United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R07-90/038
September 1990

EPA

Superfund
Record of Decision:

Missouri Electric Works, MO

50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO. EPA/ROD/R07-90/038	2.	3. Recipient's Accession No.
4. Title and Subtitle SUPERFUND RECORD OF DECISION Missouri Electric Works, MO First Remedial Action - Final			5. Report Date 09/28/90 6.
7. Author(s)			8. Performing Organization Rept. No.
9. Performing Orgainization Name and Address			10. Project/Task/Work Unit No. 11. Contract(C) or Grant(G) No. (C) (G)
12. Sponsoring Organization Name and Address U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460			13. Type of Report & Period Covered 800/000 14.
15. Supplementary Notes			

16. Abstract (Limit: 200 words)

The 6.4-acre Missouri Electric Works (MEW) site is an electrical equipment sales, service, and remanufacturing operation in Cape Girardeau, Missouri. Intermittent onsite runoff channels flow into Cape LaCroix Creek located 0.7 miles east of the site, which enters the Mississippi River, 1.1 miles to the southeast. A wetland area is located 700 feet south of the site. Since 1953, MEW has recycled materials from old electrical equipment, including the reuse of filtered transformer oil. More than 16,000 transformers have been repaired or scrapped, and approximately 28,000 gallons of transformer oil received onsite were never recycled. The MEW property, as well as adjacent properties, have been contaminated with PCBs as the result of inadequate storage and handling of transformers and PCB-contaminated transformer oils. In addition, spills and disposal of industrial spent solvents occurred onsite affecting ground water underlying the site. In 1984, preliminary State and EPA investigations found leaking drums of transformer oil onsite and PCB levels in soil of up to 21,000 mg/kg. Based on this, in 1984, the State required removal of approximately 5,000 gallons of drummed waste oil. EPA conducted investigations from 1985 to 1987 that

(See Attached Page)

17. Document Analysis a. Descriptors

Record of Decision - Missouri Electric Works, MO
First Remedial Action - Final
Contaminated Media: soil, sediment, gw
Key Contaminants: VOCs (benzene, PCE, TCE), other organics (PCBs)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 86
	20. Security Class (This Page) None	22. Price

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

Abstract (Continued)

revealed onsite PCB contamination in the soil at levels of up to 58,000 mg/kg. Offsite migration of PCBs also was detected during these investigations. In 1988, the EPA required MEW to notify the public of site contamination, limit exposure to employees and the public, and minimize movement of PCB-contaminated soil offsite from runoff and erosion. In 1989, barriers were installed across runoff channels to intercept contaminated runoff. This Record of Decision (ROD) addresses both contaminated soil and sediment removal, as well as the treatment of affected ground water. The primary contaminants of concern affecting the soil, sediment, and ground water are VOCs including benzene, PCE, and TCE; and organics including PCBs.

The selected remedial action for this site includes excavating PCB-contaminated soil and sediment and treating these by incineration onsite; placing exhaust gases through flue-gas coolers and particulate removal systems; removing acid gases in-situ; backfilling with residual materials, based on leachability test results; constructing a soil cover over the site; pumping and treatment of ground water with filtration and treatment via air stripping with subsequent carbon adsorption; discharging the treated water offsite to a surface drainage ditch between the site and the wetlands or to a publicly owned treatment works (POTW). The estimated present worth cost for this remedial action is $9,130,000, which included an estimated annual O&M cost of $64,010 for 15 years.

PERFORMANCE STANDARDS OR GOALS: Contaminant levels for soil and sediment after treatment will represent an excess upper bound lifetime cancer risk of 2×10^{-5}. Cleanup levels for ground water will be 10^{-5} and cleanup levels will meet the TSCA PCB Spill Cleanup Policy, State water quality standards and Federal MCLs for VOCs. Chemical-specific goals include TCE 5 ug/l (MCL) for ground water, PCB 10 mg/kg (TSCA) for soil to a depth of 4 feet, and PCB 100 mg/kg (TSCA) for soil below a 4-foot depth.

RECORD OF DECISION

MISSOURI ELECTRIC WORKS SITE

CAPE GIRARDEAU, MISSOURI

Prepared By:

U.S. Environmental Protection Agency

Region VII

Kansas City, Kansas

September 1990

RECORD OF DECISION

DECLARATION

MISSOURI ELECTRIC WORKS SITE

CAPE GIRARDEAU, MISSOURI

Prepared by:

U.S. Environmental Protection Agency

Region VII

Kansas City, Kansas

September 1990

RECORD OF DECISION
DECLARATION

SITE NAME AND LOCATION

Missouri Electric Works Site
Cape Girardeau, Missouri

STATEMENT OF PURPOSE

This decision document presents the selected remedial action for the Missouri Electric Works Site, located in Cape Girardeau, Missouri. This decision was developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 U.S.C. 9601 et seq. as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable the National Contingency Plan (NCP); 40 CFR Part 300 (1990). The Regional Administrator has been delegated the authority to approve this Record of Decision.

The State of Missouri has concurred with the selected remedy and determined that the selected remedy is consistent with Missouri laws and regulations.

STATEMENT OF BASIS

This decision is based on the administrative record compiled for the Site which was developed in accordance with Section 113(k) of CERCLA, 42 U.S.C. 9613 (k). The Administrative Record is available for public review at the Cape Girardeau Public Library located at 711 North Clark Street, Cape Girardeau, Missouri and at the Environmental Protection Agency (EPA) Regional Office located at 726 Minnesota Avenue, Kansas City, Kansas.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this Record of Decision (ROD), present a current or potential threat to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

The selected remedy for the Site is a comprehensive approach for complete remediation of the principal threats posed by the Site. This approach will address the polychlorinated biphenyl (PCB) contamination of the soils and sediments and the volatile organic compound (VOC) contamination of the ground water.

The major components of the selected remedy include:

Soil/sediment Contamination

- Excavate all soils and sediments with PCB concentrations greater than 10 parts per million (ppm) to a depth of 4 feet and soils below that depth with PCB concentrations greater than 100 ppm;
- Incinerate onsite the excavated PCB-contaminated soils and sediments;
- Monitor at least daily the emissions from the incinerator, both ash and gases; and,
- Backfill the excavated areas with the ash and clean soil.

Ground Water Contamination

- Install six to ten extraction wells;
- Extract ground water and store it in a tank onsite;
- Process the stored water through an air-stripping tower;
- Process the vapor-phase after air-stripping through an activated carbon adsorption unit, discharge the treated water to the surface or to the publicly owned treatment works (POTW); and,
- Monitor quarterly the effectiveness of the ground water treatment system.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate (ARARs) to this remedial action, and is cost-effective. The remedy satisfies the statutory preference for remedies that employ treatment and reduce the toxicity, mobility, or volume as a principal element and utilize permanent solutions and alternative treatment technologies to the maximum extent practicable.

This remedy will not result in hazardous substances remaining onsite above health-based levels. However, because hazardous substances will be left onsite at levels that will require limited uses of and restricted exposure to the Site, a review of the remedial actions will be made no less often than every five years after initiation of the remedial action.

Morris Kay
Regional Administrator
U.S. EPA, Region VII

9-28-90
Date

JOHN ASHCROFT
Governor

G. TRACY MEHAN III
Director

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES

Division of Energy
Division of Environmental Quality
Division of Geology and Land Survey
Division of Management Services
Division of Parks, Recreation and Historic Preservation

OFFICE OF THE DIRECTOR
P.O. Box 176
Jefferson City, MO 65102
314-751-4422

September 24, 1990

Mr. Morris Kay
Regional Administrator
U. S. Environmental Protection
Agency, Region VII
726 Minnesota Avenue
Kansas City, KS 66101

Dear Mr. Kay:

The Missouri Department of Natural Resources has reviewed the Proposed Plan for the Missouri Electric Works Superfund site in Cape Girardeau, Missouri. The Department concurs with the preferred alternative of on-site incineration of the contaminated soils and air-stripping of the contaminated groundwater based on the information available.

If you have any questions regarding this matter, please do not hesitate to contact me.

Very truly yours,

DEPARTMENT OF NATURAL RESOURCES

G. Tracy Mehan, III
Director

GTM:rgh

cc: Mr. Robert Morby, USEPA

RECORD OF DECISION

DECISION SUMMARY

MISSOURI ELECTRIC WORKS SITE

CAPE GIRARDEAU, MISSOURI

Prepared By:

U.S. Environmental Protection Agency

Region VII

Kansas City, Kansas

September 1990

MISSOURI ELECTRIC WORKS SITE

RECORD OF DECISION

DECISION SUMMARY

TABLE OF CONTENTS

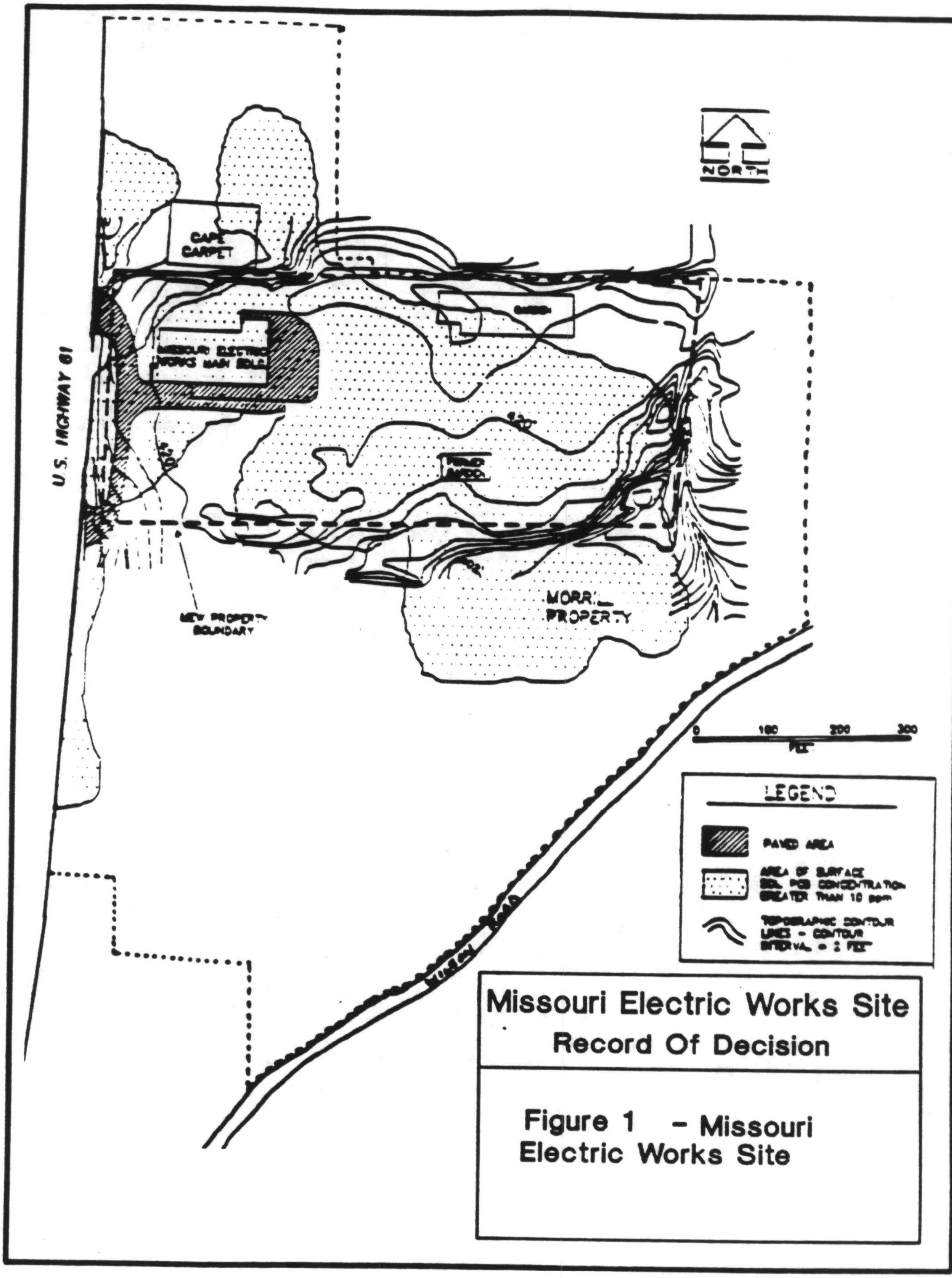
Page

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

LIST OF FIGURES

LIST OF TABLES



Missouri Electric Works Site
Record Of Decision

Figure 1 - Missouri Electric Works Site

RECORD OF DECISION
DECISION SUMMARY

1.0 SITE NAME, LOCATION, AND DESCRIPTION

Missouri Electric Works, Inc., is located on a 6.4-acre tract adjacent to U.S. Highway 61 (South Kingshighway) in a predominately commercial/industrial area of Cape Girardeau, Missouri. The Missouri Electric Works (MEW) Site includes all areas that have been identified as having PCB contamination. The approximate extent of the MEW Site is presented in Figure 1.

The MEW Site is situated approximately 1.6 miles west of the Mississippi River in the hills along the valley wall just west of the Mississippi River flood plain. Intermittent runoff channels emanate from the north, south and east boundaries of the MEW property and eventually drain into the Cape LaCroix Creek located 0.7 miles east of the Site. The Cape LaCroix Creek flows 1.1 miles to the southeast where it enters the Mississippi River. The MEW property is bounded on the north by retail and warehouse properties, on the south by a residence, commercial storage and a construction company, and on the east by a warehouse. A wetland has been identified approximately 700 feet south of the MEW property. Figure 2 indicates the approximate location of the wetland in relation to the MEW Site and the city of Cape Girardeau.

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.1 Site History

Missouri Electric Works, Inc., sells, services, and remanufactures transformers, electric motors, and electrical equipment controls. During past operations, Missouri Electric Works, Inc., reportedly recycled materials from old units, selling copper wire and reusing the dielectric fluids from the transformers. The salvaged transformer oil was filtered through Fuller's earth for reuse. An estimated 90 percent of the oil was recycled.

Missouri Electric Works, Inc., has been at its present location since 1953. According to business records obtained from Missouri Electric Works, Inc., more than 16,000 transformers have been repaired or scrapped at the Site during this time. The total amount of transformer oil that was not recycled during this period is estimated to be 28,000 gallons. In 1984, approximately 5,000 gallons of waste oil, in drums, was removed by a contractor.

Industrial solvents were used to clean the electrical equipment being repaired or serviced. Solvents were reused until they were no longer effective. Spills and disposal of spent solvents apparently occurred on the MEW property.

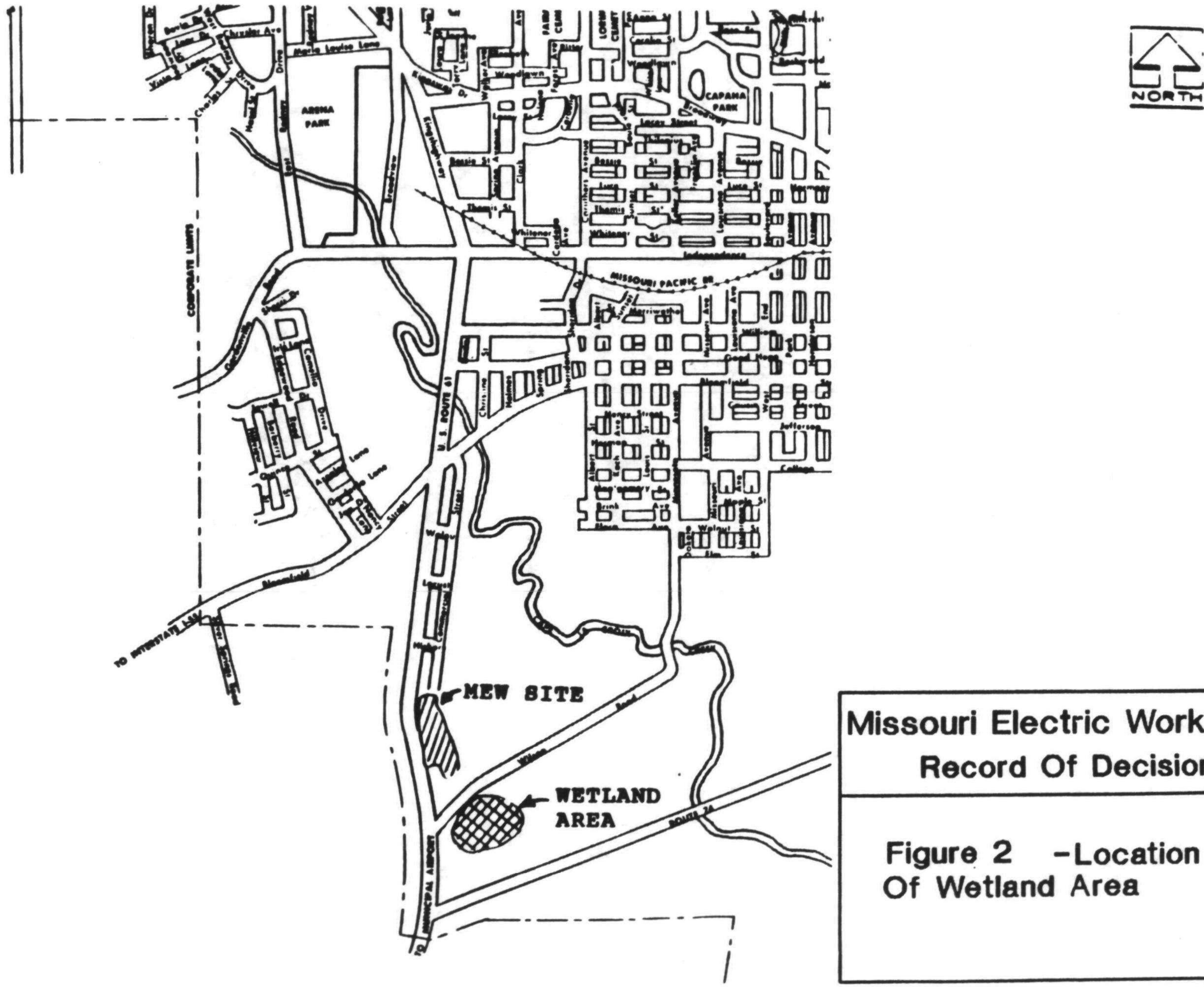
The MEW plant and general office occupy a building located on the west end of the property. To the east of the building and concrete pad is a gravel area of approximately 150 by 120 feet used for transformer storage. Portions of the Site are littered with various objects including old transformers, empty drums, old pallets and trash. The MEW property and adjacent properties have been found to be contaminated with polychlorinated biphenyls (PCBs), specifically Aroclor 1260. This PCB contamination is apparently the result of past handling and storage procedures of PCB-containing transformer fluids.

