil water with subsequent collection and treatment of contaminated soil water. Therefore, excavation of the subsurface soils of the burn pit area is not necessary. The time required for this method of remediation was taken into consideration in calculating the duration of the ground water/leachate extraction and treatment system as outlined in Section 6.0, Recommended Alternative.

Soil remediation strategies have been developed consistent with ground water cleanup goals. The strategy for subsurface soil remediation involved the use of an allowable EDC ground water concentration of 850 mg/L. The allowable soil concentration was calculated to be 139 mg/Kg.

TABLE 6

GROUND WATER CLEANUP GOALS FOR INDICATOR CHEMICALS
ALTERNATE CONCENTRATION LIMITS
B.F. GOODRICH/AIRCO SITE

Indicator Chemical	ACL (mg/L)	Standard (mg/L)	Source	Maximum Detected In Groundwater at site (mg/L)
1,2-Dichloroethane	8.5	0.005	MCL	3600
Carbon tetrachloride	8.5	0.005	MCL	16
Chloroform	0.32	0.00019	AWQC	130
1,1,2-Trichloroethane	1.0	0.0006	AWQC	55
Benezene	8.5	0.005	MCL	47
PAHs				
Fluoranthene	8.5	0.042	AWQC	0.08
Acenapthene	8.5	0.020	AWQC	0.18
Tetrachloroethene	1.5	0.00088	AWQC	3.7
1,1,2,2-Tetrachloroethane	0.29	0.00017	AWQC	5.2
Trichloroethene	8.5	0.005	MCL	4.6
Chlorobenzene	8.5	0.060	MCLG	34
1,1-Dichloroethane	8.5	4.2	AIC	120
bis(2-Chloroethyl)ether	0.051	3.0E-05	AWQC	0.9

MCL = Maximum Concentration Limit
MCLG = Maximum Concentration Limit Goal
AWQC = Ambient Water Quality Criterion for human health.
AIC = Acceptable Intake Chronic value

Note: AWQCs for carcinogens based on 10^{-6} Excess Cancer Risk (ECR)

5.0 Alternatives Evaluation

The purpose of remedial action at the B.F. Goodrich/Airco site is to mitigate and minimize potential risks to public health, welfare, and the environment posed by site soils, sediments, and ground water contamination. The following cleanup objectives were determined based on regulatory requirements and levels of contamination found at the site:

- Contain the on-site contaminated ground water plume by extraction and treatment;
- Eliminate leachate production in the burn pit area;
- Bring the landfills into compliance with Kentucky statutes regarding structures on a 100-year floodplain;
- Protect the public health and environment from exposure to on-site contaminated soils and sediments.

An initial screening of applicable technologies was performed to identify those which best meet the criteria of Section 300.68 of the National Contingency Plan (NCP). Following the initial screening of technologies, potential remedial action alternatives were identified and analyzed.

Table 7 summarizes the technology screening process. Each of the remaining alternatives for site remediation was evaluated based upon cost, technical feasibility, implementability and reliability, attainment of institutional requirements, and degree of protection of public health, welfare, and the environment.

The following nine remedial action alternatives were considered:

<u>Alternative 1:</u> No Action
Ground water monitoring

<u>Alternative 2:</u> Ground water monitoring
Impose deed restrictions preventing residential development and ground water use
Pump contaminated ground water plume and treat by biological processing or air stripping
Place a clay cap over burn pit
Secure entire site

<u>Alternative 3:</u> Ground water monitoring
Impose deed restrictions preventing residential development and ground water use
Construct a flood protection dike around landfills
Upgrade landfill clay caps

TECHNOLOGY SCREENING
B.F. GOODRICH/AIRCO SITE

Technology	Landfills	Surface Soil	Subsurface Soil	Ground Water	Comments
A. No Action	1	1	1	1	Must be fully evaluated per 40 CFR 300.68
B. Land Use Restrictions					
*Restrict site access	NA	1	NA	NA	Unauthorized site access can be prevented only for surface soil
*Deed restriction	NA	1	NA	NA	Control of future land use to provide long-term integrity to remedial action. Applicable only to surface soil
*Land use restrictions	No	No	No	No	No zoning at site
C. Land Disposal/Storage					
*off-site disposal	No	1	1	No	Limited acceptability. Surface and subsurface disposal of soils may be applicable to small volumes
*On-site landfill	No	1	1	No	Engineered containment can be designed for soils
*Land application	No	No	No	No	Unacceptable for disposal; may be viable as a treatment alternative (see biological treatment)
*Deep well injection	No	No	No	No	On-site geology not suitable for injection
D. Leachate Controls					
*Capping	1	1	1	NA	Minimize rainwater infiltration. Requires evaluation of capping material/system
*Containment barriers	2	No	No	NA	May be applicable for landfill depending on depth to bedrock
*Subsurface collection	1	NA	1	No	Viable in floodplain where water table is shallow. Not as effective as extraction wells for ground water control
E. Air Pollution Controls					
*Dust control measures	1	1	NA	NA	Interim measure only during site remediation
*Capping	NA	NA	NA	NA	
*VOC emission control	NA	1	NA	1	May be required depending on treatment units used
F. Surface Water Controls					May be required to minimize the potential for off-site transport of contaminants during construction and to provide long-term erosion protection
*Capping	NA	1	NA	NA	Proven and effective technology
*Regrading	NA	1	NA	NA	Proven and effective technology to manage water flows and control erosion
*Revegetation	NA	1	NA	NA	Used to stabilize cover surface at site. Proven and effective technology
*Channels and waterways	1	1	NA	NA	Controls surface water flow to assist other remedial technologies
*Flood protection	1	1	NA	NA	May be applicable on floodplain

Technology	Landfills	Surface Soil	Subsurface Soil	Ground Water	Comments
G. Gas Migration Controls					
*Organic vapor recovery	NA	NA	1	NA	Applicable treatment to burn pit area when combined with capping
H. Groundwater Controls					Generally used in conjunction with capping and treatment
*Extraction	NA	NA	NA	1	Effective for flow modification
*Containment barriers	No	No	No	NA	Bedrock depth is highly variable; thus depth of bedrock key cannot be confirmed
I. Excavation and Removal of Waste, Soil, and Sediment					
*Excavation and removal	No	1	1	NA	Must be used in conjunction with disposal
J. In Situ Treatment					
*Chemical treatment					Generally limited by low soil permeability
-hydrolysis	NA	NA	NA	NA	Generally not applicable to contaminants present
-oxidation	NA	No	No	No	Aliphatic hydrocarbons generally resistant to in situ oxidation
-reduction	NA	NA	NA	NA	Normally limited to chromium treatment
-solvent flushing	NA	1	2	NA	Water can be used for soluble organics and inorganics. Process generates large volumes of water that require further treatment
*Physical treatment					
-soil heating	NA	[illegible]	2	NA	Use of steam or radio frequency (RF) heating to vaporize organics
-soil freezing	NA	No	No	NA	Temporary measure using refrigerant to freeze soil and contain wastes; no commercial application
-vitrification	1	1	1	NA	Developmental technology using electricity through conductive soils. Contaminated soil is converted into durable glass and wastes are pyrolyzed or crystallized
-vacuum extraction	NA	2	No	NA	Volatile organics removed by applying vacuum to shallow wells
-soil aeration	NA	2	2	NA	Viable only for volatile organics
*Biological treatment	NA	1	1	1	Developmental technology; effective for a wide range of organics.
*Solidification, Stabilization/fixation	NA	1	1	NA	Metals are applicable to both techniques; organics are more suited to solidification (physical treatment).
K. Treatment of Removed Waste Streams					
*Incineration	NA	1	1	No	Proven and effective technology for organics; ineffective for inorganics.
*Gaseous waste treatment	NA	NA	NA	NA	Gaseous waste treatment may be required in conjunction with the remedial technologies

TABLE 7 (Continued)

Technology	Landfills	Surface Soil	Subsurface Soil	Ground Water	Comments
*Biological treatment	NA	1	1	1	Developmental technology; effective for certain organic waste streams.
*Light treatment					
-chemical	NA	1	1	1	Effective for inorganics; some application for organic waste streams.
-physical	NA	1	1	1	Generally applicable and proven effective to organics and inorganics.
*Solids treatment					
-dewatering and solids handling	NA	NA	NA	NA	Well-developed technology
L. Alternative Water Supply					
*Alternative drinking water supplies	NA	NA	NA	NA	No drinking water need supplies remediation

Note: 1 = feasible and practical with high priority for further evaluation; 2 = feasible;
No = not viable; NA = not applicable, problem does not exist in this operable unit;

Install leachate extraction system in landfills/burn pit area
Pump contaminated ground water plume and treat by biological processing or air stripping
Excavate surface and subsurface soils and place in burn pit
Install organic vapor recovery system in burn pit and cover with a RCRA cap.
Secure entire site

Alternative 4: Ground water monitoring
Impose deed restrictions preventing residential development and ground water use
Construct a flood protection dike around landfills
Upgrade clay cap over landfills
Install leachate extraction system in landfills/burn pit area
Pump contaminated ground water plume and treat by biological processing or air stripping
Excavate surface and subsurface soils and place in an on-site (RCRA) facility.
Secure entire site

Alternative 5: Ground water monitoring
Impose deed restrictions preventing residential development and ground water use
Construct a flood protection dike around landfills
Upgrade clay capover landfills
Install leachate extraction system in landfills/burn pit area
Pump contaminated ground water plume and treat by biological processing or air stripping
Excavate surface and subsurface soils and treat by biological processing or soil flushing
Secure entire site

Alternative 6: Ground water monitoring
Impose deed restrictions preventing residential development and ground water use
Construct a flood protection dike around landfills
Upgrade clay cap over landfills
Install leachate extraction system in landfills/burn pit area
Pump contaminated ground water plume and treat by biological processing or air stripping
Excavate surface soils, place in burn pit, and treat burn pit in-place by immobilization or soil flushing/biological processing.
Secure entire site

Alternative 7: Ground water monitoring
Vitrify landfills inplace
Pump contaminated ground water plume and treat by biological processing or air stripping
Excavate surface and subsurface soils, place in burn pit, and vitrify burn pit inplace
Secure entire site.

Alternative 8: Ground water monitoring
Impose deed restrictions preventing residential development and ground water use
Construct flood protection dike around landfills
Place a RCRA cap over landfills
Install leachate extraction system in landfills/burn pit area
Pump contaminated ground water plume and treat by biological processing or air stripping
Excavate surface soils and place in burn pit
Install organic vapor recovery system in burn pit and cover with a RCRA cap.
Secure entire site

Alternative 9: Ground water monitoring
Impose deed restrictions preventing residential development and ground water use
Construct flood protection dike around landfill
Upgrade clay cap over landfills
Install leachate extraction system in landfills/burn pit area
Pump contaminated ground water plume and treat by biological processing or air stripping
Excavate surface and subsurface soils and place in an off-site RCRA-approved facility
Secure entire site.

ALTERNATIVE 1

The Superfund Program requires that the "no-action" alternative be considered at every site. Under the "no-action" alternative, EPA would take no further action at the site to control the source of contamination. The "no-action" alternative serves as a baseline with which other alternatives can be compared. Potential health risks associated with current exposure by ingestion to surface soil at the site and potential future exposure to ground water by ingestion at the site would remain; this alternative exceeds the target risk range for all but the most probable current use.

This alternative does not attain ARARs. No reduction in toxicity, mobility, or volume would occur.

Continued monitoring of ground water would be a satisfactory means to determine levels of contamination; existing monitor wells would be utilized. Monitor well sampling would not pose a threat to the environment or health and safety of site workers. Present worth cost of this alternative would be $115,000.

ALTERNATIVE 2

The B.F. Goodrich/Airco landfills would not be remediated. Leachate production would be controlled by the ground water pumping scheme implemented to contain the contaminant plume. Contaminated subsurface soils in the burn pit area would be left in place; leachate flow into the alluvial aquifer would be reduced by installation of a clay cap over the area. Leachate would be captured by the ground water pumping scheme. Requirements for the protection of landfills located on a flood plain would not be met.

Ground water would be extracted at 100 gpm, treated to meet KPDES requirements, and discharged to the Tennessee River. The ground water extraction and treatment system would remain in operation until the ground water clean-up goals, as specified in Table 6, are attained in quarterly analyses from all monitor wells for a period of one year. Once this criterion is met, the extraction and treatment system would be shut down. Following shut-down, quarterly analyses from all wells would be performed for a period of two years. There is potential for the water table to rise above the base of the landfills during periods of high river stage, creating leachate. There is, furthermore, the potential for failure of the clay caps on the landfills during flooding events, and opening of a leachate pathway to the ground water. These events may occur in the long term after shut down of the ground water treatment plant.

Both the most probable and worst case exposure scenarios for this alternative result in estimated total risks that are within the target risk 10^{-4} to 10^{-7} range.

Although public health risks from exposure to contaminated site media would be reduced to within the target risk range, absence of landfill remediation from this remedy does not satisfy requirements for solid waste landfills located on a floodplain. This alternative provides for no reduction in toxicity, mobility, or volume.

Ground water treatment would involve controls to prevent the release of VOCS to the atmosphere; health and safety plans would be required for the treatment process plant to protect site workers. This alternative would be implemented in a straight-forward manner utilizing proven and reliable technology. Present worth cost for this alternative is estimated to be $2.36 million for air stripping/carbon adsorption and $6.6 million for biological treatment. It is anticipated that ground water clean-up goals would be attained within 10 years of the start-up of the extraction and treatment system. Once the criterion for attainment of ground water have been met, monitoring of ground water quality would be performed once per year thereafter for a period of 30 years. If contaminant levels increase above clean-up goals at any time during this 30-year monitor period, the extraction and treatment system would resume.

ALTERNATIVE 3

This alternative would combine the components of Alternative 2 with flood protection, a leachate extraction and treatment system, together with an upgraded cap for the landfills, and a RCRA cap for the contaminated soils. In addition, an organic vapor recovery and treatment system would be installed to collect any vapor from beneath the burn pit RCRA cap.

Upgrading the landfill caps would effectively minimize infiltration. This, combined with a leachate extraction system, would ensure the elimination of leachate migration potential from the landfill. The flood dike would maintain the integrity of the upgraded landfill cap.

Approximately 5,000 cubic yards of contaminated soils would be excavated and then contained in the burn pit area under a RCRA cap; leachate would be essentially eliminated. Public health risks from soils exposure would be reduced to within the target risk range. The organic vapor recovery system at the burn pit would remove and treat any volatiles and thus reduce soils remediation time. The leachate collection system at the burn pit would remove contaminated ground water to prevent mixing in the aquifer.

Ground water would be extracted at 100 gpm, treated to meet KPDES requirements, and discharged to the Tennessee River. Effluent will be sampled to ensure compliance with the KPDES program. Operation of the ground water extraction and treatment system would remain in operation until the ground water clean-up goals, as specified in Table 6, are attained in quarterly analyses from all monitor wells for a period of one year. Once this criterion is met, the extraction and treatment system would be shut down. Following shut-down, quarterly analyses from all wells would be performed for a period of two years.

Ground water treatment and soil excavation would involve controls to prevent the release of VOCs to the atmosphere; health and safety plans would be required for the treatment process and soil excavation to protect site workers.

Inspection and repair of the caps and maintenance of the dike and leachate collection system would be required. The ground water treatment plant would require continuous operation and periodic maintenance. Excavation of the surface soil for placement in the burn pit must be closely monitored for airborne particulate pollutants and volatile organic compounds in order to protect the health of the site workers. Dust emissions during construction can be kept within regulatory limits by wetting down the soil.

Remediation of the landfills would satisfy requirements for landfills located on floodplains; all ARARs would be attained. The organic vapor recovery system, installed to collect and treat any vapor from beneath the burn pit RCRA cap, in conjunction with the elimination of leachate production, would address the requirements of SARA by significantly reducing the mobility of contaminants. All components of this alternative are proven, reliable, and could be implemented in a straight - forward manner.

Seismic risk potential would be addressed in the remedial design of this alternative to provide for the long-term integrity of this remedy. Earthquake engineering technology would be incorporated for containment facilities to minimize potential residual risk associated with potential seismic activity in the region.

Present worth cost for this alternatives is estimated to be $6.1 million. It would require one year to address the landfills, surface soils and subsurface soils. It is anticipated that ground water clean-up goals would be attained within 10 years of the start-up of the extraction and treatment system. Once the criterion for attainment of ground water clean-up goals have been met, monitoring of ground water quality would be performed once per year thereafter for a period of 30 years. If contaminant levels increase above clean-up goals at any time during this 30 year monitor period, the extraction and treatment process would resume.

ALTERNATIVE 4

This alternative would combine the components of Alternative 2 with flood protection, a leachate collection and extraction system, together with an upgraded cap for the landfills, and an on-site RCRA facility for the contaminated soils.

Upgrading the landfill caps would effectively minimize infiltration. This, combined with a leachate extraction and treatment system would ensure the elimination of leachate migration potential from the landfill. The flood protection dike would maintain the integrity of the clay caps.

Approximately 5,000 cubic yards of contaminated soils would be excavated and then contained in an on-site RCRA facility, leachate would be essentially eliminated. Public health risks from exposure to soils would be reduced to within the target risk range.

Ground water extraction and treatment would contain the contaminant plume as described in Alternative 3.

Inspection and repair of the caps and maintenance of the dike and leachate treatment system would require periodic operation and maintenance. Excavation of the surface soil for placement in the burn pit area would be closely monitored for air pollutants and volatile organic compounds to protect the health of site workers. Dust emissions during construction can be kept within regulatory limits by wetting down the soil.

Remediation of the landfills would satisfy requirements for landfills located on floodplains; all ARARs would be attained. The organic vapor recovery system, installed to collect and treat any vapor from beneath the burn pit RCRA cap, in conjunction with the elimination of leachate production would address the requirements of SARA by significantly reducing the mobility of contaminants.

Potential for release of VOCs during excavation and ground water treatment would require implementation of air emissions controls. All components of this alternative are proven, reliable, and could be implemented in a straight-forward manner.

Seismic risk potential would be addressed in the remedial design of this alternative to provide for the long-term integrity of this remedy. Earthquake engineering technology would be incorporated for containment facilities to minimize potential residual risk associated with potential seismic activity in the region.

Present worth cost for this alternative is estimated to be $8.75 million without providing a greater degree of protection to public health or the environment than Alternative 3. It would require 18 months to address the landfills, surface soils, and subsurface soils. It is anticipated that ground water clean-up goals would be attained within 10 years of the start-up of the extraction and treatment system. Once the criterion for attainment of ground water clean-up goals have been met, monitoring of ground water quality would be performed once per year thereafter for a period of 30 years. If contaminant levels increase above clean-up goals at any time during this 30 year monitor period, the extraction and treatment process would resume.

ALTERNATIVE 5

This alternative combines the components of Alternative 2 with flood protection, a leachate collection and extraction system, together with an upgraded clay cap for the landfills and treatment of contaminated soils.