2.2 Site Investigations

The Missouri Department of Natural Resources (MDNR) inspected the MEW facility in October 1984 and discovered 102 55-gallon drums containing transformer oil that were being stored on the MEW property. Some of the drums were leaking. A sample of the oil-stained soil was obtained by MDNR for analysis and found to contain 110 parts per million (ppm) polychlorinated biphenyls (PCBs). A sample of oil-stained surface water was taken by MDNR. The analytical results for the water sample indicated a PCB concentration of 110 micrograms per liter (ug/l) or parts per billion (ppb).

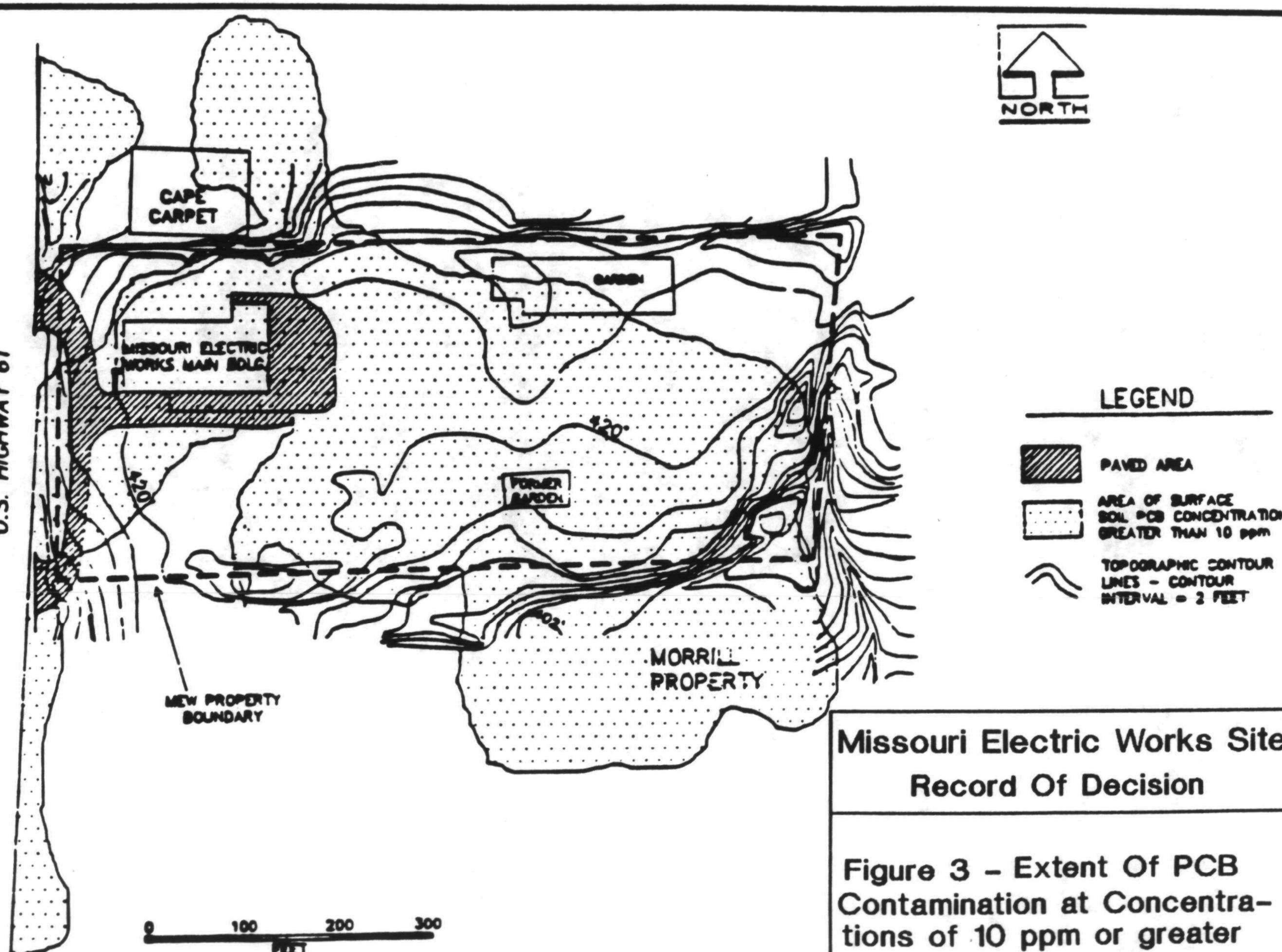
An inspection by the Environmental Protection Agency (EPA) during November 1984, pursuant to the Toxic Substances Control Act (TSCA), found that MEW handling and storage procedures for oils containing or contaminated with PCBs did not conform to the regulations. Two soil samples and one sample of stored oil were obtained. PCBs were detected in the soil samples at concentrations of 310 and 21,000 milligrams per kilogram (mg/kg) or parts per million (ppm). The oil contained 1,200 ppm PCBs.

Additional and more extensive site investigations of the MEW facility and adjacent properties were performed by EPA contractors between October 1985 and June 1987. These investigations indicated that PCB contamination in surface soils at the facility was extensive (with PCB concentrations as high as 58,000 ppm); that shallow subsurface soils at the Site were contaminated to a lesser extent; that offsite migration of PCB-contaminated soils had occurred along drainage paths; that measurable levels of PCBs were present onsite and on nearby offsite building walls; and that measurable concentrations of airborne PCBs were present. One round of sampling from onsite monitoring wells indicated that shallow ground water contained low concentrations of PCBs;



Missouri Electric Works Site
Record Of Decision

Figure 2 -Location Of Wetland Area



Missouri Electric Works Site
Record Of Decision

Figure 3 - Extent Of PCB Contamination at Concentrations of 10 ppm or greater

however, later sampling of the wells by EPA and more detailed analysis during the Remedial Investigation (RI) did not detect PCBs in the ground water and it was concluded that the earlier results were probably the result of sampling errors. These investigations, as well as other investigations are summarized in more detail in the RI Report.

EPA obtained wipe samples of the exterior of several buildings located in the vicinity of MEW during August 1989. Analytical data from these samples indicated that no PCBs had migrated to the buildings west of Highway 61.

The Missouri Electric Works Steering Committee (MEWSC), a group of potentially responsible parties for the Site, conducted a Remedial Investigation (RI) pursuant to an Administrative Order on Consent issued by EPA. The field activities were conducted from September 1989 to March 1990. The findings of these activities are summarized below:

1.0 Soils

PCBs adsorbed onto the near-surface soils have been transported onto surrounding properties primarily via storm water runoff. This contamination is located primarily along drainage pathways with the levels decreasing with greater distance from MEW. The highest levels of PCBs observed in any offsite sample (2,030 ppm) was found in a drainage channel at the boundary between the MEW property and the Morrill property.

Geostatistical modeling of the data collected during the RI was used to determine the areal extent of PCB contamination on the Site and surrounding areas. The total area of surface soils and sediment with PCB concentrations of 10 ppm or greater is approximately 295,000 square feet or 6.8 acres (excluding areas covered by paving and structures). The limits of the 10 ppm isoconcentration contour are shown in Figure 3. It is estimated that the area contaminated with PCB concentrations of 500 ppm or greater is over four acres. The upper bound 95 percentile confidence level of the arithmetic mean is approximately 5,000 ppm for all samples taken at the Site.

PCB contamination was found at depth in the transformer storage and debris burial areas. Additionally, Volatile Organic Compound (VOC) contamination was detected in soils down to 2.5 feet below the ground surface south and east of the MEW building, the transformer storage area and the debris burial area.

2. Ground Water

PCBs were not detected in any of the ground water samples obtained during Phases I and II of the RI. Water samples obtained during Phase III were not tested for PCBs. VOCs, particularly 1,1-dichloroethane, trans-1,2-dichloroethene, chlorobenzene, and trichloroethene, were detected in Monitoring Well Nos. 3 and 5 at concentrations in the part per billion (ppb) range. The highest concentration of total VOCs detected was 320 ppb. Analytical data from additional sampling showed that VOC-contaminated ground water has migrated beyond the MEW property boundaries in one of the two offsite wells (see Figure 4).

Ground water in the vicinity of the Site is apparently flowing to the east, northeast, and southeast from the Site, as the MEW property is the "high" point in the immediate area. These ground water flow directions are based on limited observations.

Regional geologic and hydrogeologic information in the possession of the Missouri Division of Geology and Land Survey (DGLS) indicates that the limestone bedrock extends to a depth of about 1,000 feet without a significant shale layer being present. This means that there is not a barrier or confining layer present to prevent the downward migration of contaminaticn in the bedrock aquifer once the contamination reaches ground water. Some of the VOC contaminants are known to be "sinkers", i.e., they are heavier than water and tend to sink through water to a confining layer.

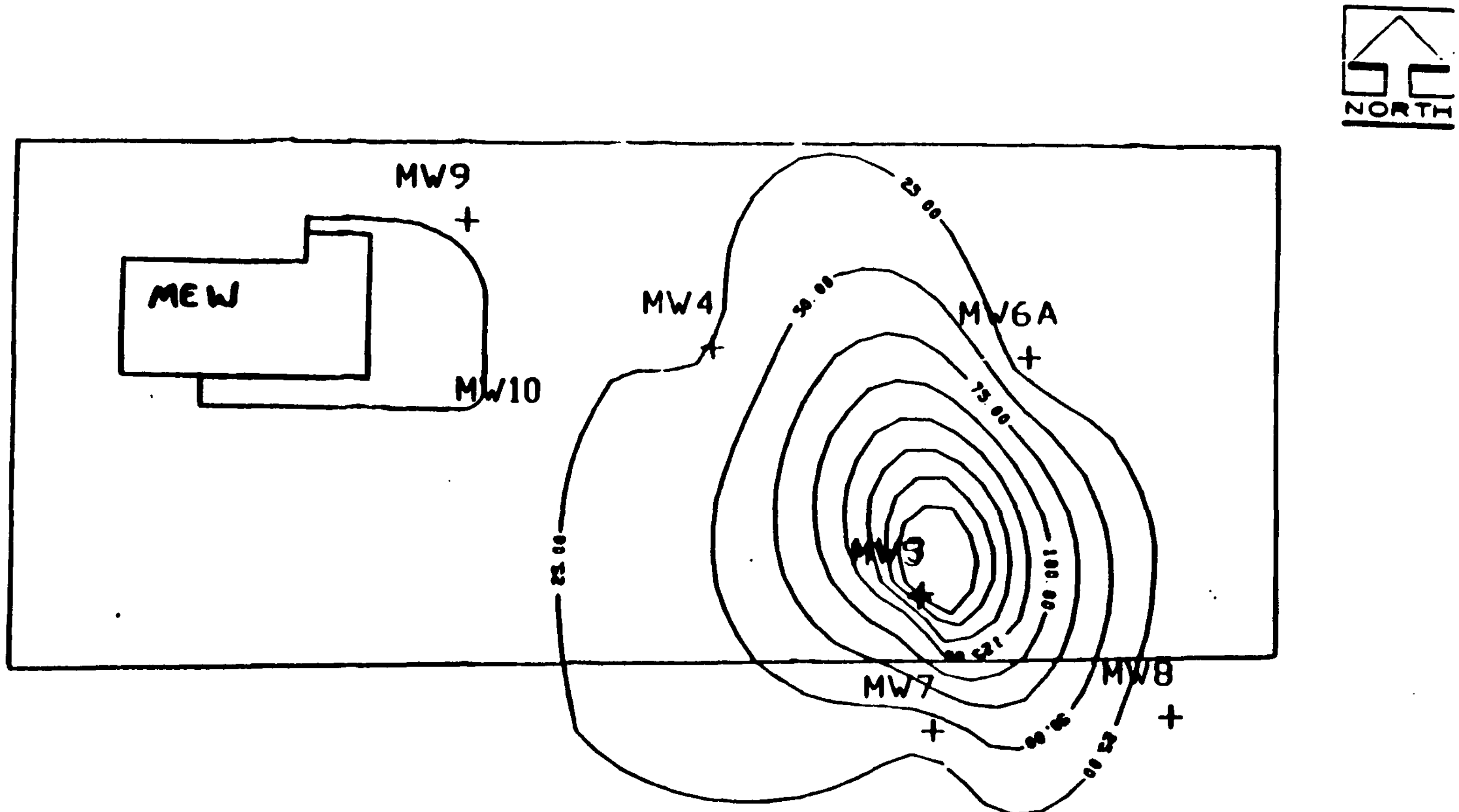
No users of the upper portions of the bedrock aquifer were identified. This does not mean that users do not exist. Users of lower portions of the bedrock aquifer have been identified.

3. Surface Water and Adjacent Wetland Area

Surface water samples were collected in the drainage ditch along Wilson Road and in the wetland area immediately south of Wilson Road. No PCBs were detected in any of those samples.

2.3 Enforcement Activities

An Administrative Order was issued to Missouri Electric Works, Inc., by EPA pursuant to §106 of CERCLA on August 2, 1988. This Order required Missouri Electric Works, Inc., to perform several response actions, specifically: to notify the public of the site contamination; minimize the exposure of the public and



ESTIMATION PLUME OF
TOTAL VOLATILE ORGANICS
(SUMMATION OF VOLATILE ORGANICS IN EACH WELL –
PHASE III RESULTS)

Missouri Electric Works Site
Record Of Decision

Figure 4 – Extent Of Ground Water Contaminant Plume

employees to PCB-contaminated dust, soil or sediment; and minimize the amount of PCB-contaminated soil migrating from the property in surface water runoff. EPA installed barriers across drainageways during 1989 to more effectively intercept PCB-contaminated runoff. Also as mentioned above, EPA entered into an Administrative Order on Consent with the MEWSC, whereby the group agreed to perform the Remedial Investigation/Feasibility Study (RI/FS).

2.4 National Priorities List Status

The Missouri Electric Works Site was proposed for listing on the National Priorities List (NPL) in June 1989. The MEW Site was listed on the NPL on February 21, 1990.

3.0 COMMUNITY PARTICIPATION

EPA and the Missouri Department of Health held meetings with adjacent property owners and other interested citizens in Cape Girardeau, Missouri on July 11 and 12, 1989. The purpose of these meetings was to discuss the Site conditions and the health risks that the Site represented to the general public. EPA staff participated in two local Cape Girardeau, Missouri radio talk shows during July 1989; interested citizens were able to "call-in" and ask questions of the EPA staff concerning the Missouri Electric Works Site and the related activities.

The Administrative Record was placed in the Cape Girardeau Public Library on August 11, 1989. A public meeting was held in Cape Girardeau on September 19, 1989 to inform the public of the details of the ongoing remedial investigation and to identify possible remedial alternatives that would be considered during the feasibility study. A second public meeting was held on June 11, 1990 to inform the public of the remedial investigation findings and to again identify the remedial alternatives that would be considered during the feasibility study. Fact sheets, identifying significant Site activities, were mailed to everyone on the Site mailing list (which included local media, officials and PRPs) during June, August, and November 1989 and March, May and July 1990.

The RI/FS Reports and Proposed Plan for the Missouri Electric Works Site were released to the public on August 18, 1990. These three documents were included in the addendum to the administrative record located in the EPA Record Center, Region VII and at the Cape Girardeau, Missouri Public Library. Notice of the availability of these documents was published in the News Guardian and the Southeast Missourian on August 19, 1990. A public comment period was held from August 19 to September 17, 1990. In addition, a public hearing was held on August 30, 1990. At this meeting, representatives from the EPA, the Missouri Department of

Natural Resources (MDNR), the Missouri Department of Health (MDOH) and the Agency for Toxic Substances and Disease Registry (ATSDR) were available to answer questions about problems at the Site and the remedial alternatives under consideration. EPA's response to the comments received during this comment period is embodied in the Responsiveness Summary.