Upgrading the landfill caps would effectively minimize infiltration. This, combined with a leachate extraction and treatment system, would ensure the elimination of leachate migration potential from the landfill. The flood protection dike would maintain the integrity of the clay caps.

Ground water extraction and treatment would contain the contaminant plume as described in Alternative 3.

Contaminated soils would be treated either by biological degradation, by composting, or by solvent flushing. These techniques address the requirements of Superfund Law by significantly reducing toxicity by treatment. Public health risks from soils exposure would be reduced to within the target risk range.

Soils treatment by composting is a proven technique that has been commercially demonstrated on a variety of biodegradable wastes. Soils treatment by flushing is a developmental technique currently being demonstrated at Superfund waste sites. Reliability of both composting and soil flushing is unconfirmed for the application at the site. Neither technique has been tested using the site contaminants. This step is of primary importance to assessing performance and reliability.

Implementability of the soils treatment techniques would involve excavation and transfer of all contaminated soils with the associated safety and environmental concerns; these concerns can be alleviated by appropriate health and safety measures and by the use of soils wetting to eliminate dust. Operation and maintenance requirements of this alternative are great since the active remedial measures use developmental techniques.

Remediation of the landfills would satisfy requirements for landfills located on floodplains; all ARARs would be attained.

Present worth cost for this alternative is estimated to be $9.32 million for biological degradation and composting or $21.3 million for solvent flushing. This remedy is not the most cost-effective remedy; reduced reliability in attaining ARARs would be associated with the developmental nature of soils remediation. Implementation of the biological degradation/composting remedy would require three years; solvent flushing would require three years to process all of the soil. It is anticipated that ground water clean-up goals would be attained within 10 years of the start-up of the extraction and treatment system. Once the criterion for attainment of ground water clean-up goals have been met, monitoring of ground water quality would be performed once per year thereafter for a period of 30 years. If contaminant levels increase above clean-up goals at any time during this 30 year monitor period, the extraction and treatment process would resume.

ALTERNATIVE 6

This alternative includes the components of Alternative 5, except contaminated soils would be treated in-place.

Approximately 5,000 cubic yards of contaminated soils would be excavated, placed in the burn pit area, and treated by in-place immobilization or by soils flushing. Both techniques address the requirements of Superfund Law: immobilization, by significantly reducing mobility of the contaminants and soils flushing, by removing and treating leachate contaminants from the soil. Public health risks from soil exposure would be reduced to within the target risk range.

Remediation of the landfills would satisfy requirements for landfills located on floodplains; all ARARs would be attained.

Implementation of both techniques would involve conventional and proven equipment. Site-specific testing of these techniques would be necessary to confirm site-specific parameters such as applicability of the process to the clayey soils at the site and to the specific organic contaminants present.

Implementability of the soils treatment techniques would involve excavation and transfer of all contaminated soils with the associated safety and environmental concerns; these concerns can be alleviated by appropriate health and safety measures and by the use of soils wetting to eliminate dust. Operation and maintenance requirements of this alternative are great, since the active remedial measures use developmental techniques.

Present worth cost for this alternative is estimated to be $19.25 million for the immobilization treatment remedy, $7.41 million for soils flushing. Remedy implementation is estimated to be one year for immobilization, ten years for soils flushing. It is anticipated that ground water clean-up goals would be attained within 10 years of the start-up of the extraction and treatment system. Once the criterion for attainment of ground water clean-up goals have been met, monitoring of ground water quality would be performed once per year thereafter for a period of 30 years. If contaminant levels increase above clean-up goals at any time during this 30 year monitor period, the extraction and treatment process would resume.

ALTERNATIVE 7

This alternative involves treatment as a principal element for all contaminated media. This alternative includes in-place vitrification of soils and buried wastes, and the treatment of contaminated ground water.

Vitrification of approximately 238,000 cubic yards of soil and waste would permanently immobilize any metals in the burn pit/landfills and pyrolize or combust organic compounds. Volatilization of organics is expected to occur. Organic vapors would have to be captured by a specially designed hood placed over the soil being vitrified.

Contaminated surface soils would be excavated and moved to the burn pit area using conventional earth-moving equipment. The burn pit area would then be vitrified to the water table. In addition, the landfills would also be vitrified in-place, including all buried wastes.

All future potential for ground water contamination would be eliminated. Similarly, this alternative would prevent any contaminated leachate from leaving the landfill area. Any variation in the water table beneath either the burn pit area or the landfills would not cause additional migration of hazardous substances. This alternative would break all contaminant migration pathways including contaminated ground water release into the Tennessee River and migration of landfill leachate.

Implementation of this alternative would eliminate the mobility and toxicity of hazardous material in the soil through treatment. Vitrification is a permenent solution, since the obsidian-like mass is expected to last over 1 million years. After approximately 9 months the vitrified mass would reach ambient temperature. The final product would require little, if any, maintenance.

This alternative addressess the requirements of Superfund Law by permanently and significantly reducing the toxicity and mobility of contaminants. This alternative as described exceeds all applicable or relevant and appropriate requirements and protects the public health to within the target risk range. Since vitrification is a developmental technology, there are doubts about its reliability in commercial application.

This emerging technology would require extensive feasibility testing to determine its applicability and reliability to the on-site organic contaminants of concern. The uncertainty of this technology and recurring electrode failure at other sites could seriously impair this remedy's ability to meet performance standards. Emissions during implementation would require stringent and extensive controls for both dust and VOCs.

Estimated cost for this remedy is $107.1 million. Implementation time is estimated at five years for the landfills, surface, and subsurface soils. It is anticipated that ground water clean-up goals would be attained within 10 years of the start-up of the extraction and treatment system.

ALTERNATIVE 8

All components of this alternative are identical to Alternative 3, except that the clay landfill cap would be upgraded to comply with Federal standards. Implementation, operation and maintenance, and reliability are unchanged. This alternative would exceed applicable or relevant and appropriate requirements for the landfills, but is less cost-effective while not providing a greater level of protection to public health or the environment.

Public health risks from contaminated soils would be reduced to within the target risk range. Leachate from soils in the burn pit would be eliminated. Ground water extraction and treatment would contain the contaminated plume as described under Alternative 3.

The time required to address the landfills, surface soils, and subsurface soils is estimated to be approximately one year. It is anticipated that ground water clean-up goals would be attained within 10 years of the start-up of the extraction and treatment system. Once the criterion for attainment of ground water clean-up goals have been met, monitoring of ground water quality would be performed once per year thereafter for a period of 30 years. If contaminant levels increase above clean-up goals at any time during this 30 year monitor period, the extraction and treatment process would resume. Present worth cost of this alternative is estimated to be $7.06 million.

ALTERNATIVE 9

This alternative includes the components of Alternative 4, except contaminated soils would be disposed off-site.

Approximately 57,000 cubic yards of soils contaminated with hazardous substances would be excavated and removed to the nearest RCRA-approved facility. Public health risks from soil exposure would therefore be mitigated. Disadvantages of off-site transport involve possible release of contaminated dusts during excavation and transportation of large volumes of contaminated soils.

Upgrading the landfill caps would effectively minimize infiltration. This, combined with a leachate extraction and treatment system would ensure the elimination of leachate migration potential from the landfill. The flood protection dike would maintain the integrity of the clay caps.

This alternative is a less cost-effective means of mitigating the risks to the public health, welfare, and environment. The alternative meets all action-specific requirements, and relies on proven technology. This alternative is not preferred, however, because it is not in compliance with Superfund Law which states that the off-site transport and disposal of hazardous substances should be the least favored alternative.

Present worth cost of this alternative is estimated to be $27.68 million. Implementation would be two years. It is anticipated that ground water clean-up goals would be attained within 10 years of the start-up of the extraction and treatment system. Once the criterion for attainment of ground water clean-up goals have been met, monitoring of ground water quality would be performed once per year thereafter for a period of 30 years. If contaminant levels increase above clean-up goals at any time during this 30 year monitor period, the extraction and treatment process would resume.