4.0 SCOPE AND ROLE OF RESPONSE ACTION

The remedial action to be performed at the Missouri Electric Works Site, has been divided into two parts: the first part addresses the contaminated soils. The second part addresses the contaminated ground water. The contaminated soils pose a threat, current or potential, to human health and the environment due to the risks of possible ingestion, inhalation or dermal contact with the soils. The contaminated ground water poses a threat, current or potential, to human health and the environment because of possible future ingestion of drinking water from wells that contain contaminants above health-based levels. The purpose of the response actions is to prevent and/or minimize current or future exposure to the contaminated soils and ground water. These actions are expected to be the final response actions for the MEW Site.

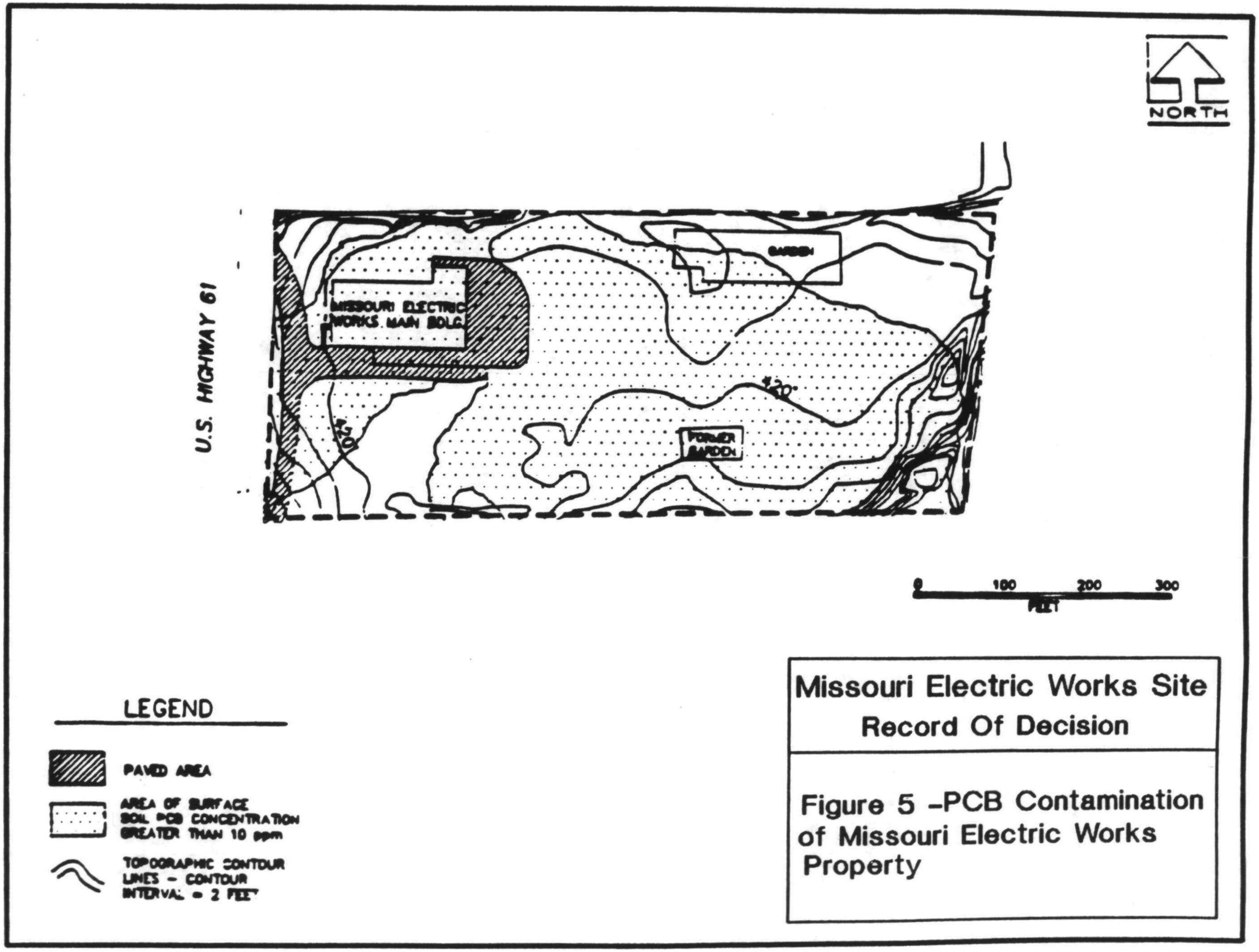
5.0 SITE CHARACTERISTICS SUMMARY

Nine contaminants of concern were detected at the Site during the investigations. These contaminants include polychlorinated biphenyls (PCBs) and volatile organic compounds (VOCs); specifically, methylene chloride, trichloroethane, trans-1,2-dichloroethene, chlorobenzene, 1,1-dichloroethane, trichloroethene, tetrachloroethene, and benzene. The presence of these contaminants is the result of past handling, disposal, and storage practices at the Site.

Approximately 75 percent of the surface soils on the Missouri Electric Works property were found to be contaminated with PCBs at concentrations of 10 ppm or greater (see Figure 5). PCBs adsorbed onto the soils have migrated, primarily via storm water runoff, onto surrounding properties. This contamination is generally located along drainage pathways with the concentrations decreasing with greater distance from MEW. The highest concentration of PCBs observed in any offsite sample (2,030 ppm) was found in a drainage channel at the boundary between the MEW property and the Morrill property located to the south.

6.0 SUMMARY OF SITE RISKS

A Baseline Risk Assessment of the MEW Site was performed by the MEWSC to assess the risks posed to human health by the PCB and VOC-contaminated soils and sediments and the VOC contaminated



Missouri Electric Works Site
Record Of Decision

Figure 5 -PCB Contamination of Missouri Electric Works Property

ground water. The compounds of concern and the media in which they were detected are presented in tabular form below.

Detected Compounds	Environmental Media
PCBs	Soil, Sediment, Air
Methylene Chloride	Soil
Trichloroethane	Soil
Trans 1,2-dichloroethene	Ground water
Chlorobenzene	Soil, Ground water
1,1 Dichloroethane	Ground water
Trichloroethene	Ground water
Tetrachloroethene	Ground water
Benzene	Ground water

Pathways through which populations could potentially become exposed were evaluated. These pathways include: 1) ingestion of contaminated soils; 2) dermal (skin) contact with contaminated soils; 3) inhalation of contaminated soil particles and vapors; and 4) ingestion of contaminated ground water.

Incremental lifetime cancer risks and a measure of the potential for noncarcinogenic adverse health effects were estimated for each population in each exposure scenario. For carcinogenic compounds, risks were estimated by multiplying the estimated exposure dose by the cancer potency factor of each contaminant. The product of these two values is an estimate of the incremental cancer risk.

For noncarcinogenic compounds, a Hazard Index (HI) value was estimated. This value is a ratio between the estimated exposure dose and the reference dose (RfD) which represents the amount of toxicant that is unlikely to cause adverse health effects. Generally, if the HI is less than one, the predicted exposure dose is not expected to cause harmful noncarcinogenic human health effects. Where the HI exceeds one, the potential to cause adverse noncarcinogenic human health effects increases as the HI increases.

Due to the potential additive effects of ingestion, inhalation and dermal contact to contaminants via different pathways, exposure routes for soil were identified. There are three routes at which populations could potentially be exposed via one or a combination of scenarios. These exposure routes are: 1) occupational (site workers); 2) recreational users of the Site, both adults and children; and 3) residential populations, both adults and children. These exposure scenarios were evaluated for current and future uses of the Site. The future use scenario included ingestion of contaminated ground water as an additional exposure pathway.

For purposes of the Risk Assessment, it was assumed that no remedial action would be performed at the Site in order to evaluate the possible future risks posed by the contamination. The risks posed by the soil contamination at the Site are summarized in Tables 1 to 6.

No current exposure risk was evaluated for ground water. Information indicates that there are currently no users of the upper portion of the ground water. No contamination was detected in the ground water samples obtained from the onsite drinking water well. Risks to human health were evaluated assuming that drinking water wells would be installed in the contaminated zone of the bedrock aquifer in the future, for human consumption. Tables 7 to 9 summarize the risks associated with ingestion of contaminated ground water.

The analyses performed indicated that the MEW Site currently presents an unacceptable risk to human health and the environment for all of the exposure scenarios. With respect to the ground water, available information on the regional geologic conditions indicates there is not a barrier in the limestone bedrock to prevent downward contaminant migration in the ground water. The depth to the first barrier is estimated to be approximately 1,000 feet. Because the potential for exposure is greater due to increased ground water usage at such depths, the contamination must be addressed.

7.0 REMEDIAL GOALS

EPA's national goal for the Superfund program is to select remedies that will be protective of human health and the environment, that will maintain protection over time and that will minimize untreated waste. In establishing remedial goals for the MEW Site, EPA considered applicable or relevant and appropriate requirements (ARARs) specific to the contaminants of concern; the Risk Assessment; Maximum Contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLGs) established under the Safe Drinking Water Act; and EPA guidance and policy, specifically the TSCA PCB Spill Cleanup Policy, 40 C.F.R. Part 761 (A complete list of ARARs for the selected remedy is included as Appendix A).

For soil contamination, EPA considers a cleanup level of 10 ppm PCBs to a depth of four feet and 100 ppm in soils below four feet to be protective of human health and the environment. With these cleanup levels, the geometric mean of analytical data of samples obtained outside the area to be excavated is estimated to be 6 ppm. This residual contamination concentration, after cleanup, represents an excess upper bound lifetime cancer risk on the order of 2×10^{-5}. These cleanup levels are consistent with the TSCA PCB Spill Cleanup Policy.

<u>TABLE 1</u> -- SUMMARY OF PCB EXPOSURE RISKS FOR CHILDREN
MISSOURI ELECTRIC WORKS SITE

<u>Current Use -- Hazard Index (HI)</u>

Recreational

Exposure Point	Worst Case	Most Probable Case
Ingestion	2.47	0.00356
Dermal	8.51	0.0123
Inhalation	0.000140	0.0000349
Total	10.980140	0.0158949

Residential

Exposure Point	Worst Case	Most Probable Case
Ingestion	91.5	0.132
Dermal	315	0.454
Inhalation	0.0620	0.0155
Total	406.5620	0.6015

<u>Future Use -- Hazard Index</u>

Recreational

Exposure Point	Worst Case	Most Probable Case
Ingestion	6.24	0.00898
Dermal	10.4	0.015
Inhalation	0.000167	0.0000419
Total	16.640167	0.0240219

Residential

Exposure Point	Worst Case	Most Probable Case
Ingestion	189	0.272
Dermal	315	0.0454
Inhalation	0.0620	0.0155
Total	504.0620	0.3329

TABLE 2 -- SUMMARY OF PCB EXPOSURE RISKS FOR ADULTS MISSOURI ELECTRIC WORKS SITE

Current Use -- Hazard Index

Recreational

Exposure Point	Worst Case	Most Probable Case
Ingestion	0.0548	0.0000791
Dermal	3.08	0.00443
Inhalation	0.000131	0.0000326
Total	3.134931	0.0045417

Residential

Exposure Point	Worst Case	Most Probable Case
Ingestion	0.284	0.000410
Dermal	16.0	0.0230
Inhalation	0.0580	0.0145
Total	16.342	0.03791

Occupational

Exposure Point	Worst Case	Most Probable Case
Ingestion	0.365	0.000527
Dermal	20.5	0.0295
Inhalation	0.0193	0.00483
Total	20.8843	0.034857

TABLE 3 -- SUMMARY OF PCB EXPOSURE RISKS FOR ADULTS
MISSOURI ELECTRIC WORKS SITE

Future Use -- Hazard Index

Recreational

Exposure Point	Worst Case	Most Probable Case
Ingestion	0.650	0.000938
Dermal	3.76	0.00541
Inhalation	0.000157	0.0000392
Total	4.410157	0.0063872

Residential

Exposure Point	Worst Case	Most Probable Case
Ingestion	20.3	0.0293
Dermal	114	0.164
Inhalation	0.0580	0.0145
Total	134.358	0.2078

Occupational

Exposure Point	Worst Case	Most Probable Case
Ingestion	20.3	0.0293
Dermal	114	0.164
Inhalation	0.0193	0.00483
Total	134.3193	0.19813

TABLE 4 -- SUMMARY OF PCB EXPOSURE RISKS FOR CHILDREN MISSOURI ELECTRIC WORKS SITE

Current Use -- Increased Cancer Risks

Recreational

Exposure Point	Worst Case	Most Probable Case
Ingestion	$1x10^{-3}$	$2x10^{-6}$
Dermal	$4x10^{-3}$	$4x10^{-3}$
Inhalation	$6x10^{-8}$	$2x10^{-8}$
Total	$5x10^{-3}$	$4x10^{-3}$

Residential

Ingestion	$1x10^{-2}$	$2x10^{-5}$
Dermal	$4x10^{-2}$	$4x10^{-2}$
Inhalation	$3x10^{-5}$	$7x10^{-6}$
Total	$5x10^{-2}$	$4x10^{-2}$

Future Use -- Increased Cancer Risks

Recreational

Exposure Point	Worst Case	Most Probable Case
Ingestion	$3x10^{-3}$	$4x10^{-6}$
Dermal	$5x10^{-3}$	$7x10^{-6}$
Inhalation	$8x10^{-8}$	$2x10^{-8}$
Total	$8x10^{-3}$	$1.1x10^{-5}$

Residential

Ingestion	$8x10^{-2}$	$1x10^{-4}$
Dermal	$1x10^{-1}$	$2x10^{-4}$
Inhalation	$3x10^{-5}$	$7x10^{-6}$
Total	$1.8x10^{-1}$	$3x10^{-4}$

TABLE 5 -- SUMMARY OF PCB EXPOSURE RISKS FOR ADULTS
MISSOURI ELECTRIC WORKS SITE

Current Use -- Increased Cancer Risks

Recreational

Exposure Point	Worst Case	Most Probable Case
Ingestion	$3x10^{-5}$	$4x10^{-8}$
Dermal	$1x10^{-3}$	$2x10^{-6}$
Inhalation	$6x10^{-8}$	$1x10^{-8}$
Total	$1x10^{-3}$	$2x10^{-6}$

Residential

Exposure Point	Worst Case	Most Probable Case
Ingestion	$1x10^{-4}$	$2x10^{-7}$
Dermal	$7x10^{-3}$	$1x10^{-5}$
Inhalation	$3x10^{-5}$	$6x10^{-6}$
Total	$7.1x10^{-3}$	$1.6x10^{-5}$

Occupational

Exposure Point	Worst Case	Most Probable Case
Ingestion	$2x10^{-4}$	$2x10^{-7}$
Dermal	$9x10^{-3}$	$1x10^{-5}$
Inhalation	$6x10^{-6}$	$2x10^{-6}$
Total	$9x10^{-3}$	$1.2x10^{-5}$

TABLE 6 -- SUMMARY OF PCB EXPOSURE RISKS FOR ADULTS
MISSOURI ELECTRIC WORKS SITE

Future Use -- Increased Cancer Risks

Recreational

Exposure Point	Worst Case	Most Probable Case
Ingestion	$3x10^{-4}$	$4x10^{-7}$
Dermal	$2x10^{-3}$	$2x10^{-6}$
Inhalation	$7x10^{-8}$	$2x10^{-8}$
Total	$2.3x10^{-3}$	$2.4x10^{-6}$

Residential

Exposure Point	Worst Case	Most Probable Case
Ingestion	$9x10^{-3}$	$1x10^{-5}$
Dermal	$5x10^{-2}$	$7x10^{-5}$
Inhalation	$3x10^{-5}$	$6x10^{-6}$
Total	$5.9x10^{-2}$	$8.6x10^{-5}$

Occupational

Exposure Point	Worst Case	Most Probable Case
Ingestion	$6x10^{-3}$	$9x10^{-6}$
Dermal	$4x10^{-2}$	$5x10^{-5}$
Inhalation	$6x10^{-6}$	$2x10^{-6}$
Total	$4.6x10^{-2}$	$6.1x10^{-5}$

TABLE 7 -- SUMMARY OF EXPOSURE RISKS FOR ADULTS INGESTION OF VOC-CONTAMINATED GROUND WATER MISSOURI ELECTRIC WORKS SITE

Future Use -- Hazard Index

Residential

Contaminant	Worst Case	Most Probable Case
Trans 1,2-dichloroethene	0.055	0.011
Chlorobenzene	0.240	0.0094
1,1-dichloroethane	0.0036	0.0078
Trichloroethene	(1)	(1)
Tetrachloroethene	0.024	0.0044
Benzene	(1)	(1)
Total	0.3226	0.0326

Occupational

Contaminant	Worst Case	Most Probable Case
Trans 1,2-dichloroethene	0.0275	0.0055
Chlorobenzene	0.120	0.0047
1,1-dichloroethane	0.0018	0.0039
Trichloroethene	(1)	(1)
Tetrachloroethene	0.0120	0.0022
Benzene	(1)	(1)
Total	0.1613	0.01613

(1) The Hazard Index cannot be calculated since an acceptable dose has not been established.

TABLE 8 -- SUMMARY OF EXPOSURE RISKS FOR ADULTS INGESTION OF VOC-CONTAMINATED GROUND WATER MISSOURI ELECTRIC WORKS SITE

Future Use -- Increased Cancer Risk

Residential

Contaminant	Worst Case	Most Probable Case
Trans 1,2-dichloroethene	(1)	(1)
Chlorobenzene	(1)	(1)
1,1-dichloroethane	2×10^{-5}	4×10^{-6}
Trichloroethene	2×10^{-6}	4×10^{-7}
Tetrachloroethene	7×10^{-6}	1×10^{-6}
Benzene	2×10^{-6}	9×10^{-7}
Total	3×10^{-5}	6×10^{-6}

Occupational

Contaminant	Worst Case	Most Probable Case
Trans 1,2-dichloroethene	(1)	(1)
Chlorobenzene	(1)	(1)
1,1-dichloroethane	7×10^{-6}	1×10^{-6}
Trichloroethene	8×10^{-7}	1×10^{-7}
Tetrachloroethene	3×10^{-6}	5×10^{-7}
Benzene	7×10^{-7}	3×10^{-7}
Total	1×10^{-5}	2×10^{-6}

(1) Incremental risk cannot be calculated since a carcinogenic potency factor is not established.

TABLE 9 -- SUMMARY OF EXPOSURE RISKS FOR CHILDREN INGESTION OF VOC-CONTAMINATED GROUND WATER MISSOURI ELECTRIC WORKS SITE

Future Use -- Hazard Index

Residential

Contaminant	Worst Case	Most Probable Case
Trans 1,2-dichloroethene	0.175	0.0345
Chlorobenzene	0.750	0.0295
1,1-dichloroethane	0.011	0.0025
Trichloroethene	(1)	(1)
Tetrachloroethene	0.076	0.0140
Benzene	(1)	(1)
Total	1.012	0.0805

Future Use -- Increased Cancer Risk

Residential

Contaminant	Worst Case	Most Probable Case
Trans 1,2-dichloroethene	(2)	(2)
Chlorobenzene	(2)	(2)
1,1-dichloroethane	$9x10^{-6}$	$2x10^{-6}$
Trichloroethene	$1x10^{-6}$	$2x10^{-7}$
Tetrachloroethene	$3x10^{-6}$	$6x10^{-7}$
Benzene	$6x10^{-6}$	$3x10^{-6}$
Total	$2x10^{-5}$	$6x10^{-6}$

(1) The Hazard Index cannot be calculated since an acceptable dose has not been established.

(2) Incremental risk cannot be calculated since a carcinogenic potency factor is not established.

For ground water contamination, EPA has determined that a cleanup level of 20 ppb for chlorobenzene, which has been detected at levels up to 240 ppb, and 5 ppb for trichloroethene (TCE), which has been detected at levels up to 19 ppb, is adequate to protect human health and the environment. The residual contamination levels, after cleanup, represent an excess upper bound life-time cancer risk on the order of 1×10^{-5}. These cleanup levels comply with Missouri Water Quality Standards and the MCLs for those contaminants.

The cleanup levels for the MEW Site result in cancer risks in excess of 1×10^{-6}, which is the point of departure for determining remediation goals. The cleanup levels for the Site have been identified after considering the background levels of PCBs in the environment and the technical impracticability of removing PCBs below 10 ppm. Ground water cleanup levels were selected based on the technical limits of remediation. Case studies for ground water remediations have indicated that the effective removal of contaminants from the ground water lessens as contaminant concentrations decrease.

8.0 DESCRIPTION OF ALTERNATIVES

The MEWSC performed a Feasibility Study (FS) to develop and evaluate alternatives for remediation of the contaminated soil and ground water at the Site. The remedial alternatives developed and evaluated in the FS are presented below. (Alternatives for contaminated soil are identified with an "SM" prefix; ground water alternatives are identified with a "GM" prefix. Identification numbers match those presented in the FS.)

For Contaminated Soils:

- Alternative SM-1 - No Action Alternative
- Alternative SM-2 - Limited Action Alternative
- Alternative SM-4 - Asphalt Cap
- Alternative SM-6 - Offsite Landfill
- Alternative SM-7 - Solidification/Fixation
- Alternative SM-8 - Solvent Extraction
- Alternative SM-10 - In-Situ Vitrification
- Alternative SM-11 - Rotary Kiln Incineration

For Ground Water Contamination:

- -- Alternative GM-1 - No Action
- -- Alternative GM-2 - Limited Action Alternative
- -- Alternative GM-3 - Extraction with Discharge to Surface Water
- -- Alternative GM-4 - Extraction with Discharge to POTW
- -- Alternative GM-5 - Air-Stripping
- -- Alternative GM-6 - Liquid Phase Carbon Adsorption
- -- Alternative GM-7 - Ultraviolet Catalyzed Oxidation

8.1 Soil/Sediment Remedial Alternatives

All PCB-contaminated soils with concentrations in excess of 10 ppm will be addressed during this remedial action. The volume of PCB-contaminated soils and sediments to be addressed with this remedial action is estimated to be 20,500 cubic yards. This estimate is based on the RI and other investigations performed at the Site.

8.1.1 No Action Alternative (SM-1)

As set forth in the National Contingency Plan, 40 CFR Part 300 (NCP), a no action alternative must be considered in the evaluation and selection of a remedial action for NPL sites. This alternative would provide no treatment of the soils or ground water, nor any engineering controls or institutional controls. Current site conditions, migration routes, and exposures would remain unchanged in the near- and long-term. Treatability tests will not be required. No costs would be associated with this remedy.

8.1.2 Limited Action Alternative (SM-2)

The Limited Action alternative for the MEW Site incorporates physical and institutional controls to limit direct exposure to the contaminated soils/sediments/waste, and provides for long-term monitoring and maintenance of the Site. This alternative would consist of: installation of a physical barrier around all onsite and offsite areas exhibiting surficial soil PCB concentrations of 10 ppm or greater; use of institutional controls to prohibit disturbance of contaminated soils/sediments/waste and to restrict use of the Site to industrial purposes; and maintenance of the site including vegetative cover, perimeter fencing, and all other appropriate support facilities. Treatability tests would not be required. Monitoring and maintenance would continue for at least 30 years.

Estimated Time for Construction	2 months
Estimated Time to Implement	30 years
Estimated Capital Cost	$65,000
Estimated Annual Operation and Maintenance Cost	$7,000
Estimated Present Worth Cost	$140,325

8.1.3 **Asphalt Cap Alternative (SM-4)**

The alternative would involve consolidating the contaminated soils and covering them with a low permeability asphalt cap. The purpose of this cap would be to reduce the potential for migration of contamination into the ground water, prevent direct contact with the waste mass and reduce potential migration from storm water and/or precipitation runoff. All contaminated soils from offsite areas would be consolidated with soils from some onsite areas to occupy approximately four acres located in the eastern two-thirds of the MEW property. Rip-rap would be placed on the side slopes of the property to minimize the potential for migration due to erosion. Heavy equipment would be used to construct the cap, which would probably be constructed of asphalt. Treatability tests would not be required. After construction, fences would be erected around the MEW property, signs would be installed and a monitoring/maintenance program initiated. Monitoring and maintenance would continue for at least 30 years.

Estimated Time for Construction	2 months
Estimated Time to Implement	30 years
Estimated Capital Cost	$825,000
Estimated Annual Operation and Maintenance Cost	$13,000
Estimated Present Worth Cost	$950,000

8.1.4 **Offsite Landfill Alternative (SM-6)**

All soils contaminated with concentrations of PCBs of 10 ppm or greater would be excavated to a depth of four feet; below that depth, those areas with PCB concentrations in excess of 100 ppm would be excavated. The excavated material would be transported offsite by truck to a TSCA-permitted chemical waste landfill. The excavated areas would be backfilled, using clean material from offsite borrow areas, and revegetated. The principal components of this alternative would consist of identification of an EPA-approved facility to accept the PCB-contaminated soils; excavation and transportation of the contaminated soils; placement of the contaminated soils in the selected facility; restoration of the MEW Site, including backfilling, compaction, and final grading for drainage; and revegetation of the MEW Site. Testing of the excavated soils would be required to verify landfill acceptance.

Estimated Time to Implement	2 months
Estimated Capital Cost	$10,900,000
Estimated Annual Operation and Maintenance Cost	$0
Estimated Present Worth Cost	$10,900,000

NOTE: For soil alternatives SM-6, SM-7, SM-8, and SM-10, all soils contaminated with PCB concentrations of 10 ppm or greater would be excavated to a depth of four feet; below that depth soils containing PCBs in excess of 100 ppm would be excavated. The excavated material would be stockpiled on the MEW property in areas constructed to contain runoff and the piles would be covered to minimize contaminant migration due to wind erosion.

8.1.5 **Onsite Stabilization/Fixation Alternative (SM-7)**

Stabilization/Fixation is a treatment process which employs additives to diminish the hazardous nature of materials containing hazardous constituents by converting the waste into a form that immobilizes the hazardous constituents within a stable matrix. Stabilization processes typically involve mixing the waste with chemical reagents to immobilize contaminants and improve the physical properties of the waste. This process would reduce the migration potential of the PCBs. Treatability tests would be required to identify the most effective additives and the optimum percentage and ratios of the additives. The excavated soils would be processed and fed into a mixer (similar to a pug mill) where the moisture content would be adjusted and a stabilization/fixation agent added. Tight controls on mixture ratios would be exercised. A high degree of quality control would be required and exercised during the mixing and blending process. An area on the MEW property would be excavated to create cells with sufficient volume to receive the processed soils. The processed soils would be transported to the excavated monolith area, placed and compacted in the cells. A soil cover, thirty (30) inches thick would be constructed over the cells. The cohesive nature (clayey) of the Site soils could cause a problem if additives are not effective in solidifying them or fixing the contamination; treatability tests would be required. Institutional controls would be required to restrict use of the MEW property. The area would be fenced and signs installed. Long-term monitoring would be initiated.

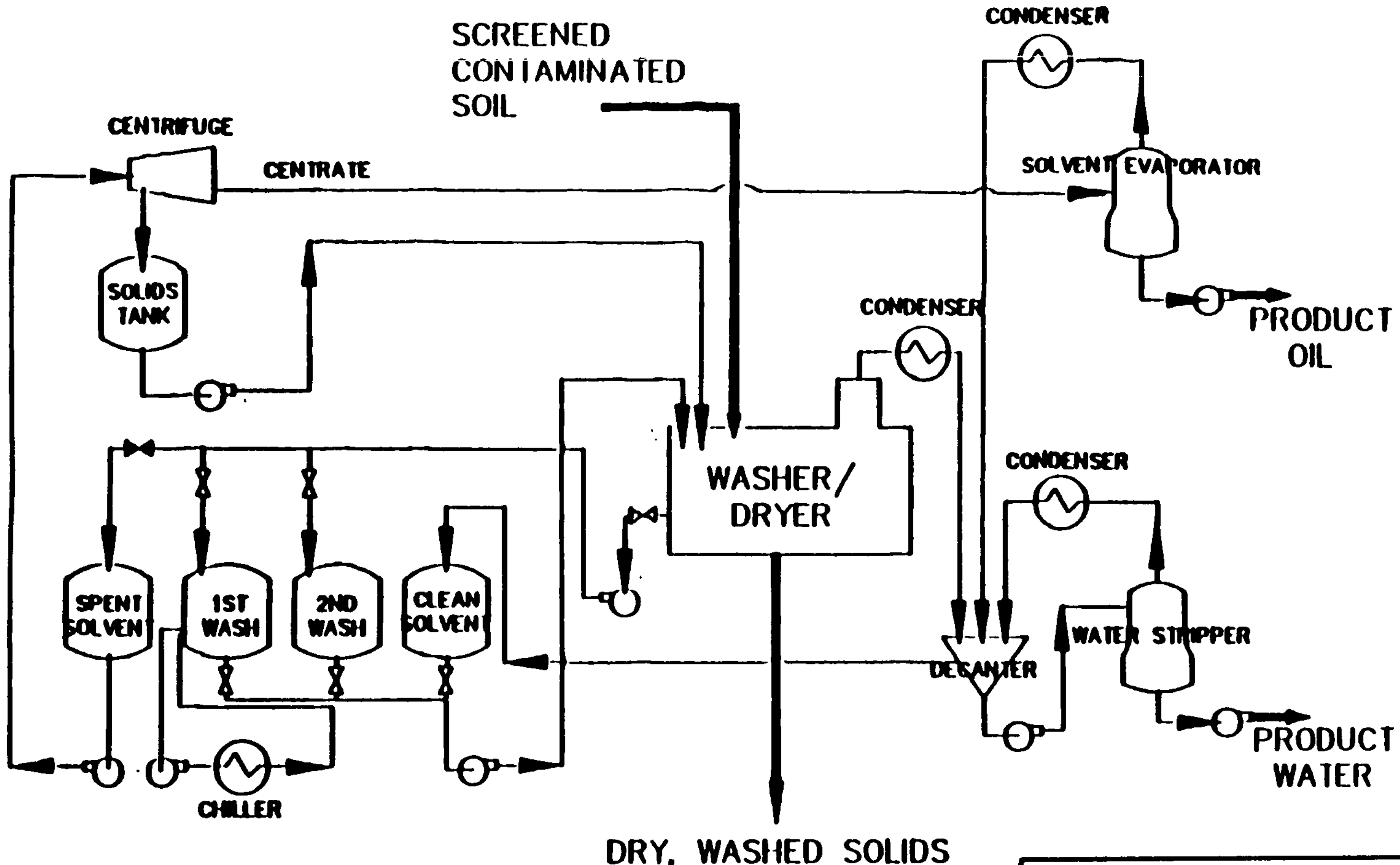
Estimated Time for Construction	1 year
Estimated Time to Implement	30 years
Estimated Capital Cost	$4,300,000
Estimated Annual Operation and Maintenance Cost	$13,500
Estimated Present Worth Cost	$4,400,000

8.1.6 **Solvent Extraction Alternative (SM-8)**

This alternative would employ a chemical separation process utilizing one or more of a family of aliphatic amine or other solvents. While the processes are designed to recover and recycle solvents used for extraction, the fine-grained nature of the soils at the MEW Site may hinder recovery, resulting in some amount of solvent remaining in treated soils. Site soils may reduce the effectiveness of the process thereby making it more difficult to implement. The availability of the process equipment is uncertain. Solvent extraction processes applied to soil contamination are generally considered to be in a developmental/ demonstration state. Studies have shown the process to be capable of 99+ percent removal of PCBs from a wide variety of sludges, soils and sediments. Excavated soils would require processing prior to treatment. The soils would be placed in a closed mixing chamber where a chilled solvent would then be introduced. Mixing would occur, the solids would be allowed to settle, and the solvent would be pumped off. Additional solvent "charges" would be added, as necessary, to attain cleanup standards (see Figure 6 for a diagram of the process). Extracted PCBs would be collected, stored and disposed offsite by incineration in accordance with TSCA regulations. Residual water may be a byproduct of the process. This water could require testing and additional treatment. Construction of a wastewater treatment plant to process the residual water could be necessary. (The costs presented below do not include those for a wastewater treatment plant.) The excavated areas would be backfilled, using the treated soils and covered with a clean soil cover.

A treatability study would be needed for this remedial action alternative to evaluate its feasibility for the Site conditions and to evaluate the reaction time needed to achieve cleanup levels.