6.0 RECOMMENDED ALTERNATIVE

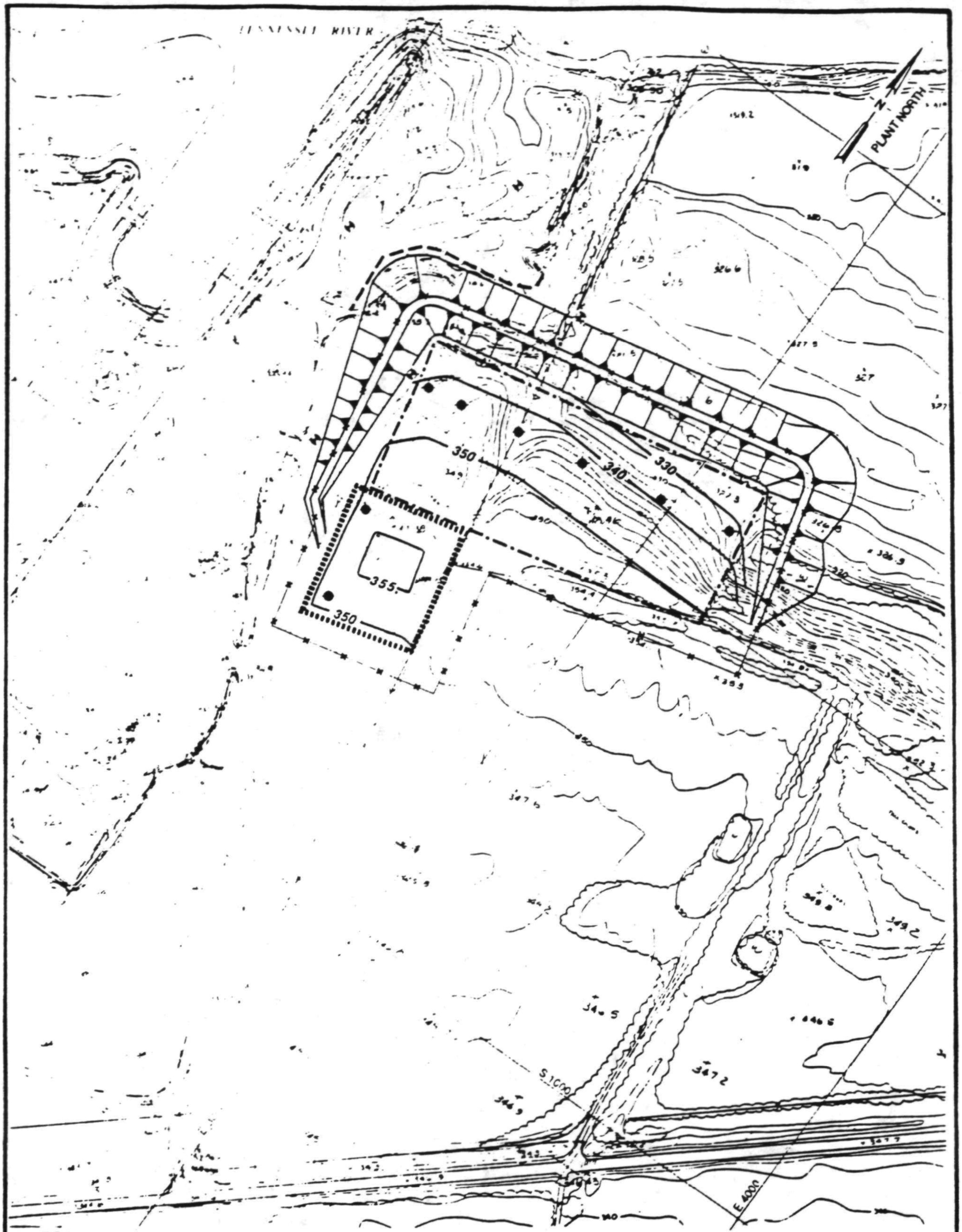
6.1 Description of Recommended Alternative

The recommended alternative, Alternative #3 (Figure 4), for remediation of contamination at the B.F. Goodrich/Airco site includes the following components:

- Ground water monitoring
- Impose deed restrictions preventing residential development
- Construct flood protection dike around landfills
- Upgrade landfill clay caps
- Install leachate extraction system
- Pump contaminated ground water plume and treat by air stripping
- Excavate surface soils and place in burn pit
- Install organic vapor recovery system in burn pit and cover with a RCRA cap

Preserving the integrity of the remedial action is essential towards providing long-term protection to public health and the environment. Imposition of institutional controls (deed restrictions) will serve as one measure to protect the integrity of the remedy by preventing residential development and installation of drinking water supply ground water wells on the B.F. Goodrich and Airco - owned properties bounded on the north by the landfills and on the south by Highway 1523.

Fencing of the entire landfills/burn pit area serves as an additional measure to preserve the integrity of the remedy by preventing future access. Approximately 3,200 feet of fence will be constructed around the landfills/burn pit area. The fence will be a 6-foot tall chainlink fence with three strands of barbed wire. There will be four lockable gates to allow access to the area by authorized personnel.



LEGEND:

- SECURITY FENCE
- GROUNDWATER PUMPING WELL
- LEACHATE EXTRACTION SUMP
- 355 CONTOUR OF CAP
- EDGE OF CLAY CAP
- EDGE OF RCRA CAP
- RELOCATED CHANNEL

0 200 400
SCALE IN FEET

CONTOUR INTERVAL = 2 FEET

NOTES:
- Grid system shown based on BFGoodrich plant coordinate system.
- Aerial mapping by Walker & Associates, Inc., January 7, 1986.
- Ground control by Florence & Hutcheson, Inc.

BFGOODRICH/AIRCO SITE
CALVERT CITY, KENTUCKY

FIGURE 4

SITE PLAN
SITE ALTERNATIVE 3

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A flood protection dike will be constructed on the north, east and west sides of the landfills. The elevation at the top of the dike will be 346.1 feet msl, which is two feet above the 100-year flood elevation of 344.1 feet msl. Contaminated surface soils will be excavated prior to construction of the flood protection dike clay core. Any contaminated soil remaining below the dike core would be sealed by the overlying impervious material.

The dike will be constructed outside the edge of the landfill in order to prevent inundation of waste from flood waters. Additional landfill capping material may be utilized with a drainage outlet to prevent ponding of runoff from the landfill inside the dike. Approximately 120,000 cubic yards of fill will be required for dike construction. A ditch that runs along the northwest corner of the B.F. Goodrich landfill will be relocated to facilitate construction.

The existing B.F. Goodrich and Airco landfill caps will be upgraded by stripping approximately four inches of the existing vegetative cover from the landfills, adding 2,700 cubic yards of compacted clay fill to achieve the desired grades on the landfill surface at a minimum cap permeability of 10^{-7} cm/sec., covering the clay with a 12-inch layer of vegetative fill, seeding and mulching the area, and constructing drainage ditches to control runon.

A leachate extraction system will be installed on the western edge of the burn pit area. Two sumps will be installed approximately two feet into the sandy clay unit that occurs at approximately 25 feet below the surface of the burn pit. The leachate extraction system will also involve the installation of six sumps in the B.F. Goodrich/Airco landfills. Sumps will be driven to a depth of two feet below the bottom of the waste.

Collected leachate will be stored in a holding tank, treated at the ground water treatment plant if necessary, and then discharged to the Tennessee River only after it meets KPDES standards as specified in Table 8, as revised thereafter. Leachate samples will be submitted to the appropriate laboratory for analysis and split samples collected and analyzed by EPA prior to discharge.

The zone of contaminated ground water capture/treatment is illustrated in Figure 5. The recovery system will employ five production water wells, optimally spaced to fully capture targeted ground water without excessive inflow of uncontaminated ground water. Each recovery well will be installed at depths of 40 to 60 feet, each pumping at a rate of 20 gpm.

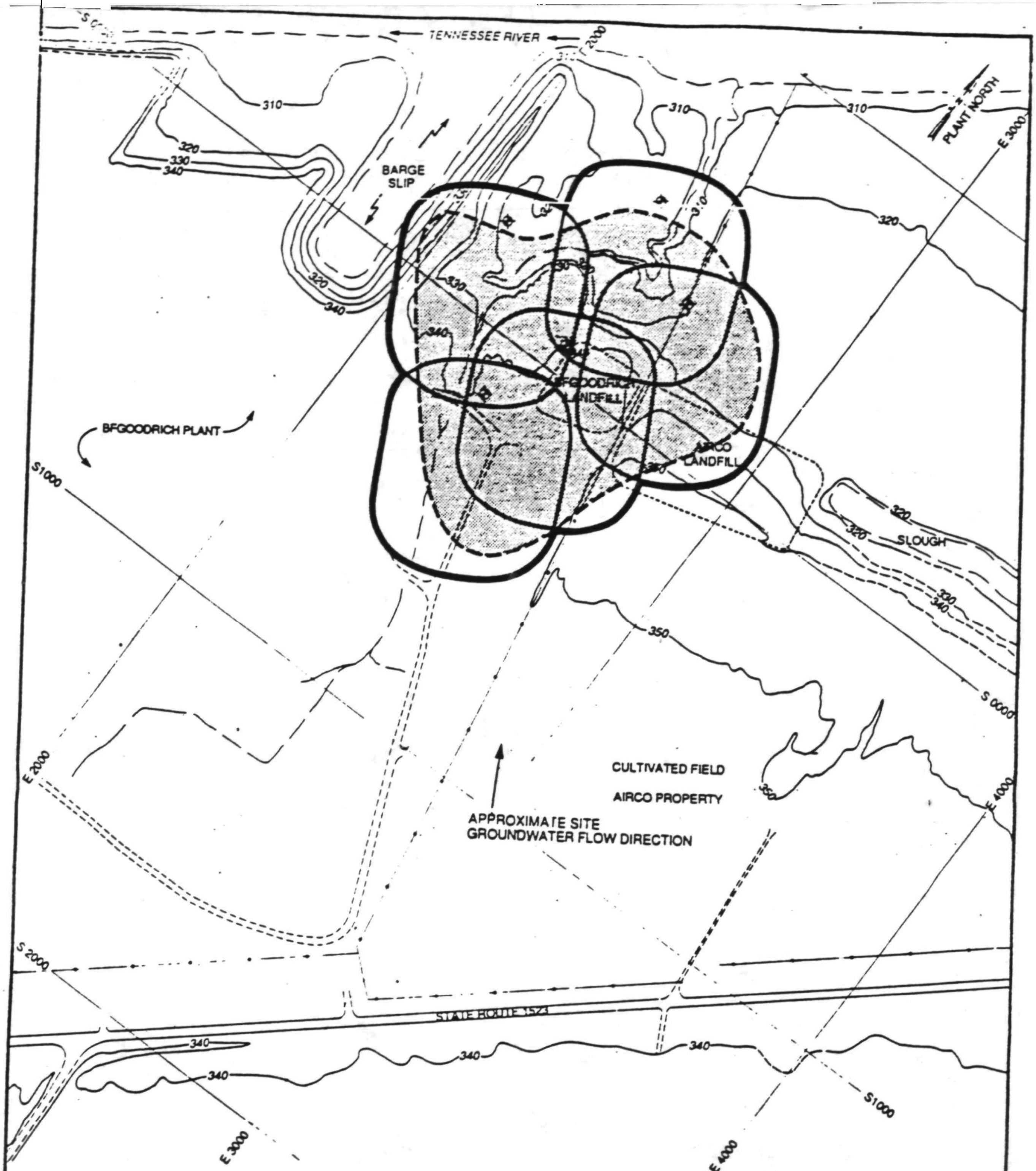
In order to achieve ground water clean-up goals it is estimated that approximately 6,075,000 cubic feet of contaminated ground water will be pumped to a ground water treatment plant located