Estimated Time to Implement	1 year
Estimated Capital Cost	$6,400,000
Estimated Annual Operation and Maintenance Cost	$0
Estimated Present Worth Cost	$6,400,000



Missouri Electric Works Site
Record Of Decision

Figure 6 – Typical Solvent Extraction Process

8.1.7 **In-Situ Vitrification Alternative (SM-10)**

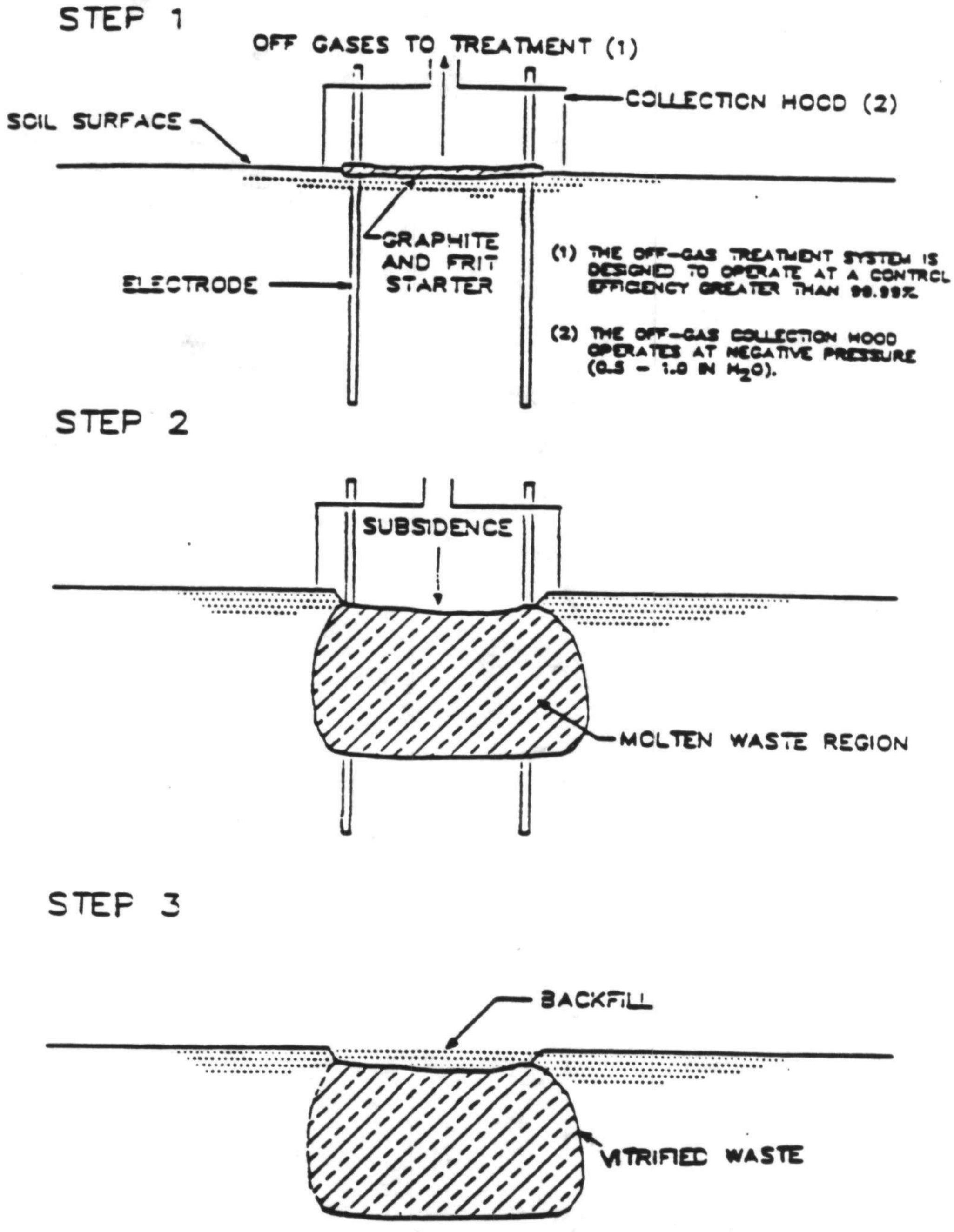
In-situ vitrification is a treatment process that uses an electric current to heat soils to their melting point. Due to the relatively shallow depth of contamination at the Site, contaminated soils would be excavated and placed in 12 to 15-foot trenches for treatment. Electrodes would be placed into the soil in the trenches and an electric current induced between the electrodes. The current would heat the soils, causing them to melt. The melting soils would cause a 20 to 40 percent reduction in the volume of the soils being treated. This process has been shown to destroy organic contaminants, i.e, PCBs, by pyrolyzing them (see Figure 7). By-products of the pyrolysis migrate to the surface and burn in the presence of oxygen. A specially designed hood would be placed over the treatment area to collect gases generated during the processing and maintain a controlled atmosphere in which the gases could burn. The gases in the hood would be processed through various steps before being released into the atmosphere. Treatability tests are likely to be needed.

Estimated Time to Implement	1 year
Estimated Capital Cost	$11,200,000
Estimated Annual Operation and Maintenance Cost	$0
Estimated Present Worth Cost	$11,200,000

8.1.8 **Onsite Incineration Alternative (SM-11)**

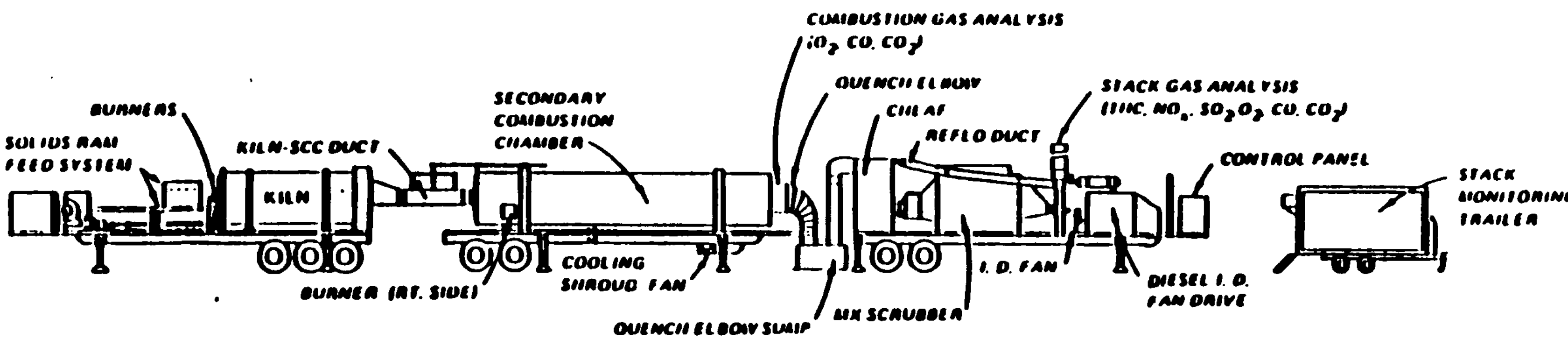
The onsite incineration alternative provides an onsite treatment process to manage PCB-contaminated soils from all onsite and offsite areas. Rotary kiln incinerators (see Figure 8) are probably the most common type of equipment used for mobile incineration because they have been commercially proven, provide flexibility in handling many types of materials and provide good mixing and long residence times for solids. A trial burn would be required to identify the residence time required to destroy the PCB contamination.

The incineration operation would require approximately one acre of space at the Site. The contaminated soils would be processed to obtain the proper particle size and then "fed" into the lower end of the combustion chamber. Use of a high combustion air velocity and circulating solids would result in a uniform temperature around the combustion loop resulting in rapid heating of the materials and highly efficient combustion, thus eliminating the need for an afterburner or secondary combustion of off-gases. Thermal treatment would achieve a PCB-destruction efficiency of 99.9999 percent.



Missouri Electric Works Site
Record Of Decision

Figure 7 – In-situ Vitrification Process



Missouri Electric Works Site
Record Of Decision

Figure 8 - Schematic Of Rotary Kiln Process (Onsite Incineration)

Exhaust gases would be routed to air pollution control devices consisting of flue-gas coolers and particulate removal systems before being released to the atmosphere. Acid gases would be removed in-situ. During operation, treated soil and ash would be removed periodically and cooled.

After thermal treatment, the treated soils and ash would be tested using, the Toxicity Characteristic Leaching Procedure (TCLP) prior to their use as backfill for the excavated areas of the Site. After backfilling the excavated areas, a soil cover would be constructed over the Site and the Site would be revegetated.

Estimated Time to Implement	1-2 years
Estimated Capital Cost	$8,400,000
Estimated Annual Operation and Maintenance Cost	$0
Estimated Present Worth Cost	$8,400,000

8.2 <u>Ground Water Remedial Alternatives</u>

Based on available data, it is estimated that the volume of ground water that will require treatment is 1,000,000 gallons. This figure is based on information gathered during the installation and sampling of the monitoring wells.

8.2.1 **No Action Alternative (GM-1)**

As set forth in the NCP, a no action alternative must be considered in the evaluation and selection of a remedial action for an NPL site. This alternative would provide no treatment of ground water, no engineering controls or institutional controls. Current Site conditions, migration routes and exposures would remain unchanged in the near- and long-term. No costs would be associated with this remedy.

8.2.2 **Limited Action Alternative (GM-2)**

This alternative would incorporate physical and institutional controls to prevent or limit direct exposure to the contaminated soils/sediments and ground water and would provide for monitoring of the ground water contamination. Monitoring of the ground water would be accomplished using an array of onsite and downgradient wells designed to track the leading edge of the contamination plume and quantify horizontal migration within the water bearing unit. Analytical data gathered during the monitoring activities would be evaluated to determine if additional remedial actions are necessary. The monitoring would be continued until contaminant levels in the ground water fall below the MCLs (it is assumed that the monitoring would continue for 30 years).

Estimated Time for Construction	2 months
Estimated Time to Implement	30 years
Estimated Capital Cost	$73,500
Estimated Annual Operation and Maintenance Cost	$36,000
Estimated Present Worth Cost (30 years, 10%)	$375,000

For Alternatives GM-3 through GM-7, a ground water extraction system consisting of six to ten wells would be constructed. Prior to the installation of the ground water remediation system, additional investigation of the hydrogeologic regime in the vicinity of the MEW Site will be performed. The purpose of this investigation will be to identify information necessary for the design of the ground water remediation system. This system would be used to remove the contaminated ground water. Figure 9 presents a possible configuration of extraction wells and their relation to the ground water contaminant plume.

8.2.3 Extraction and Discharge to Surface Waters Alternative (GM-3)

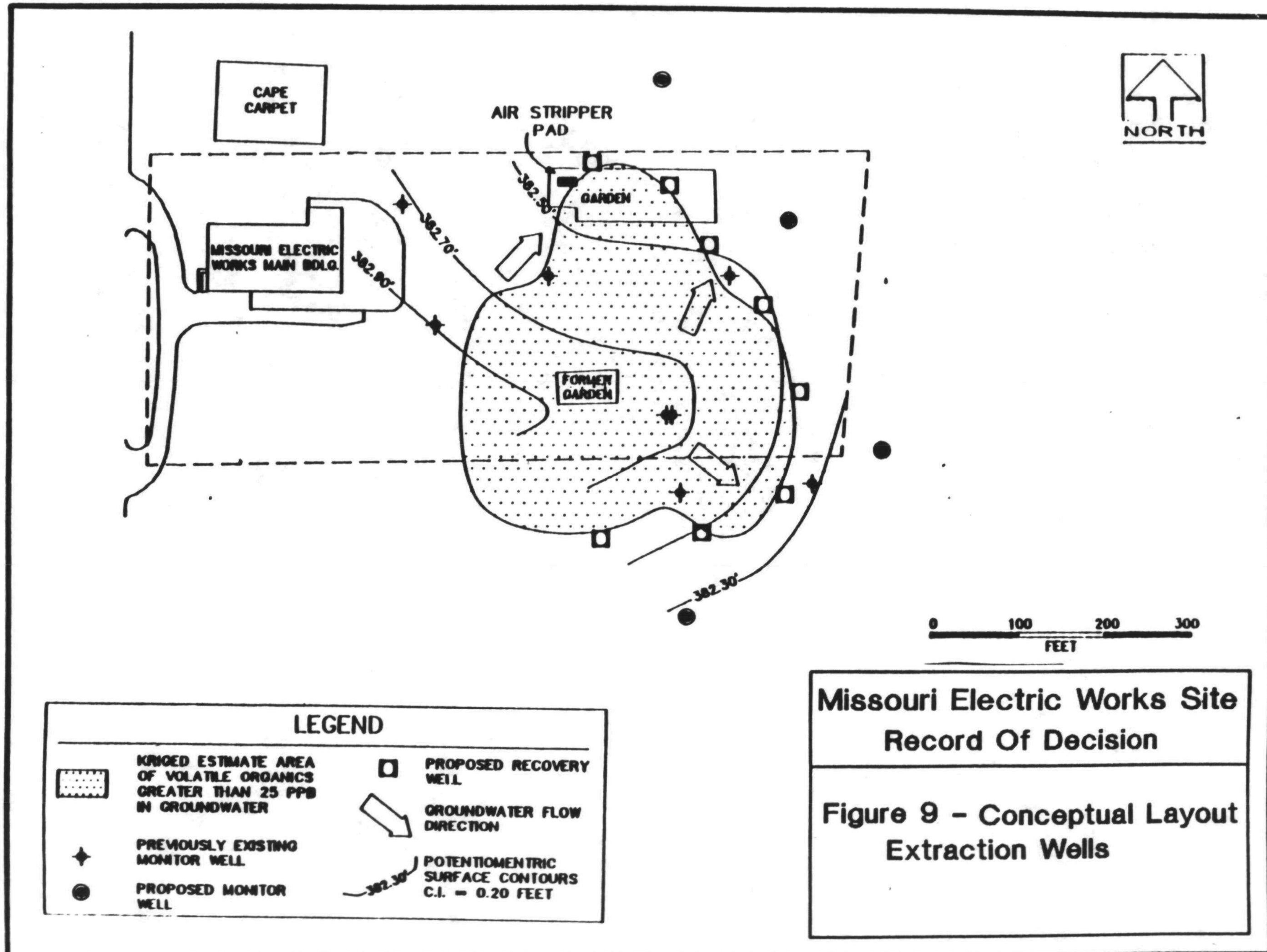
After extraction, the ground water would be discharged through an effluent monitoring station to a release point along the Wilson Road ditch. This alternative would essentially remove the contaminants from the ground water and place them in the surface water/sediment and atmosphere. It relies solely on dilution to meet the Water Quality Criteria. It would increase the mobility of the contaminants due to volatilization.

Estimated Time to Implement	15 years
Estimated Capital Cost	$165,000
Estimated Annual Operation and Maintenance Cost	$12,000
Estimated Present Worth Cost (15 years, 10%)	$510,000

8.2.4 Extraction with Discharge to Publicly Owned Treatment Works (POTW) Alternative (GM-4)

After extraction, the ground water would be discharged to the municipal water treatment system for treatment. This alternative would continue until cleanup levels are met (estimated to be 30 years). Monitoring of the ground water quality would be needed periodically to ensure that discharge requirements were met.

Estimated Time to Implement	30 years
Estimated Capital Cost	$100,000
Estimated Annual Operation and Maintenance Cost	$108,00
Estimated Present Worth Cost (30 years, 10%)	$1,100,0C



Missouri Electric Works Site
Record Of Decision

Figure 9 - Conceptual Layout Extraction Wells

NOTE: All ground water treatment technologies described in the following paragraphs are estimated to continue for a period of approximately 15 years. Extraction of ground water would control migration of the contaminant plume. Monitoring to evaluate the effectiveness of the treatment technology and maintenance of the ground water extraction system would be required for all treatment technologies.

8.2.5 **Air-Stripping Alternative (GM-5)**

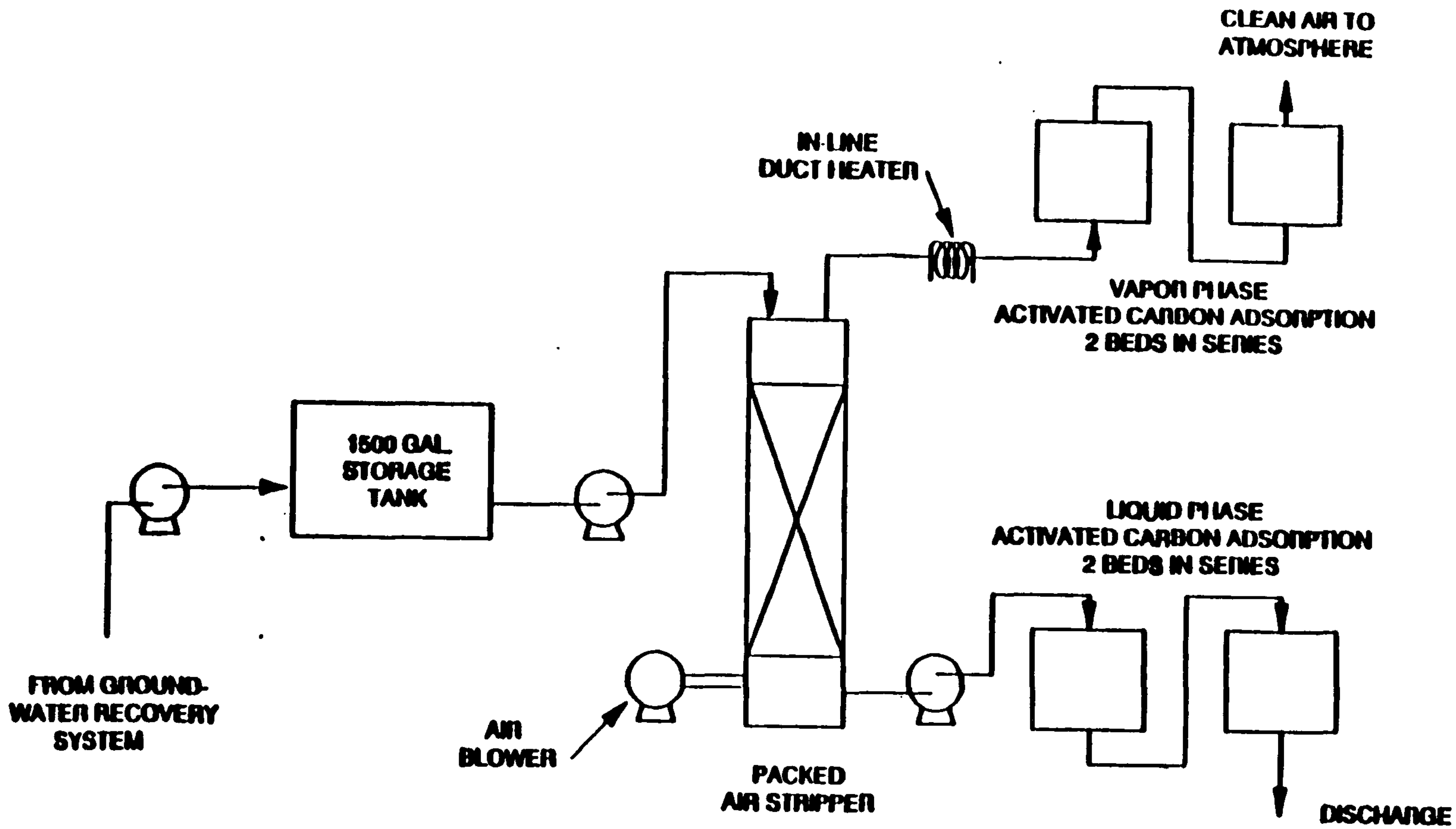
After extraction, the ground water would be pumped through a filter system to remove suspended particulates. This would be followed by injection into the top of a packed air-stripper column equipped with an air blower. The treated water effluent would then be piped to an outfall along Wilson Road or to the local Publicly Owned Treatment Works (POTW). The VOCs "stripped" from the ground water would be processed through a vapor-phase carbon adsorption filter to prevent the release of VOCs to the atmosphere. A schematic of an air-stripping process is presented in Figure 10. The volume and quality of the treated effluent would be monitored prior to its release. Treatability studies would be needed prior to final design of the system. Process residuals, such as the spent activated carbon, would require disposal.

Estimated Time to Implement	15 years
Estimated Capital Cost	$242,000
Estimated Annual Operation and Maintenance Cost	$64,010
Estimated Present Worth Cost (15 years, 10%)	$730,000

8.2.6 **Liquid Phase Carbon Adsorption Alternative (GM-6)**

After extraction, the ground water would be pumped through a filter system to remove suspended particulates that could cause clogging of the carbon bed. Effluent from the filtration unit would flow to carbon adsorption units. Treated effluent would be discharged, after sampling and monitoring, to an outfall along Wilson Road or released to the local POTW. The carbon adsorption units would require recharging after their adsorption capacities had been depleted.

Estimated Time to Implement	15 years
Estimated Capital Cost	$218,875
Estimated Annual Operation and Maintenance Cost	$85,000
Estimated Present Worth Cost (15 years, 10%)	$860,500



Missouri Electric Works Site
Record Of Decision

Figure 10 – Schematic of Air-stripper

8.2.7 **Ultraviolet Catalyzed Oxidation Alternative (GM-7)**

After extraction, the ground water would be pumped into the ozone/ultraviolet (UV) unit where hydrogen peroxide would be added and mixed, followed by addition of ozone. The mixture would be subjected to ultraviolet radiation which acts as a catalyst for the oxidation reaction. The oxidation reaction "strips" volatiles from the ground water. Off-gases would be decomposed catalytically. This is an innovative technology. A treatability study would be required. This alternative destroys the contaminants rather than "fixing" them on carbon.

Estimated Time to Implement	15 years
Estimated Capital Cost	$380,000
Estimated Annual Operation and Maintenance Cost	$12,000
Estimated Present Worth Cost (15 years, 10%)	$850,000

9.0 <u>**SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES**</u>

The NCP has established nine criteria to be used to evaluate remedial alternatives. To select a remedy, each alternative must be evaluated with regard to these criteria and then compared to each other (see Tables 10 and 11).

The selected remedy is that alternative that provided the best balance of trade-offs in this comparative analysis.

EPA has determined that the best alternatives for the MEW Site are SM-11 (onsite incineration) and GM-5 (air-stripping). As discussed below, SM-11 and GM-5 provide the best balance of trade-offs among the alternatives with respect to the nine criteria.

The NCP prioritizes the nine criteria into three categories. The first such category is <u>threshold criteria</u>. An alternative must meet the following two requirements to be considered as a final remedy for the Site:

9.1 **Overall Protection of Human Health and the Environment**

The selected remedy for soil contamination is to excavate and thermally destroy the PCB-contaminated soils. The selected remedy for ground water contamination is to extract the contaminated water and treat it by air-stripping followed by vapor phase carbon adsorption. These alternatives will reduce the exposure to contaminated soils and ground water to protective levels and also minimize the potential for contaminant migration.

TABLE 10

EVALUATION OF REMEDIAL ALTERNATIVES IDENTIFIED IN THE FEASIBILITY STUDY MISSOURI ELECTRIC WORKS SITE CAPE GIRARDEAU, MISSOURI

PCB Contaminated Soil

Remedial Alternative Description	Protective of Human Health & Environment	Complies with ARARs	Long-Term Effectiveness	Reduction of			Short-Term Effectiveness	Can It be Implemented	Cost	State Acceptance	Community Acceptance
				Mobility	Toxicity	Volume					
SM-1 No Action	No	No	No	No	No	No	No	Yes	0	No	No
SM-2 Limited Action	No	No	No	No	No	No	No	Yes	140,325	No	No
SM-4 Asphalt Cap	No	No	No	No	No	No	Yes	Yes	630,000	No	No
SM-6 Offsite Landfill	Yes	Yes	Yes	No	No	No	Yes	Yes	10,900,000	--	--
SM-7 Stabilization/ Fixation	Yes	Yes	Yes	Yes	No	No	Yes	Yes	4,400,000	--	--
SM-8 Solvent Extraction	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	6,400,000	--	--
SM-10 In-situ Vitrification	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	11,100,000	--	--
SM-11 Onsite Incineration	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	8,400,000	Yes	Yes

TABLE 11

EVALUATION OF REMEDIAL ALTERNATIVES IDENTIFIED IN THE FEASIBILITY STUDY MISSOURI ELECTRIC WORKS SITE CAPE GIRARDEAU, MISSOURI

VOC-Contaminated Ground Water

Remedial Alternative Description	Protective of Human Health & Environment	Complies with ARARs	Long-Term Effectiveness	Reduction of			Short-Term Effectiveness	Can It be Implemented	Cost	State Acceptance	Community Acceptance
				Mobility	Toxicity	Volume					
GW-1 No Action	No	No	No	No	No	No	No	Yes	0	No	No
GW-2 Limited Action	Yes	No	No	No	No	No	No	Yes	375,000	No	--
GW-3 Extraction/Surface Water	Yes	No	No	No	No	No	--	Yes	510,000	--	--
GW-4 Extraction/Local POTW	Yes	Yes	Yes	Yes	Yes	Yes	--	Yes	1,100,000	--	--
GW-5 Air-stripping	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	730,000	Yes	Yes
GW-6 Liquid Phase Carbon Adsorption	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	860,000	--	--
GW-7 Ultraviolet Catalyzed Oxidation	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	850,000	--	--

The No Action (SM-1/GM-1) and soil Limited Action (SM-2) Alternatives and the Asphalt Cap Alternative (SM-4) do not provide overall protection to human health and the environment. These alternatives rely on physical barriers and institutional controls to reduce or minimize the threat of contact with the contaminated materials. They do not significantly reduce the risks to human health or the environment represented by Site conditions, and therefore unacceptable residual risk remains.

The soil alternatives (SM-1, SM-2, and SM-4) do not provide any technology which would treat the PCB contamination to decrease its toxicity, mobility or volume. The PCB contamination would not be reduced with direct contact limited only by an asphalt cap or perimeter fencing. The fence would not provide a barrier to migration of the contaminated soils by either wind or runoff. Cracking and deterioration of the cap would expose the underlying contaminated soils. Construction of a cap would require greater use of institutional controls and the potential for exposure would still exist. The source of VOC contamination to the ground water would not be removed by capping the Site.

The No Action ground water alternative in unacceptable because of the uncertainty of possible exposures. Available information on regional geologic conditions indicates that there is not a barrier in the limestone bedrock to prevent downward migration of the contamination for a depth of approximately 1,000 feet. Should no ground water barrier be present, the exposure and potential exposure to contaminated ground water has not been adequately addressed.

The ground water Limited Action Alternative (GM-2) may be considered to be protective of human health and the environment. While it relies on institutional controls and physical barriers to minimize the threat of contact with the contaminated materials, it also incorporates frequent monitoring of the ground water conditions. The monitoring data would be used to indicate if the contamination is posing additional risk to human health or the environment.

Soil Alternatives SM-8, SM-10 and SM-11, all use technologies that would destroy the PCBs bound to the soils and sediments. Institutional controls, such as deed restrictions, would be required for the residually contaminated property because the residual concentrations would result in unacceptable risk levels for residential use. However, with institutional controls there would be no long-term risk above acceptable levels. These technologies would result in the permanent elimination of the risks posed by the PCB contamination.

Ground water Alternatives GM-5, GM-6 and GM-7 would provide permanent elimination of the risks posed by the ground water contamination by removal and destruction of the volatile organic compounds. The long-term residual risk would be below acceptable levels.

Soil Alternative SM-7 would provide long-term reduction of risks presented by direct contact with PCBs. However, the 99+ percent destruction of PCBs in the soil and sediment is considered to be more protective of human health and the environment than simply encapsulating the contamination in a stabilized soil monolith.

Neither soil Alternative SM-4 nor ground water Alternative GM-3 would permanently eliminate residual risk.

9.2 Compliance with ARARS

The selected remedies will comply with all federal and state applicable or relevant and appropriate requirements (ARARs). Applicable requirements are those state or federal requirements legally applicable to the release or remedial action contemplated that specifically address a hazardous substance, pollutant, contaminant, remedial action, location or other circumstance found at the Site. If it is determined that a requirement is not applicable, it may still be relevant and appropriate to the circumstances of the release. Requirements are relevant and appropriate if they address problems or situations sufficiently similar to the circumstances of the release or remedial action contemplated and are well-suited to the Site.

Chemical-specific ARARs associated with the Site include the Toxic Substances Control Act; the National Ambient Air Quality Standards; and the National Emission Standards for Hazardous Air Pollutants. Also identified as ARARs for the Site are the Missouri State Water Quality Standards. As an EPA policy, the TSCA PCB Spill Cleanup Policy, 40 CFR Part 761, is to be considered in evaluating alternatives.

No federal location-specific ARARs were identified for the Site. However, the presence of a wetland south of the Site must be considered as the selected remedy cannot adversely affect the wetland area. A state location-specific ARAR, Protection of Lakes and Streams, Missouri Water Quality Standards (10 C.S.R. 20-7.031), was identified for the Site.

The federal action-specific ARARs for the Site are: all pertinent Occupational Safety and Health Act requirements; the Clean Water Act Regulations applicable to discharges to POTWs; all pertinent requirements in the Toxic Substances and Control Act, including its land disposal and incinerator standards for PCBs; and the Clean Air Act requirements applicable to incinerators. TSCA requires that thermal treatment destroy PCBs at an efficiency of 99.9999 percent with less than 2 ppm residual concentration of PCBs in the ash. A trial burn will be conducted to demonstrate that this requirement can be satisfied.

The No Action and Limited Action alternatives for soil and ground water do not satisfy chemical-specific ARARs. Nor does alternative GM-3 (extraction of ground water with discharge to surface water).

Offsite landfilling of the excavated soils, onsite stabilization/fixation, solvent extraction, and in-situ vitrification (soil Alternatives SM-6, SM-7, SM-8, and SM-10) and ground water Alternatives GM-4, GM-6 and GM-7 (extraction with discharge to POTW, liquid phase carbon adsorption, and ultraviolet catalyzed oxidation) would meet the chemical-specific, action-specific and location-specific ARARs identified in Appendix A.

Six alternatives, three soil and three ground water, did not meet threshold criteria. Specifically, these alternatives are: No Action for both soils and ground water (SM-1 and GM-1); Limited Action for both soils and ground water (SM-2 and GM-2); Asphalt Cap for soils (SM-4); and ground water extraction with discharge to surface water (GM-3). Because these alternatives did not meet threshold criteria, they were not considered further in the comparative analysis of alternatives.

The second category of criteria is primary balancing criteria. The following five criteria are used to evaluate the alternatives to determine the option that provides the best balance of trade-offs for the Site.

9.3 Long-Term Effectiveness and Permanence

The selected remedies will eliminate long-term risks associated with direct contact and potential migration of contaminants by destroying the PCB contamination through incineration of the soils onsite and by permanently removing and destroying the VOC contamination in the ground water by air-stripping followed through carbon adsorption.

Solvent extraction and in-situ vitrification of the soil (soil Alternatives SM-8 and SM-10), both involve treatment to destroy or remove the PCB-molecules. These alternatives would also eliminate the risks associated with the PCB-contamination.

Soil Alternative SM-7 (stabilization/fixation) would immobilize the PCB-contaminated soils by stabilizing them. However, the PCBs would not be destroyed. Accordingly, long-term monitoring, maintenance and institutional controls would be required. Degradation of the soil cover over the stabilized soils could expose the monolith to precipitation runoff (erosive forces), and freeze/thaw and wet/dry cycles. These forces have been shown to adversely affect the integrity of stabilized soils. Moreover, the Site is located in a seismic area. As a result the integrity of the monolith could be adversely affected by an earthquake.

Offsite landfilling of the contaminated soils (soil Alternative SM-6), would remove the contaminated soils from the Site. However, long-term effectiveness of this alternative is questionable since landfilling does not destroy or treat the contaminants.

Ground water alternatives GM-4 (extraction with discharge to POTW), GM-6 (extraction with liquid phase carbon adsorption) and GM-7 (extraction with ultraviolet catalyzed oxidation) would remove and treat the contaminants. However, long-term effectiveness at the place of disposal for GM-4 is questionable because the treatment of the ground water contamination would not be directly controlled by EPA. Alternatives GM-6 and GM-7 would provide long-term protection.

9.4 Reduction of Toxicity, Mobility, or Volume

The selected remedies will achieve reduction of toxicity, mobility, and volume of contaminants at the Site.

Soil Alternatives SM-8 and SM-10 (solvent extraction and in-situ vitrification) would treat the contaminated soils to achieve a reduction in toxicity, mobility and volume. Solvent extraction would remove the PCBs from the soils and consolidate them in a liquid form. The liquid would be incinerated offsite, thereby destroying the PCBs. In-situ vitrification would destroy the majority of the PCB contamination by subjecting it to high temperatures. However, the technology has not been approved by TSCA as a technology equivalent to incineration or landfilling in a permitted chemical waste landfill. The residual contamination would be encapsulated in a vitrified mass, similar to volcanic glass. A volume reduction of 20 to 40 percent is expected with in-situ vitrification.

As stated above, soil Alternative SM-7 (stabilization/fixation) would result in a reduction in the mobility of the PCBs. However, there would be no reduction in the toxicity of the PCBs. Moreover, it would result in an increase in the volume of PCB-contaminated materials.

Soil Alternative SM-6 (offsite landfilling) provides no reduction in the mobility, toxicity or volume. It merely moves the contamination from the Site to a permitted chemical waste landfill.

Ground water Alternatives GM-4, GM-6, and GM-7 would treat the contaminated ground water to achieve a reduction in toxicity, mobility and volume. Liquid phase carbon adsorption (GM-6) would reduce the toxicity, mobility and volume of the contaminants by capturing the VOCs on an activated carbon filter and then "recharging" the spent filter with thermal treatment which will destroy the VOCs. Ultraviolet catalyzed oxidation (GM-7) would reduce the toxicity, mobility and volume of the VOCs by subjecting them to a chemical reaction process which will destroy the VOCs present in the ground water.

9.5 Short-Term Effectiveness

The short-term risks associated with the selected remedies would include the normal construction hazards associated with excavation of contaminated soils and construction of wells and installation of a filtration system. Workers onsite could be exposed to contaminated soils and ground water; these exposures can be reduced and controlled by use of appropriate health and safety procedures.

There are risks associated with incinerator operation. Improper operation of the incinerator represents the principal risk. However, these risks are controlled by frequent testing of the gaseous incinerator emissions and monitoring of the operations. Employees involved with the incinerator operation will be required to wear protective clothing as safeguards. As a result, risks to the public and the environment can be effectively minimized.

The preferred soil alternative would require approximately one to two years to complete. The time estimate for installation of wells and filtration system is two months. The time required to achieve a reduction in contaminant levels to health-based levels in the ground water is uncertain, but is expected to take approximately 15 years. However, extraction of the ground water should preclude migration of the contaminant plume.

All other alternatives would also have minimal short-term risks as described above. However, as previously noted, compliance with the action-specific ARARs would effectively minimize and control the exposures.

The remaining soil alternatives would take about two months for excavation and stockpiling of the soils. Soil Alternative SM-6 would be essentially complete at the end of the two-month time period. It is estimated that soil Alternatives SM-7, SM-8, and SM-10 would require approximately one year to implement. All ground water alternatives would take similar amounts of time (estimate: 15 years) to implement.

9.6 Implementability

Implementation of the selected remedies would involve use of conventional construction techniques and proven technologies for the wastes being treated. The reliability and adequacy of controls on mobile incineration units have been established through pilot and full-scale tests at several sites. Mobile incineration units are currently available from several vendors. Air-stripping of the water followed by carbon adsorption of the vapor phase is a process used frequently to treat contaminated ground water.