TABLE 8

B.F. GOODRICH/AIRCO SITE
KENTUCKY POLLUTION DISCHARGE ELIMINATION SYSTEM (KPDES)
STANDARDS FOR INDICATOR CHEMICALS

Indicator Chemical	KPDES* Standards (not using end-pipe biological treatments)	KPDES* Standards (using end-pipe biological treatments)
1,2-Dichloroethane	180	22
Carbon tetrachloride	142	18
Chloroform	111	21
1,1,2-Trichloroethane	32	N/A
Benzene	57	37
PAHs	19	22
Tetrachloroethene	52	22
1,1,2,2-Tetrachloroethane	N/A	N/A
Trichloroethene	26	22
Chlorobenzene	142	15
1,1-Dichloroethane	22	N/A
bis(2-chloroethyl) ether	N/A	N/A
PCBs	N/A	N/A

All concentrations in ug/L
N/A = information not available
* Source: Federal Register Nov. 5, 1987, 40 CFR Part 414.91, 414.01 and based on discussions with Kentucky Division of Water at time of feasibility study.



LEGEND:

- GROUNDWATER PUMPING WELL
- LIMIT OF GROUNDWATER REQUIRING TREATMENT
- CAPTURE ZONE OF INDIVIDUAL WELL
- COMBINED CAPTURE ZONE OF WELL FIELD

CONTOUR INTERVAL = 10 FEET

NOTES:
- Grid system shown based on BFGoodrich plant coordinate system.
- Aerial mapping by Walker & Associates, Inc., January 7, 1986.
- Ground control by Florence & Hutcheson, Inc.
- Landfill boundaries approximate.

0 250 500
SCALE IN FEET

BFGOODRICH/AIRCO SITE
CALVERT CITY, KENTUCKY

FIGURE 5

GROUNDWATER CAPTURE ZONE
SITE ALTERNATIVE
3

DAMES & MOORE MARCH 1986

within the eastern boundary of the B.F. Goodrich plant site. Ground water may contain significant quantities of oil requiring treatment with an oil/water separator. This floating light oil will be stored for no more than three months in an oil storage tank, after which time it will be disposed in an oil recycling facility. Oil-free water and water with possible trace amounts of oil will be fed to an air stripping system and treated in keeping with discharge limitations. It is estimated that the air stripping system will remove 99.5 to 99.7 percent of volatile organic contaminants. Semivolatiles will be partially removed by the air stripper. The water and remaining contaminants will then be polished using activated carbon adsorption or existing biological treatment and discharged through a currently-permitted KPDES outfall to the Tennessee River only after it meets KPDES program standards as specified in Table 8, as revised thereafter.

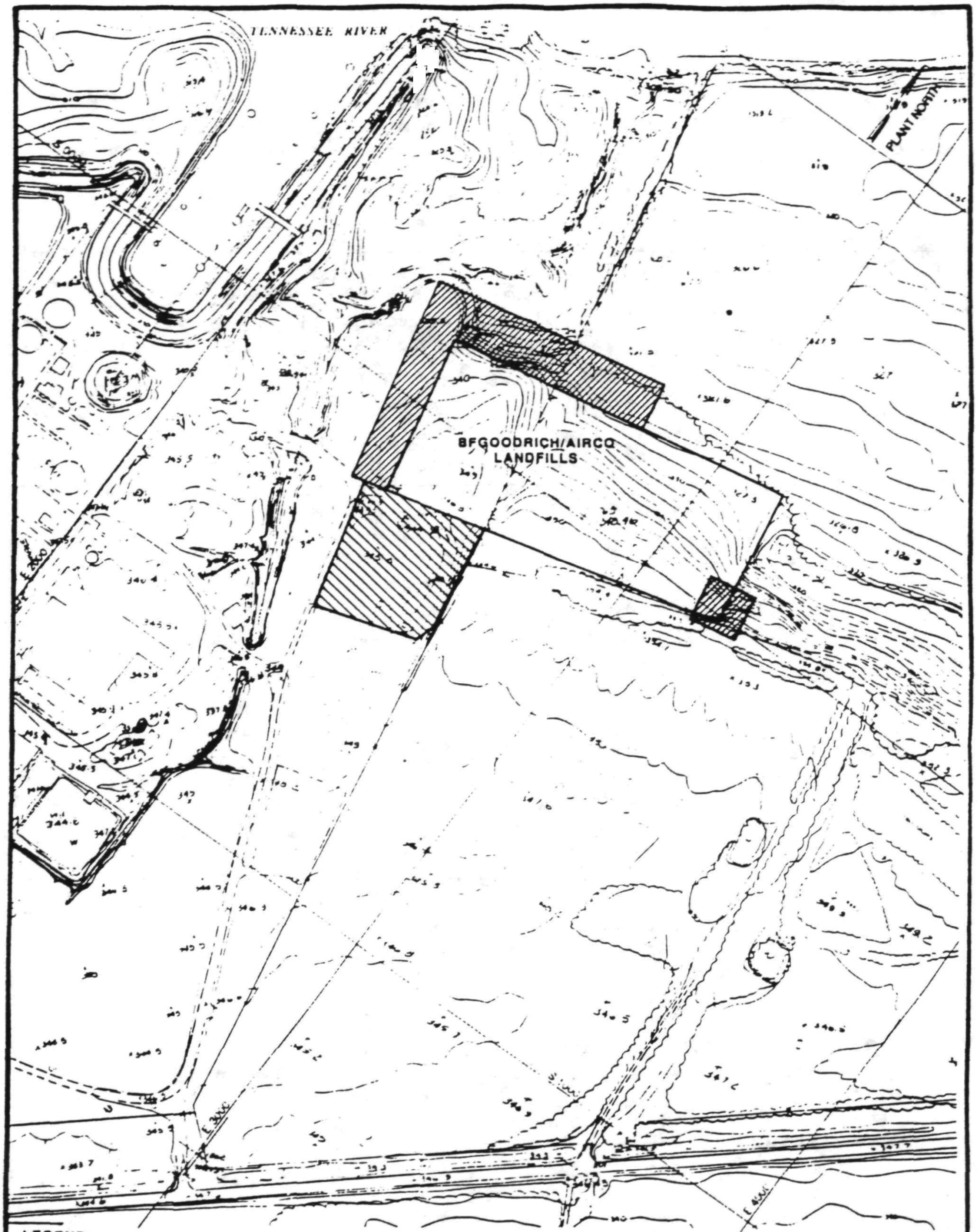
Air leaving the air strippers is often permitted to discharge to the atmosphere, but due to the initial levels of contamination, the off-gas will be treated by adsorbing onto granular activated carbon. The activated carbon will be regenerated on-site using steam.

Preliminary designs on the air stripping system indicate that carbon adsorption is a viable, proven technology capable of treating potentially contaminated off-gas. Carbon adsorption beds will be employed to treat off-gas contaminants, as necessary, however; should the carbon adsorption emission control system prove to be unsatisfactory towards attainment of emissions standards, an alternate emission control technology may be employed. Alternate emission control technologies will be implemented only after obtaining the necessary EPA and State approval.

Surface soil remediation will be accomplished by excavation of soils to a depth of approximately 1.5 feet in areas approximated as an 80-foot-wide strip along the west side of the B.F. Goodrich landfill, a 100-foot-wide strip along the north side of the B.F. Goodrich and Airco landfills that extends from the northwest corner of the B.F. Goodrich landfill to 50 feet east of sample location 7 and a 100-by 100-foot-square area around sample location 12 (Figures 3 and 6). The total volume of surface soil requiring remediation is approximately 5,000 cubic yards.

Sediment remediation will be accomplished by removal of sediments along the drainage ditch north of the B.F. Goodrich/Airco landfills from ditch sampling point 1 to 3 (Figure 3).

Contaminated surface soils and sediments will be placed in the burn pit area and covered with a RCRA cap. Necessary design considerations, as outlined in <u>Covers for Uncontrolled Hazardous Waste Sites</u>, EPA/2 - 85/002, will be adhered to in development of



LEGEND:

SURFACE SOIL REMEDIATION AREA (1.5 feet deep)

SUBSURFACE SOIL REMEDIATION AREA (Approximately 20 feet deep)

CONTOUR INTERVAL = 2 FEET

NOTES:
- Grid system shown based on BFGoodrich plant coordinate system.
- Aerial mapping by Walker & Associates, Inc., January 7, 1988.
- Ground control by Florence & Hutcheson, Inc.

0 200 400

SCALE IN FEET

BFGOODRICH/AIRCO SITE
CALVERT CITY, KENTUCKY

FIGURE 6

SOIL REMEDIATION AREAS

DAMES & MOORE MARCH 1988

the RCRA cap design. EPA approval will not be granted until the site-specific design has been submitted to EPA and reviewed for its adequacy.

In order to separate EDC and other volatile organics from contaminated soil, an organic vapor recovery system will be installed over the soils in the burn pit area. A 6-inch layer of gravel will be installed over the soils along with a network of perforated pipe on 50-foot centers. The pipe system will be connected to several vacuum blowers which will extract volatile organics as they are released by the soils. Released gases will be blown through a carbon adsorption bed, if necessary.

The recommended alternative uses proven technologies that are immediately available. Landfill construction and ground water treatment (air stripping) technologies are well established. The remedy can be designed to meet all appropriate state and federal requirements, thus reducing delays that newer technologies might encounter during implementation. While soil flushing, immobilization, and vitrification (Alternatives 5, 6, and 7) are effective in significantly reducing the toxicity and mobility of wastes, they must rely upon scarce technological resources, which delays their implementation and reduces their ability to achieve required performance standards.

Alternative 3 is the most cost-effective alternative that effectively provides protection to public health and the environment and attains all ARARs. Alternative 2 does not prevent long-term threat to the ground water. The off-site disposal alternative (Alternative 9) is less cost-effective and presents more risks, due to the need to transport the waste. Alternatives 4 and 8 are less cost-effective without providing a greater level of protection to public health or the environment. Alternative 7 (vitrification) is an emerging technology with a lesser degree of reliability. Extensive feasibility testing would be required to determine vitrification's reliability and applicability to on-site organic contaminants; instances of electrode failure are recurrent at other sites.

Public health risks from soil and ground water exposure will be reduced to within the target risk range under Alternative 3; earthquake engineering technology will be incorporated for containment facilities during the remedial design to minimize potential residual risk associated with potential seismic activity in the region. All applicable or relevant and appropriate requirements for the remedy will be attained.

Alternative 3 provides for the treatment of contaminated ground water/leachate via an extraction and treatment system. Volatile organics will be removed from soils in the burn pit via an organic vapor recovery system and treated if necessary. With time, the stripping action of soil water will treat remaining contaminants in the burn pit area. Ground water extraction and treatment will remain in operation until ground water clean-up goals have been achieved. Following attainment of clean-up goals, a 30-year period of monitoring will be performed to ensure clean-up goals are being maintained.

Ground water treatment and soil excavation will involve controls to prevent the release of VOCs to the atmosphere; health and safety plans plans will be developed for the remedial action to protect site workers. No negative impacts on the community or environment are anticipated during the implementation of Alternative # 3.

Thus, EPA believes that Alternative 3 presents the best balance among the effectiveness, implementability, and cost factors for this site. Further, this remedy meets all applicable federal and state standards.

6.2 Operation and Maintenance

Overall implementation of this remedy is estimated to take 10 years, following design and contract award. The time required to address the landfills, surface soils, and subsurface soils is estimated to be approximately 1 year. Ground water extraction and treatment will continue until the ground water achieves the clean-up goals. It is anticipated that these clean-up goals will be met within ten years of the initiation of the extraction and treatment system. Following completion of the landfill and soil remedial action, operation and maintenance (O&M) will be performed.

Virtually all of the contamination will be removed from the ground water before reaching the Tennessee River. In the event any contaminant escapes the zone of influence of the extraction wells, it will be diluted to below Maximum Concentration Limits (MCLs) when mixed in the Tennessee River. This should have a negligible effect on water quality in the river, but regular monitoring of ground water and river water will indicate the need to increase pumping rates or to install additional wells. Periodic maintenance of all mechanical and electrical parts associated with the leachate extraction and ground water recovery wells will be performed. The leachate collection system should have an effective life of over 15 years and would require replacement at that time, or when appropriate. Annually the air stripping system will be shut down to allow for acid washing of the tower packing.

A 30-year monitoring program will be developed and implemented to meet the RCRA requirements for capped areas that contain hazardous materials. This program will consist of regular inspection for erosion and subsidence, periodic mowing of the vegetative cover, and a ground water monitoring program.

6.3 Cost of Recommended Alternative

The present worth cost of this remedy is estimated to be $6.09 million. The capital cost will be approximately $2.96 million. The total present worth of the operation and maintenance costs is estimated to be $3.13 million.

6.4 Schedule

The planned schedule for remedial activities at the B.F. Goodrich/Airco site is as follows:

Summer 1988	Approve Record of Decision/Consent Decree Signed
Fall 1988	Consent Decree Entered/Initiate Remedial Design
8 months after Consent Decree entered	Complete Remedial Design and Begin Mobilization
20 months after Consent Decree entered	Complete landfills, surface soils, and subsurface soils remediation
10 years following initiation of Remedial Action	Complete ground water remediation

6.5 Future Actions

Following completion of ground water remediation, long-term operation and maintenance will be performed, as described in Section 6.2, to ensure that the integrity of this remedy is maintained.

6.6 Consistency With Other Environmental Laws

Remedial actions performed under CERCLA must comply with all applicable or relevant and appropriate requirements (ARARs). All alternatives considered for the B.F. Goodrich/Airco site were evaluated on the basis of the degree to which they complied with these requirements. The recommended alternative was found to meet or exceed the following ARARs, as discussed below.

<u>Resource Conservation and Recovery Act</u>

The recommended remedy includes the construction of a RCRA cap over the burn pit/disposal area and upgrading of the existing clay caps on the B.F. Goodrich/Airco landfills. All substantive regulations governing closure of solid waste management units and the design and construction of RCRA caps will be met, as defined in 40 CFR Section 264.310 of RCRA and as outlined in Covers for Uncontrolled Hazardous Waste Sites, EPA/2 - 85/002.

Two plausible scenarios exist as to ground water contaminant source. One scenario identifies the landfills as a potential source. Both landfills, for some period of time, operated under a Solid Waste Disposal Permit and were operated accordingly. This, in conjunction with the uncertain nature of landfill contents, precludes the need for a RCRA cap on the landfills. Additional remedial measures, such as leachate extraction sumps in the landfills and flood protective dikes, take into account the uncertainty involved. Should future site monitoring or discovery of new information reveal the presence of hazardous waste in the landfills, the remedy will be reevaluated to determine its effectiveness.

Clean Water Act/Safe Drinking Water Act

Ground water cleanup criteria involved an evaluation of contaminant concentrations relative to available health-based standards. Such standards (ARARs) include drinking water Maximum Concentration Limits (MCLs) and Maximum Concentration Limit Goals (MCLGs), and federal Ambient Water Quality Criteria (AWQC) as defined by the Safe Drinking Water Act (SDWA) (40 CFR Parts 141 and 142) and the Clean Water Act respectively. For the B.F. Goodrich/Airco site, Alternate Concentration Limits (ACLs), based on MCLs, or Ambient Water Quality Criteria in the absence of MCLs, in the mixing zone of the Tennessee River, were employed to relate contaminant concentrations in ground water to those at the point of use.

Applicable statutory language concerning clean-up standards and the application of Alternate Concentration Limits) under CERCLA is found in Section 121 (d)(2)(B)(ii) of SARA.

Floodplain Regulations

Remedial action requirements for the landfills address corrective measures to ensure compliance with regulations regarding landfills located on a 100-year floodplain.

Department of Transportation

Transportation of hazardous substances is regulated by the Department of Transportation (DOT). If residual material results from the ground water treatment system, it will be shipped to an off-site disposal facility. If tests on the material indicate the need for disposal in a hazardous waste facility, DOT regulations governing its shipment will be followed.

Occupational Safety and Health Administration

A Health and Safety Plan will be developed during remedial design and will be followed during field activities to assure that regulations of the Occupational Safety and Health Administration (OSHA) are followed.

National Pollution Discharge Elimination System

Discharge of treated ground water is part of the recommended remedial alternative. This discharge will meet effluent limit requirements of the National Pollutant Discharge Elimination System (NPDES).

Endangered Species Act

The recommended remedial alternative is protective of species listed as endangered or threatened under the Endangered Species Act. Requirements of the Interagency Section 7 Consultation Process, 50 CFR, Part 402, will be met. The Department of Interior, Fish and Wildlife Service, will be consulted during remedial design to assure that endangered or threatened species are not adversely impacted by implementation of this remedy.

Ambient Air Quality Standards

The ground water treatment system will be designed to assure that air emissions meet all State and Federal standards.

7.0 Community Relations

Community relations activities have remained an important aspect throughout the RI/FS. On May 28, 1986 a public information meeting was held at the City Hall in Calvert City, KY to inform concerned citizens within the community of the Remedial Investigation/Feasibility Study. Prior to the May 28 meeting, public notices, fact sheets, and press releases were issued. Throughout the RI/FS, correspondence remained open with various citizen and environmental groups.

On October 16, 1987, EPA established an Administrative Record for the B.F. Goodrich/Airco site at the Marshall County Public Library in Calvert City. On March 15, 1988, the final RI, draft FS, and final Endangerment Assessment reports were submitted to repositories in Calvert City, and Benton, KY. A public meeting was held at the Calvert City Elementary School in Calvert City on March 29, 1988 to present the findings of the RI and EPA's preferred remedial alternative. Prior to the March 29 meeting, EPA issued press releases, public notices, fact sheets, and a proposed plan. Following the March 29 meeting, a public comment period was opened for 30 days, ending on April 28, 1988.

The majority of comments received during the comment period were from citizens concerned that the recommended alternative (Alternative 3) focused primarily on the potential for earthquake-induced failure of the remedial action and the possibility of Kentucky Dam failure upstream, with subsequent failure of the remedy. Comments during the public meeting and those received during the comment period favored Alternative 7, vitrification of the landfills and burn pit/burial area over the recommended alternative.

A responsiveness summary has been prepared to summarize community concerns and to provide a response to those documents received. A transcript of the March 29, 1988 RI/FS public meeting is available for review in the Administrative Record.