Soil Alternative SM-7 would require treatability studies to identify and determine the optimum mixtures of the stabilization and/or fixation agents to be used. These treatability studies would probably be performed in two or more phases. The first phase would be to identify the most effective stabilization and fixation agents. The second and any following phases would be needed to identify the optimum mixtures or ratios of the stabilization/fixation additives.

Soil Alternative SM-8 would require a treatability study to evaluate the effectiveness and implementability of the process for site-specific soils. The equipment for this process is available from a limited number of contractors. If equipment is unavailable at the time of remedial action, then delays would result.

Bench and pilot scale tests for similar cases indicate that the technology used in Soil Alternative SM-10 (in-situ vitrification) would likely be effective for the MEW Site. Power needs for this alternative are readily available. However, only one vendor is licensed to use the technology and it currently has only one unit. This could cause delays at the time of remedial action.

Analytical testing of the ground water would be required for ground water Alternative GM-4. The testing would be needed prior to the local POTW agreeing to accept the ground water for treatment and processing.

Ground water Alternative GM-6 (liquid phase carbon adsorption) is a proven technology. The equipment and materials needed to effect this remedial alternative are readily available. It should be implemented relatively easily.

Ground water Alternative GM-7 (ultraviolet catalyzed oxidation) would require treatability studies to identify any site-specific operational problems prior to implementation. Handling of the hydrogen peroxide could represent some potential problems; however, use of standard industrial procedures should minimize any problems and are considered safe. The equipment used for this technology is fragile and may need to be replaced during implementation.

9.7 Cost

The costs of the selected remedies would include the costs associated with onsite thermal treatment, $8.4 million, and the costs for air-stripping followed by carbon treatment of the ground water, $730,000. These costs reflect the estimated present worth of pumping and treating ground water for 15 years.

The range of present worth costs for the soil alternatives is $4.4 million for soil Alternative SM-7 to $11.1 million for soil Alternative SM-10. The estimated present worth for the remaining ground water alternatives is $850,000 for Alternative GM-7 and $1.1 million for Alternative GM-4. Both selected remedies achieve permanent reduction in the toxicity, mobility and volume of contaminants at costs that are proportional to their overall effectiveness.

The following summary is provided of the evaluation of the soil and ground water alternatives with respect to the five primary balancing criteria:

Soils/Sediments

Alternatives SM-8, SM-10 and SM-11 (solvent extraction, in-situ vitrification, and onsite incineration) would perform equally with respect to long-term effectiveness; Alternatives SM-7 and SM-6 (stabilization/fixation and offsite landfill) would provide less permanent long-term effectiveness. Alternatives SM-7, SM-8, SM-10, and SM-11 would all reduce the mobility of the PCB contaminants; SM-6 would not reduce contaminant mobility. Toxicity and volume of the PCB contaminants would be reduced by alternatives SM-8, SM-10 and SM-11; no toxicity reduction would be achieved by SM-6 or SM-7. Alternative SM-6 affords no volume reduction of the PCB contaminants, while SM-7 would result in an increase in the volume of PCB-contaminated material. All soil alternatives considered in conjunction with the primary balancing criteria would provide short-term effectiveness. Alternative SM-10 has not been used for a full-scale site cleanup; problems with this technology could arise which would decrease its ability to be implemented. Alternative SM-8 may not be effective given the cohesive nature of the Site soils. Residual solvent concentrations could remain in the soils making it less attractive. Alternative SM-7 is the least expensive soil alternative with a cost of $4.4 million. Soil Alternative SM-10 is the most expensive with a cost of $11.1 million. Onsite incineration costs fall in the middle of the costs for the alternatives considered. This remedy provides the best balance of trade-offs among the alternatives, particularly with respect to long-term effectiveness and the permanent reduction of toxicity, mobility and volume.

Ground Water

Ground water Alternatives GM-5, GM-6, and GM-7 were considered to perform equally with respect to long-term effectiveness; Alternative GM-4 was considered to be potentially less effective over the long-term since less control over the process would be exercised by EPA or the MEWSC. All ground water alternatives considered were judged to provide equal reduction of mobility, toxicity and volume of the VOC contamination. The short-term effectiveness of all ground water alternatives was considered t be equal. All ground water alternatives can be implemented.

GW-5 (air-stripping followed by vapor phase carbon adsorption) was the least expensive alternative, with an estimated cost $730,000. Alternative GM-4 was the most expensive with an estimated cost of $1.1 million. Remedy GM-5 provides the best balance of trade-offs among the ground water alternatives, particularly with respect to long-term effectiveness and permanent reduction in toxicity, mobility and volume.

The third category of criteria is modifying criteria. The following two criteria are considered when evaluating the alternatives and are used to help determine the final remedies for the Site.

9.8 State Acceptance

The State of Missouri has been informed of EPA's selected remedies: onsite incineration of the PCB-contaminated soils and air-stripping followed by vapor phase carbon adsorption of the VOC-contaminated ground water. The State of Missouri has officially notified EPA of its concurrence with the selected remedial actions.

9.9 Community Acceptance

The community and other interested citizens or parties were given the opportunity to review the Proposed Plan and supporting documents of the Administrative Record. A thirty-day comment period was available for the public to comment on these documents. A Public Hearing was held in Cape Girardeau on August 30, 1990 to discuss the Proposed Plan and the preferred remedial alternatives. No comments on the Proposed Plan were received at that Public Hearing. There have been no comments indicating strong opposition from the general public to the preferred alternatives identified in the Proposed Plan. Comments that were submitted are addressed in the Responsiveness Summary.

10.0 THE SELECTED REMEDY

10.1 Soils/Sediments

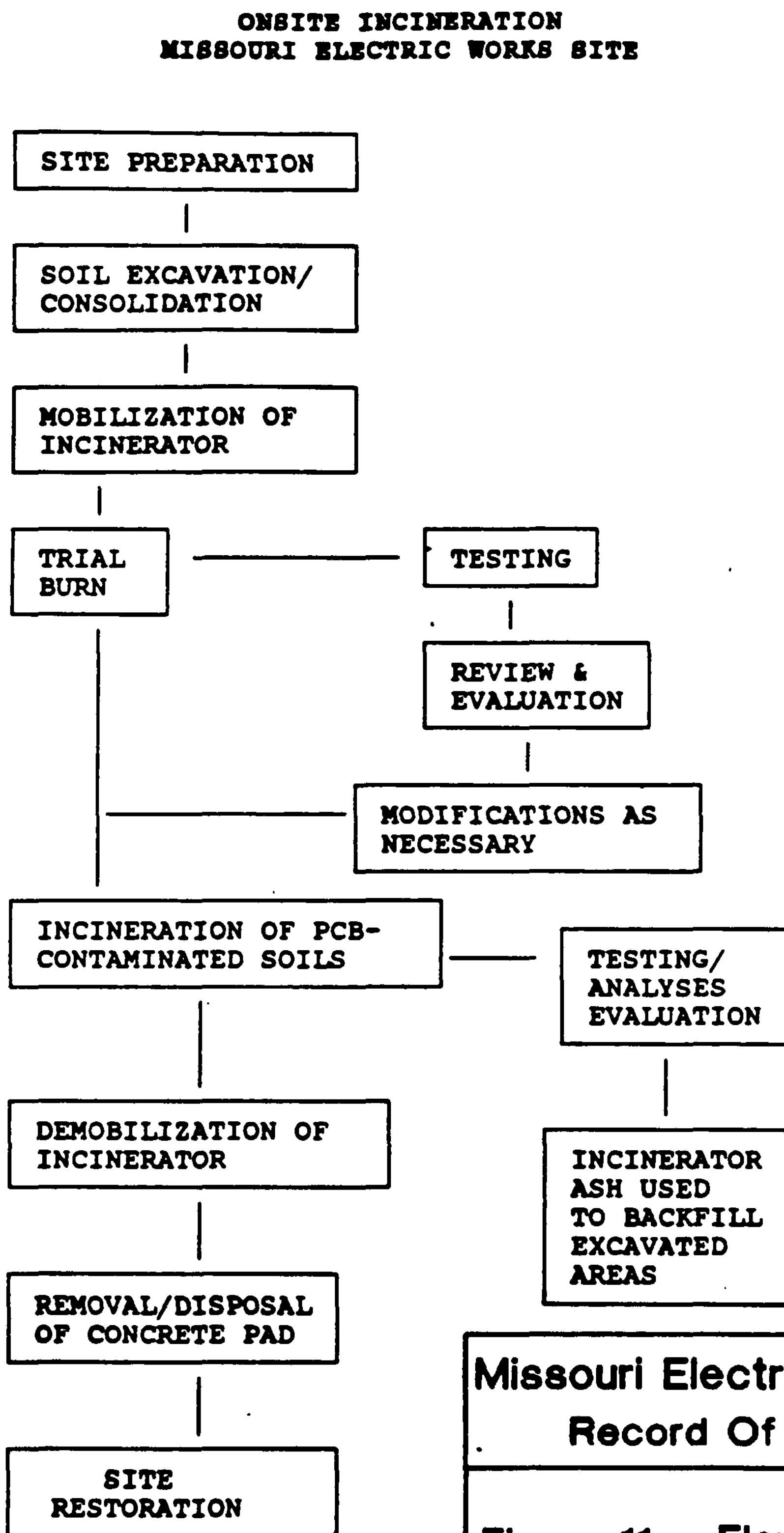
The remedial action selected for the soil cleanup will provide overall protection of human health and the environment by eliminating, reducing and controlling all current and potential risks posed by the exposure pathways at the Site, and will be in compliance with all applicable or relevant and appropriate requirements (ARARs). The long-term effectiveness and permanence of the selected soil remedy were determined to be critical factors in balancing the trade-offs among the other soil alternatives.

The statutory preference of CERCLA §121(b) to permanently and significantly reduce the volume, toxicity, or mobility of the hazardous substances through treatment technologies (to the maximum extent practicable) is satisfied by the selected soil remedy. The technology selected is a proven technology. Case studies of other cleanups indicate that onsite incineration is a consistent practical approach to permanent destruction of PCBs. This remedy should be relatively easy to implement from both a technical and administrative point of view. Mobile incineration units are available from several vendors and therefore should be readily available.

The cost of implementing the selected soil remedy, onsite incineration, was considered during EPA's evaluation process. The results of this comparative analysis indicated that while the costs associated with onsite incineration do exceed the cost associated with the other source control alternatives analyzed (stabilization/fixation and solvent extraction), these costs are proportional to the overall greater effectiveness of onsite incineration.

Rotary kiln incinerators are probably the most common type of equipment used for mobile incineration because they have been commercially proven, provide flexibility in handling many types of materials and provide good mixing and long residence times for solids. Rotary kilns are equally applicable to solids, sludges, and slurries and are capable of receiving and processing liquids and solids simultaneously. The five basic components of the rotary kiln system are: 1) rotary kiln (primary combustion chamber); 2) secondary combustion chamber; 3) heat recovery boiler; 4) air pollution control train; and 5) effluent neutralization chamber. The soil is fed into the rotary kiln that is mounted on an incline. Temperatures range from 1,200 to 1,800 degrees Fahrenheit and the residence time depends on the contaminants being treated. Typical feed rates for soils are 1,300 to 1,400 pounds per hour. The soil is removed at the lower end of the kiln and the vapors desorbed from the soil then enter the secondary chamber, at temperatures of 1,500 to 3,000 degrees Fahrenheit, to complete oxidation. As the exhaust gases exit the secondary chamber, they are directed through a pollution control train which may consist of a water quench, a packed scrubbing tower or an ejection scrubber system.

Implementation of onsite incineration at the MEW Site would consist of the following tasks. Preparation of the Site will be performed by clearing trees and vegetation in the area where the incinerator is to be placed. Contaminated soils will be excavated and consolidated onsite with provisions to minimize migration of the contaminated materials. The incinerator will be brought to the Site, at which time trial burn(s) will be performed, tested and evaluated before the incineration of the PCB-contaminated soils will be done. When the incineration is complete, the incinerator will be removed from the Site. The Site will be restored and revegetated. Figure 11 is a flow-diagram of the PCB-contaminated soil remedial action.



Missouri Electric Works Site
Record Of Decision

Figure 11 - Flow Diagram of PCB-Contaminated Soils-Remedial Action

Site preparation activities would consist of clearing an area approximately one acre in size where the incinerator would be setup. Contaminated soils from this area would be stockpiled in the immediate vicinity to await processing when the incinerator is in-place and operational. A concrete pad would be constructed in the cleared area to support the processing equipment. Other Site preparation activities would include removal of trees and miscellaneous trash and debris present on the Site in those areas with PCB levels greater than 10 ppm.

Excavation and consolidation of all on and offsite contaminated soils with PCB concentrations greater than 10 ppm would have to be performed. Excavation of the soils and any other contaminated materials would be accomplished using conventional heavy construction equipment. Excavated materials would be staged for processing near the incinerator in stockpiles. These stockpiles would be established, with appropriate runoff and wind dispersion protective devices, for both contaminated feed materials (contaminated soils) and the process residuals. The residuals would be used to backfill the onsite excavated areas. Clean soils would probably be required to complete Site restoration and final grading.

Permitting for the onsite incinerator will not be required, as this remedial action will be performed onsite. However, a trial burn will be required, as will frequent monitoring and analytical tests, to establish that the incinerator complies with all substantive requirements applicable to a TSCA incinerator.

After constructing the concrete pad in the processing area, the incinerator will be mobilized to the Site. The incinerator will be brought to the Site using highway or railroad conveyances. Upon arrival at the Site, the incinerator will be setup in its working configuration.

A trial burn will be performed after incineration set-up is complete. The primary reason for a trial burn is to provide data, both operational and analytical, that verifies that the incinerator complies with all substantive requirements of a permitted TSCA incinerator. In addition, the data generated will be used to identify the residence time needed to meet PCB destruction requirements and to monitor the emissions from the incinerator.

After the data generated by the trial burn has been reviewed and evaluated by State and Federal authorities, approval to begin "production-type" operations will be given, if all substantive requirements of a permitted unit have been met. Operations will consist of sizing of the stock-piled contaminated materials in preparation for incineration. These sized materials will be fed into the incinerator using equipment similar to a pug-mill. Feed rates will be monitored continuously. Emissions from the incinerator, both ash and gases, will be monitored frequently (not less than daily) to document that destruction efficiencies and air emissions standards are complied with. In addition, the ash residuals will be tested to identify its leaching characteristics and to identify the compounds within the ash. The leaching characteristics will be identified using the Toxicity Characteristic Leaching Procedure (TCLP).

After the PCB-contaminated soils and other materials have been destroyed by incineration, the incinerator and other appurtenant equipment will be demobilized and removed from the Site. The concrete pad will be tested to ascertain whether it was contaminated during incineration operations. If it is not contaminated, the concrete pad will be removed and disposed of in a sanitary landfill. If the concrete pad is found to be contaminated, disposal in a licensed chemical waste landfill will be necessary.

As the residual ash from incineration operations is produced and tested, it will be used to backfill the excavated areas on the Missouri Electric Works, Inc., property. The residual ash will be spread and compacted using conventional heavy construction equipment. Soil, that has been verified as being uncontaminated with analytical tests, will be used to backfill other portions of the Site. The entire Site will be restored to its original grade using this verified "clean" material. The soil will be spread and compacted using conventional means.

The final grading of the Site will be such that the natural drainage of the Site is controlled or managed. This will be done to ensure that erosional features, similar to those presently existent at the Site, do not reform.

A 6- to 12-inch layer of topsoil will be spread over the entire Site. This topsoil will be seeded or sod will be placed to revegetate the Site.

Institutional controls, such as deed restrictions and/or zoning restrictions will be imposed to limit use of the Site to industrial or commercial purposes.

10.2 **Ground Water**

The selected ground water remedy will provide overall protection of human health and the environment by reducing and controlling all potential risks posed by ingestion of the ground water. The selected remedy will comply with all applicable or relevant and appropriate requirements (ARARs). The selected remedy will use a proven technology that is readily available from several vendors at a costs that is proportional to its overall effectiveness.

This remedial technology involves collection of ground water utilizing an extraction well network, temporary storage, followed by removal of volatile organics utilizing an air-stripper with gas phase carbon adsorption from the air stream. Polishing of the liquid stream utilizing liquid phase carbon adsorption can also be included, as necessary. Volatile contaminants are transferred from the ground water to the air, via continuous contact in the tower. The ground water stream is introduced at the top of the tower while air is blown into the base of the tower and flows upward, contacting with the water.

Air-stripping is an efficient means of removing volatiles for compounds with Henry's Law Constants greater than 0.001 (applies to all the VOCs at the MEW Site). The air-stripper off-gas is treated by vapor phase carbon adsorption to prevent release of the stripped contaminants to the atmosphere.

Prior to the installation of the ground water remediation system, additional investigation of the hydrogeologic regime in the vicinity of the MEW Site will be performed. The purpose of this investigation will be to identify the vertical extent of contamination; confirm the presence or absence of a continuous aquiclude within the upper 200-300 feet of the bedrock; perform pump tests to determine the flow rates and hydraulic conductivity of the aquifer; confirm the flow direction of the aquifer; and identify other data that will be necessary for the design of the ground water remediation system.