RESPONSIVENESS SUMMARY

B.F. GOODRICH/AIRCO SITE, CALVERT CITY, KENTUCKY

This community relations responsiveness summary is divided into the following sections:

SECTION I. Overview: This section discusses EPA's recommended alternative for remedial action and public reaction to this alternative.

SECTION II. Background on Community Involvement and Concerns: This section provides a brief history of community interest and concerns raised during remedial planning activities at the B.F. Goodrich/Airco sites.

SECTION III. Summary of Major Comments Received During the Public Comment Period and EPA Responses to Those Comments: Both the comment and EPA's response are provided.

SECTION IV. Remaining Concerns: This section describes remaining community concerns that EPA should be aware of in conducting the remedial design and remedial action at the B.F. Goodrich/Airco sites.

I. OVERVIEW

Prior to and at the time of the RI/FS public meeting in March 1988, EPA presented its preferred remedial alternative to the public. This alternative addresses soil, sediment, and ground water contamination at the sites. The recommended alternative specified in the Record of Decision (ROD) includes: ground water monitoring, imposition of deed restrictions preventing residential development on B.F. Goodrich- and Airco-owned property immediately south of the landfills, construction of a flood protection dike around the landfills, upgrading of the landfill clay caps, installation of leachate extraction sumps in the landfills and burn pit area, extraction and treatment of contaminated ground water, excavation of contaminated surface soils and sediment with subsequent placement of these materials in the burn pit, placement of an organic vapor recovery system and RCRA cap over the burn pit.

The community, in general, does not favor selection of the recommended alternative. A preference for the vitrification alternative was expressed.

II. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

The B.F. Goodrich/Airco sites are located on the eastern edge of a heavily industrialized area approximately two miles northeast of Calvert City, Kentucky. Seven major industrial plants are located in the vicinity of the sites. Community interest at the B.F. Goodrich/Airco sites is strong and became apparent when the sites were placed on the National Priorities List in the early 1980's. Community concerns, as expressed during the public meetings, comment period, and RI/FS, seem to center around area-wide health concerns. The issue of air emissions by the local industries was of particular concern to the community. Additional concerns centered around the possibility of failure of the upstream Kentucky Dam and potential seismic activity in the region and what effect these would have on the integrity of the recommended alternative.

At the writing of this Responsiveness Summary at least one citizen's group intends to apply for EPA's Technical Assistance Grant to receive assistance in interpreting the conclusions and findings of the RI/FS.

III. SUMMARY OF PUBLIC COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND THE EPA RESPONSES TO THE COMMENTS

1. Several commenters stated that the public has been deprived of the right to participate in the remedy selection process that is guaranteed by Congress and EPA statutes.

EPA Response: The assertion that the public has been deprived of the right to participate in the selection process is not correct. Prior to release of the Remedial Investigation (RI), Feasibility Study (FS), and Endangerment Assessment (EA) reports to the repositories on March 15, 1988, EPA maintained an open line of communication with various citizen and environmental groups. A public meeting was held on May 28, 1986 prior to commencement of the RI field work. In October 1987, EPA established an Administrative Record in the Calvert City, KY repository. This Administrative Record contains all progress reports, correspondence, etc. used towards preparation of the Record of Decision. On March 29, 1988, EPA held a public meeting on the RI/FS and preferred remedial alternative at the Calvert City Elementary School. This initiated the public comment period which ended on April 28, 1988. The public was provided with the opportunity to review the RI, FS and EA reports for 44 days prior to closing of the public comment period, more than twice the required minimum public comment period of 21 days (3 weeks) as specified in the current National Contingency Plan (NCP). The Administrative Record was available for review for six months prior to closing of the public comment period.

2. The Citizen's Clearinghouse for Hazardous Waste made the comment that there was an insufficient number of background samples collected and analyzed.

EPA Response: Collection of additional background samples is not necessary. Background samples collected as part of the Remedial

Investigation corresponded with regional soil and water background levels.

3. The Citizen's Clearinghouse for Hazardous Waste commented that the issue of bank storage during flood events was not sufficiently analyzed.

EPA Response: This assertion is not correct. An extensive program was conducted to examine historical water level data, including analysis of wells during the 1982-83 flood event, in conjunction with a detailed evaluation of water level data in numerous recently-installed monitor wells.

This data concluded that the aquifer beneath the B.F. Goodrich/Airco site is recharged by the Tennessee River during flood events through bank storage. It was determined that contaminant plume movement beneath the site is not affected by bank storage except on a very localized scale (tenths of a foot) and thus, should not create a threat to the upgradient Calvert City wellfield.

4. The Tennessee Valley Authority commented that it should be noted in the Final RI Report that the Kentucky Dam is operated for navigation and flood control and, to the extent consistent with these primary purposes, for production of power. It should also be noted that TVA has no written committment to maintain a 20,000 cfs discharge if there is a need to conserve water upstream and navigable elevations in the tailwater are being maintained by other mechanisms.

EPA Response: It will be so noted.

5. The Citizen's Clearinghouse for hazardous waste commented that EPA failed to establish whether the landfills were "leaking" and that there is no technical basis provided in the RI report for establishing the burn pits as the primary source of ground water contamination.

EPA Response: The RI report does provide a technical basis for establishing the burn pits as the primary source of ground water contamination. A review of background information regarding historical waste practives was conducted in conjunction with a review of the findings of the remedial investigation. The conclusions of these reviews are presented in Section 5.5, Nature and Extent of Ground Water Contamination.

A second plausible scenario for ground water contamination source is also presented in Section 3.2, Ground Water Contamination of the Record of Decision which identifies the landfills as a contributing source of contamination, although minor in comparison to the burn pit area.

6. TVA commented that the possibility of contamination of the deep aquifer in the Mississippian limestone bedrock beneath the alluvial deposits has not been addressed.

EPA Response: Two fairly distinguishable plumes of contamination in the alluvial aquifer beneath the site were identified during the RI, a deep and shallow plume. The shallow plume is much more concentrated than the deep plume. The RI data indicates that the deep contaminant plume is situated above the limestone bedrock with little if any vertical migration. Figure 35 of the RI Report presents a vertical cross-section of the EDC contaminant plume. The possible solution channel noted at monitor well GA-22 is northeast of the landfills/burn pit area on the floodplain and not in the direction of contaminant plume migration (north-northwest).

The Mississippian-aged Warsaw Formation (limestone bedrock immediately underlying the alluvial aquifer) was intersected by nine boreholes during the RI. Visual observation of rock cores taken at four different borings concluded that the rock is hard and massive. In 1962, a deep boring into the limestone bedrock underlying the Warsaw Formation, the Fort Payne Formation, described this rock as a massive crystalline limestone free of joints and solution cavities.

Figure 7 of the RI illustrates the location of ground water and surface water users within a 3-mile radius of the site. All users are located upgradient or lateral to the site; bank storage during flood conditions does not induce contaminant plume migration beyond site boundaries.

7. TVA commented that differences in analytical data between laboratories should be discussed in Section 9.0, Quality Assurance/Quality Control of the RI report.

EPA Response: Section 9.0 of the RI Report discusses the QA/QC that went in to the sampling procedures, sample chain-of-custody, laboratory data quality, and data management on samples used towards preparation of the RI/FS project reports. It is neither relevant nor appropriate to dicuss the rejected sample data in the RI report. All samples were collected and prepared in accordance with EPA Region IV Standard Operating Procedures; EPA or its representatives provided oversight during this collection and preparation of samples. All data used in preparing the RI/FS reports underwent extensive QA/QC checks by EPA's Environmental Services Division and was deemed adequate for use.

8. TVA commented that it should be noted in the RI report that the drainage area of 710 $mi.^2$ referred to on RI page 6-2 is for the Tennessee RIver below Kentucky Dam only. The drainage area of the river upstream of the site is 40,200 $mi.^2$. Also, it should be noted that Wilson Dam on the Tennessee River in Alabama was closed in 1924; flows at this site were not regulated until 1944 with closure of Kentucky Dam.

EPA Response: It will be so noted.

9. Two commenters inquired if the number of surface water and sediment samples collected from the Tennessee River was adequate.

EPA Response: The importance of the Tennessee River as a source of navigation, domestic water supply, primary and secondary contact recreation, and warm water aquatic habitat is realized. The RI conclusively determined that the contaminant plume has not reached the Tennessee River. The remediation of the drainage ditch north of the landfills demonstrates the recognition of the river's many uses. This ditch contained low levels of a PCB compound of unknown origin. The Endangerment Assessment concluded that these sediments were within the target risk range; however, the ditch will be remediated due to the bioaccumulation potential of PCB.

In light of the absence of ground water contaminants entering the Tennessee River, additional sampling of the river is not necessary.

10. One citizen commented that the monitor well spacing at the sites was inadequate towards reaching the conclusion that the contaminant plume had not reached the Tennessee River.

EPA Response: The current number of monitor wells is sufficient for defining the extent of the ground water contaminant plume. Aside from installing monitor wells every foot (technically impossible) assumptions have to be made in developing plume contours between well points.

11. TVA inquired about the differences in EPA and Contract Laboratory analytical data for a Tennessee River sediment sample.

EPA Response: SD-TR2A and SD-TR2B, in Table 58, Sediment Sample Results - Semi-Volatiles of the RI report, are duplicate samples; neither sample detected 2-Methylnaphthalene. EPA's split sample detected an estimated concentration of 0.170 mg/L. The average concentration of 2-Methylnaphthalene in ground water at the site was less than one part per billion; the highest concentration was less than one part per million. A discrepency in split sample data concerning a prevalent site contaminant would be sufficient reason to resolve the discrepency by resampling; however, this was not the case.

12. TVA inquired about the preparation of surface water and sediment samples as outlined in Appendix D to the RI report, Technical Memorandum: Task 14 - Surface Water and Sediment Sampling and Analysis. Was EPA Method 624 followed during collection of samples?

EPA Response: Yes. The appendix will be revised to state that sediment samples for VOC analysis were collected and prepared in accordance with EPA Method 624. An "approximate 10 percent air space" was not left in sediment samples collected for VOC analysis.

13. TVA questioned the appropriateness of the State's regulation of discharges to the Tennessee River independantly versus assessing the cumulative impacts of all discharges to the river.

EPA Response: The State is currently addressing the cumulative impacts issue and reviewing the KPDES program.

14. The Citizen's Clearinghouse for Hazardous Waste questioned the appropriateness of using Alternate Concentration Limits for establishing ground water clean-up goals. It was suggested that Ambient Water Quality Criteria or MCLs be applied at the site versus in the mixing zone of the Tennessee River.

EPA Response: Applicable statutory language concerning clean-up standards under Superfund Law can be found in Section 121 (d)(2)(B)(ii) of the Superfund Amendments and Reauthorization Act (SARA). Section 121 of SARA does not allow any increase of contaminants in off-site surface water. Since clean-up goals must be based on some finite number, the ground water model used to develop clean-up goals reflects the large dilution factor in the Tennessee River and is based on Ambient Water Quality Criteria or Maximum Concentration Limits not being exceeded in the river. AWQC or MCLs are not applied at the site because there are no users of ground water at the site or downgradient of the site. Deed restrictions on the sites and Kentucky statutes precluding residential development on floodplains prevent future users of the ground water at or downgradient of the site. Therefore, applying MCLs or AWQC at the site is not appropriate.

15. One commenter stated that excavation alternatives were not considered in the remedy selection process and went on to suggest that contaminated soil be excavated one "cell" at a time.

EPA Response: Excavation of source areas was considered during the evaluation of alternatives. Off-site disposal is a least favored remedy that merely relocates the contaminants. The remedy in the Record of Decision involves containment of the waste in the burn pit area. Treatment of the contaminants will be accomplished via organic vapor recovery system and the stripping action of soil water over time.

16. The Citizen's Clearinghouse for Hazardous Waste stated that the indicator chemicals selected do not accurately reflect the most common toxic contaminants found at the site.

EPA Response: There is no pre-determined number of indicator chemicals appropriate for all sites. Between 5-10 chemicals would be a manageable number. However, if a very large number of chemicals has been detected at a site, it may be wise to select more indicator chemicals. The number and identity of indicator chemicals selected is a site-specific determination. Thirteen indicator chemicals were selected for the B.F. Goodrich/Airco sites; this adequately reflects the large number of contaminants detected. The compounds that the commenter suggested be included in the indicator chemical list (vinyl chloride, 1,2-dichlorobenzene, 1,2-transdichloroethene, chloroethane, and toluene) were evaluated during the indicator chemical selection process. It was determined that the indicator chemicals selected are the most appropriate.

17. Several commenters, during the public meeting and comment period, stated that the evaluation of remedial alternatives failed to take into consideration the proximity of the sites to Kentucky Dam and the potential for Kentucky Dam failure - what impact this failure would have on the integrity of the remedy.

EPA Response: Consideration of the potential failure of the Kentucky Dam is beyond the scope of a reasonable evaluation of remedial alternatives in light of the fact that there is no reason to question the structural integrity of the Kentucky Dam.

18. Several commenters, during the public meeting and comment period, stated that the evaluation of remedial alternatives failed to take into consideration the seismic risk potential in the region - what effect seismic activity will have on the integrity of the remedy.

EPA Response: Regional seismic risk potential was taken into consideration during the Remedial Investigation and evaluation of alternatives. The remedial design will incorporate earthquake engineering technology.

19. During the public comment period and public meeting on March 29, 1988 the community expressed a preference for the vitrification alternative over the recommended remedy.

EPA Response: Vitrification would require extensive feasibility testing to determine its applicability and reliability to the on-site organic contaminants of concern. The uncertainty of this technology and recurring electrode failure at other sites could seriously impair this technology's ability to meet performance standards. Furthermore, feasibility testing and implementation time increase the potential for exposure to site contaminants. Movement of ground water contaminants towards the Tennessee River could be accelerated by the extremely high temperatures generated during vitrification. Potential release of toxic emissions to the atmosphere during implementation could increase site worker and community exposure. Pacific Northwest Laboratory's March 1987 report, In Situ Vitrification of Transuranic Waste, presents the results of bench-scale, engineering-scale, pilot-scale, and large-scale tests on vitrification. This report describes vitrification as an emerging technology and points out numerous instances of electrode failure during these tests. Additionally, vitrification would not provide for a greater degree of protection to public health or the environment than Alternative No. 3.

20. A couple of commenters discussed the crediblity of the engineering firm of Dames & Moore (retained by B.F. Goodrich and Airco to conduct the RI/FS). One comment on this issue was in relation to a New Brunswick, New Jersey site.

EPA Response: Without knowing the specifcs of the New Brunswick, New Jersey site or Dames & Moore's alleged role in this site, no response is offered. EPA and the NUS Corporation provided oversight to RI/FS activities conducted by Dames & Moore and B.F. Goodrich and The BOC Group, Inc. (Airco). Numerous other parties within EPA reviewed the RI, FS and Endangerment Assessment reports and conclusions and interpretations contained therein that were prepared by Dames and Moore. It is the conclusion of this Agency that Dames and Moore conducted the RI/FS at the B.F. Goodrich/Airco sites in a technically sound and professional manner.

21. The Citizen's Clearinghouse for Hazardous Waste commented that the FS only considers one permanent remedy for cleaning up the site. The Clearinghouse went on to suggest that "...other permanent treatment technologies exist that were not considered that may be appropriate for use at this site. Several candidates include infrared incineration..., Advanced Electric Reactor (AER)..., and certain biological treatment systems...".

EPA Response: A wide range of technologies, permanent or otherwise, was considered during the technology screening process, including incineration and biological treatment. Incineration was discarded due to the associated potential air pollution problems and cost-effectiveness. The remedy provides for the possibility of using biological treatment as part of the air stripping process. Permanent solutions are to be employed to the maximum extent practicable. The remedy's treatment and containment components provide protection to public health, welfare, and the environment. Numerous measures are incorporated to ensure the long-term integrity of the remedy. An extensive monitoring program will be implemented over a 30-year period to continuously evaluate the remedy's adequacy. Should it be determined during this period that the remedy is not attaining the required perfromance criteria, the Record of Decision may be revised to incorporate technology that will meet the performance criteria. If revisions to the Record of Decision are necessary, the public will have an opportunity to comment on the proposed revisions prior to their implementation.

22. One commenter stated that no provisions were made for treatment of heavy metals in the leachate.

EPA Response: The Remedial Investigation identified organic compounds as the most prevalent compounds requiring remediation, although inorganic compounds (metals) were detected in the ground water, two of which exceeded the primary drinking water standards. Though the remedy centers primarily around the treatment of organics, leachate analyses will include scans for metals prior to treatment and disposal.

23. One commenter stated that rainfall in the diked area (surrounding the landfill) would increase flow to the aquifer due to hydraulic pressure. This would result in an unrealistic amount of treatment capacity for removal of rain water.

EPA Response: The landfill caps will be upgraded and contoured to divert rain water off and around the landfills to prevent ponding. With the required minimum permeability of 10^{-7} cm/sec for the landfill clay caps, the majority of rain water will not penetrate the landfills.

24. One commenter felt it would be appropriate to place warning signs on the fence surrounding the landfills.

EPA Response: This comment will be incorporated in the remedial design.

25. Air Products commented that they should not be considered a potentially responsible party at the Airco site since they did not dispose of hazardous wastes or materials at the site.

EPA Response: The waste Air Products disposed of contained hazrdous constituents; therefore, Air Product's status as a potentially responsible party remains.

26. Air Products commented that the Airco site and B.F. Goodrich site must be considered separately by EPA in deciding on appropriate remedial measures and for other purposes.

EPA Response: The Airco and B.F. Goodrich sites are separate sites on the National Priorities List; the sites were studied as one because of their proximity and it was determined that one study would be more technically and scientifically sound as well as cost-efficient. Two Records of Decision have been written, although the remedy is the same. EPA has an administrative need for two RODs; no statutes exist that preclude EPA from selecting one remedy for two sites.

IV. REMAINING CONCERNS

The community's concerns surrounding the B.F. Goodrich/Airco sites should be addressed in the following areas: community relations support throughout the Remedial Design/Remedial Action, incorporation of comments/suggestions in the Remedial Design.

Community relations support during the Remedial Design/Remedial Action should consist of making available final documents (i.e. Remedial Design Work Plan, Remedial Design Report, etc.) in a timely manner to both local repositories and issuance of fact sheets to those on the mailing list to provide the community with project progress and schedule of events. The community should be made aware that the design of the selected remedy will incorporate design criteria to ensure long-term integrity of the remedy. At any time during the remedial design, remedial action, or for 30 years thereafter, if new information is revealed that could affect the implementation of the remedy or, if the remedy fails to achieve the necessary design criteria, the Record of Decision may be revised to incorporate new technology that will attain the necessary performance criteria.

Community relations activities should remain an active aspect of the Remedial Design/Remedial Action phase of this project.

During the Remedial Design, the appropriate earthquake engineering technology should be employed to the maximum extent practicable. The technology incorporated should be appropriate for containment facilities for potential seismic risk of the region.