Elements required for implementation of the ground water remedy include the following:

The aquifer will be tested, either by pump or slug tests, to identify flow rates and hydraulic conductivity of the aquifer. This information will be needed to design the extraction well network to optimize its removal efficiency. In addition, the water extracted during the pump tests will be sampled and analyzed to better identify the contaminants and associated concentrations present in the ground water. Design parameters affected by the results of this testing include: the size of the wells, pumps and storage tanks; the length of pumping time; the size of the air stripping tower; and the amount of activated carbon needed to filter the vapor phase.

Ground water from the Site will be used in a bench-scale air-stripper test to evaluate the effectiveness of the system on the Site contaminants. The information gathered from these tests will be used to adjust design parameters to achieve optimum contaminant reduction and removal.

After the data from these tests are available, a conceptual design of the extraction well network will be produced. This conceptual design will be studied and reviewed to identify if a more efficient or cost-effective option exists. When this peer review is complete, the extraction well system will be designed. This design will include well locations, pump sizes, pumping frequency, location and sizes of connecting piping, the size and location of the storage tank and the location of the air-stripper.

The data gathered during the aquifer tests and the treatability study will be used to develop the specifications for the air-stripper to be used at the Site. These specifications will be used to identify the vendor with the most appropriate unit for the Site. An air-stripper, modified as necessary to meet Site criterion, will then be purchased. The purchased air-stripper system will be assembled onsite. The air-stripper will have piping for discharge of the processed water to the local POTW or to the wetland area via a surface water discharge.

The extraction wells will be strategically located to intercept the contaminated ground water. The storage tank will be installed with piping connected to the air-stripper.

After the extraction wells and appurtenant piping and utilities and the air-stripper system are installed the entire system will be connected. Pressure testing or visual inspection of all connections will be performed as appropriate. The system then will be started-up and cleanup of the ground water initiated.

Discharges from the air-stripper system will be monitored frequently, both the vapor and liquid phase. The analytical data from monitoring will be evaluated to ensure that the discharges are in compliance with the regulations for surface water and air emissions. Adjustments to the system will be made to ensure that all appropriate regulations are complied with. Those portions of the system with a finite operational life, i.e., activated carbon filters, water filter, water pumps, etc., will be replaced as necessary to keep the system operational.

Samples of the ground water will be obtained and analyzed to evaluate the performance of the air-stripper system. The extraction and air-stripping of the ground water will continue until risk criteria or regulatory limits are met. After regulatory limits are met and maintained for a period no less than one year, the system will be shut-down. After shut-down the ground water will be monitored on a quarterly basis for a period of at least two years. If during this time, the contaminant concentrations do not increase above regulatory limits, the air-stripping system will be decommissioned and the extraction wells abandoned in compliance with the requirements set forth by the State of Missouri.

Pursuant to CERCLA §121, any remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the Site shall be reviewed no less often than five years after the initiation of such remedial action to ensure that human health and the environment are being protected by the remedial action being implemented.

Because the remedial actions for the Site will result in hazardous substances remaining in the onsite ground water and will require that institutional controls be placed on the Site the overall Site conditions will be reviewed at least once every five years after the initiation of the remedial action at the Site. This review will be consistent with the CERCLA standards applicable for five-year site reviews in effect at the time of the review. The extent and nature of this review program will be developed during the design phase of the selected remedy, but will include at a minimum, those data collected during the monitoring programs identified above for the ground water and the onsite incinerator.

11.0 STATUTORY DETERMINATIONS

The remedial actions selected for implementation at the Missouri Electric Works Site are consistent with CERCLA and, to the extent practicable, the NCP. The selected remedies are protective of human health and the environment, attain ARARs, and are cost-effective. The selected remedies also satisfy the statutory preference for treatment which permanently and significantly reduce the toxicity, mobility, or volume of hazardous substances as a principle element.

The selected remedies for the Site will address the release or threat of release posed by the contaminated soils, sediments and ground water. The remedies selected are thereby protective.

The soil and sediment cleanup levels to be attained through excavation and onsite incineration will reduce the risks associated with these contaminated materials to a level protective of human health and the environment. These cleanup levels address the risks from direct contact, inhalation and ingestion of the contaminated soils or sediments or the vapors originating from the contaminated soils and sediments.

The extraction and onsite treatment of the ground water will comply with the cleanup levels established for the Site. These cleanup levels are the Federal MCLs and the Missouri ground water criteria.

The selected remedies will meet or attain all applicable or relevant and appropriate Federal and State requirements that apply to the Site. Federal and State laws which are applicable or relevant and appropriate are identified in Appendix A.

12.0 DOCUMENTATION OF SIGNIFICANT CHANGES

There were no significant changes made to the Proposed Plan in this Record of Decision.

APPENDIX A

SUMMARY OF APPLICABLE OR RELEVANT AND
APPROPRIATE REQUIREMENTS (ARARs)
AND "TO BE CONSIDERED" (TBC) CRITERIA

TABLE 1
FEDERAL CHEMICAL-SPECIFIC ARARs
MISSOURI ELECTRIC WORKS SITE

STANDARD, REQUIREMENTS, CRITERIA, OR LIMITATION	CITATION	DESCRIPTION	APPLICABLE RELEVANT AND APPROPRIATE	COMMENT
National Primary Drinking Water Standards	40 CFR Part 141	Establishes health-based standards for public water systems (maximum contaminant) levels).	Yes	The MCLs for organic and inorganic contaminants are relevant and appropriate for ground water.
National Secondary Drinking Water Standards	40 CFR Part 143	Establishes welfare-based standards for public water (secondary maximum contaminant levels).	Yes	Secondary MCLs for these parameters/contaminants may be relevant and appropriate for ground water.
Maximum Contaminant Level Goals	40 CFR Part 141	Establishes drinking water quality goals set at levels of no known or anticipated adverse health effects with an adequate margin of safety.	Yes	Proposed MCLGs for organic contaminants should be treated as "other criteria, advisories and guidance".
Water Quality Criteria	40 CFR Part 131 Quality Criteria for Water, 1986	Sets criteria for water quality based on toxicity to aquatic organisms and human health.	Yes	AWQCs may be relevant and appropriate for surface water discharges.
Releases from Solid Waste Management Units	40 CFR Part 264 Subpart F	Establishes maximum contaminant concentrations that can be released from hazardous waste units in Part 264, Subpart F.	Yes	Onsite hazardous waste management unit may be considered. Same levels as MCLs.
National Ambient Air Quality Standards	40 CFR Part 50	Establishes primary (health based) and secondary (welfare based) standards for air quality.	Yes	Standards for particulate matter must be monitored during some remedial activities.
National Emission Standards for Hazardous Air Pollutants	40 CFR Part 61	Establishes emission levels for certain hazardous air pollutants.	Yes	Standards for some chemicals may relevant and appropriate to the Site.

TABLE A-1 (continued)
FEDERAL CHEMICAL-SPECIFIC ARARs
MISSOURI ELECTRIC WORKS SITE

STANDARD, REQUIREMENTS, CRITERIA, OR LIMITATION	CITATION	DESCRIPTION	APPLICABLE RELEVANT AND APPROPRIATE	COMMENT
Occupational Health and Safety Regulations	29 CFR 1910.1000 Subpart Z	Establishes permissible exposure limits for work-place exposure to many chemicals.	Yes	Listed chemicals detected on-site. Standards applicable to remedial worker exposure.
Toxic Substances Control Act (TSCA)	40 CFR Part 761	Establishes prohibitions of of and requirements for the manufacture, processing, distribution in commerce, use disposal, storage and marking of PCB items. Sets forth PCB Spill Cleanup Policy.	Yes	The PCB Spill Cleanup Policy (Part 761.25) is a TBC which establishes cleanup guidelines for nonregulated access areas. Part 761.60 requirements for the storage and disposal of PCB-contaminated soil and provides a basis for utilizing alternative technologies for PCB treatment. Part 761.70 establishes requirements for PCB incinerators, which are applicable if onsite or offsite incineration is involved. Part 761.75 establishes requirements for chemical waste landfills for land disposal of PCBs at concentrations of less than 500 ppm.

TABLE A-2
STATE CHEMICAL-SPECIFIC ARARs
MISSOURI ELECTRIC WORKS SITE

STANDARD, REQUIREMENTS, CRITERIA, OR LIMITATION	CITATION	DESCRIPTION	APPLICABLE RELEVANT AND APPROPRIATE	COMMENT
Missouri Safe Drinking Water Act and Missouri Water Quality Standards	10 CSR 20-7.031	Maximum chemical contaminant levels and monitoring requirements	Yes	The requirements may be relevant and appropriate for the MEW Site.
Missouri Hazardous Waste Management Regulations	10 CSR 25-10.010	Procedures for obtaining state approval for remedial actions at abandoned or uncontrolled sites.	Yes	The requirements may applicable for the MEW Site.
Missouri Hazardous Waste Management Regulations	10 CSR 25-11.010	Procedures and requirements for managing waste oil, which are in addition to Federal requirements on used oil.	Yes	These procedures may be applicable for the MEW site if removal of non PCB-contaminated oil is involved as a remedial action.
Missouri Hazardous Waste Management Regulations	10 CSR 25-13.010	Standards for management of waste materials or waste manufactured items containing PCBs at concentrations of fifty parts per million or more.	Yes	These standards may be applicable or relevant and appropriate requirements for the MEW Site.
Missouri Hazardous Waste Management Regulations	10 CSR 25-6.263	Standards for Transporters of Hazardous Waste	Yes	These requirements may be applicable for the MEW Site if removal offsite of hazardous waste non-PCB contaminated oils or PCB materials.

TABLE A-3
FEDERAL LOCATION-SPECIFIC ARARs
MISSOURI ELECTRIC WORKS SITE

STANDARD, REQUIREMENTS, CRITERIA, OR LIMITATION	CITATION	DESCRIPTION	APPLICABLE RELEVANT AND APPROPRIATE	COMMENT
Protection of Wetlands	Exec. Order No. 11,990 40 CFR 6.302(a) and Appendix A	Requires Federal agencies to avoid, to the extent possible, the adverse impacts associated with the destruction or loss of wetlands and to avoid support of new construction in wetlands if a practical alternative exists.	Yes	The U.S. Army Corps of Engineers has identified a jurisdictional wetland near the MEW Site.

TABLE A-4
STATE LOCATION-SPECIFIC ARARs
MISSOURI ELECTRIC WORKS SITE

STANDARD, REQUIREMENTS, CRITERIA, OR LIMITATION	CITATION	DESCRIPTION	APPLICABLE RELEVANT AND APPROPRIATE	COMMENT
Protection of Lakes and Streams	Missouri Water Quality Standards 10 CSR 20-7.031	Promulgates rules to protect quality of lakes and streams. Beneficial uses of Cape La Croix Creek listed as livestock and wildlife watering and warm water fishing.	Yes	Chemical specific ARARs are listed in Table A-2.

TABLE A-5
FEDERAL ACTION-SPECIFIC ARARs
MISSOURI ELECTRIC WORKS SITE

STANDARD, REQUIREMENTS, CRITERIA, OR LIMITATION	CITATION	DESCRIPTION	APPLICABLE RELEVANT AND APPROPRIATE	COMMENT
CLEAN WATER ACT	33 USC 1251-1376			
National Pollutant Discharge Elimination System (NPDES)	40 CFR Part 125	Requires permits for the discharge of pollutants for any point source into waters of the United States.	Yes	Permit not required for CERCLA activities; however, technical requirements for discharge must be met if onsite water treatment occurs and is discharged to surface water.
National Pretreatment Standards	40 CFR Part 403	Sets standards to control pollutants which pass through or interfere with treatment processes in public treatment works or which may contaminate sewage sludge.	Yes	Only if the treated ground water is discharged to a publicly owned treatment works.
SOLID WASTE DISPOSAL ACT ("SWDA")	42 USC 6901-6987			
Criteria for Classification of Solid Waste Disposal Facilities and Practices	40CFR Part 257	Establishes criteria for use in determining which solid waste disposal facilities and practices pose a reasonable probability of adverse effects on public health or the environment and thereby constitute prohibited open dumps.	Yes	The soil selected remedy will involve onsite disposal of incinerator ash.
Standards Applicable to Generators of Hazardous Waste	40 CFR Part 262	Establishes standards for generators of hazardous waste.	No	The selected remedies do not involve offsite transportation of either soil or ground water for treatment or disposal.

• [illegible] RCRA regulations to wastes found on the site is will be determined after receipt of TCLP data.

TABLE A-5 (continued)
FEDERAL ACTION-SPECIFIC ARARs
MISSOURI ELECTRIC WORKS SITE

STANDARD, REQUIREMENTS, CRITERIA, OR LIMITATION	CITATION	DESCRIPTION	APPLICABLE RELEVANT AND APPROPRIATE	COMMENT
Standards Applicable to Transporters of Hazardous Waste	40 CFR Part 263	Establishes standards which apply to transporters of hazardous waste with the US if the transportation requires a manifest under 40 CFR Part 262.	No	The selected remedies do not involve offsite transportation of hazardous wastes for treatment and/or disposal.
Contingency Plan and Emergency Procedures	Subpart D	"	Yes	If onsite ground water treatment system produces hazardous waste.
Manifest System, Record-	Subpart E	"	Yes	If the selected remedies involve the offsite transport of hazardous waste.
Use and Management of Containers	Subpart I	"	Yes	If the selected remedies involve storage of containers.
Tanks	Subpart J	"	Yes	If the selected remedies involve the use of tanks to treat or store hazardous materials.
Waste Piles	Subpart L	"	Yes	If the selected remedies would treat or store hazardous materials in piles.
Incinerators	Subpart O	"	Yes	The selected remedy for soils is onsite incineration. Also covered by CFR 761.70.
Land Disposal	40 CFR Part 268	Establishes restriction for burial of wastes and other hazardous materials.	Yes	If the selected remedies would offsite burial of contaminated soils or residues containing prohibited wastes, a CERCLA waiver may be required.

TABLE A-5 (continued)
FEDERAL ACTION-SPECIFIC ARARs
MISSOURI ELECTRIC WORKS SITE

STANDARD, REQUIREMENTS, CRITERIA, OR LIMITATION	CITATION	DESCRIPTION	APPLICABLE RELEVANT AND APPROPRIATE	COMMENT
OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA)	29 USC 651-678 29 CFR Par 1910	Regulates worker health and safety at hazardous waste sites.	Yes	Under 40 CFR 300.38, requirements of the Act apply to all response activities under the NCP.
HAZARDOUS MATERIALS TRANSPORTATION ACT	49 USC 1801-1813			
Hazardous Materials Transportation Regulations	49 CFR Parts 171-178	Regulates transportation of hazardous materials.	Yes	If selected remedy would involve transportation of hazardous materials.
TOXIC SUBSTANCES CONTROL ACT	13 USC Sec. 2601-2629			
PCB Requirements	40 CFR Part 761	Establishes storage and disposal requirements for PCBs.	Yes	Treatment and disposal methodologies must meet substantive requirements set forth by 40 CFR 761.
PCB Spill Cleanup Policy	40 CFR 761	Establishes cleanup procedures for PCB spills.	Yes	Specifies soil cleanup levels and excavation requirements.

TABLE A-6
STATE ACTION-SPECIFIC ARARs
MISSOURI ELECTRIC WORKS SITE

STANDARD, REQUIREMENTS, CRITERIA, OR LIMITATION	CITATION	DESCRIPTION	APPLICABLE RELEVANT AND APPROPRIATE	COMMENT
Missouri Hazardous Waste Management Regulations	10 CSR 25-10.010	Procedures for obtaining State approval for remedial actions at abandoned or uncontrolled sites.	Yes	The requirements may be applicable for the MEW Site.
Missouri Hazardous Waste Management Regulations	10 CSR 25-11.010	Procedures and requirements for managing waste oil, which are in addition to Federal requirements on used oil.	Yes	The procedure may be applicable for the MEW Site if removal of non PCB-contaminated oil is involved.
Missouri Hazardous Waste Management Regulations	10 CSR 25-13.010	Standards for management of waste materials or waste manufactured items containing PCBs at concentrations of fifty parts per million or more.	Yes	These standards may be applicable/ relevant and appropriate requirements for the MEW Site.
Missouri Hazardous Waste Management Regulations	10 CSR 25-6.263	Standards for Transporters of Hazardous Waste.	Yes	These requirements may be applicable for the MEW Site if removal offsite of hazardous waste, non-PCB contaminated oil or PCB materials.

RECORD OF DECISION

REMEDIAL ALTERNATIVE SELECTION

THE RESPONSIVENESS SUMMARY

MISSOURI ELECTRIC WORKS SITE

CAPE GIRARDEAU, MISSOURI

Prepared By:

U.S. Environmental Protection Agency

Region VII

Kansas City, Kansas

September 1990

MISSOURI ELECTRIC WORKS SITE

RECORD OF DECISION

RESPONSIVENESS SUMMARY

TABLE OF CONTENTS

Missouri Electric Works Site
Cape Girardeau, Missouri
Responsiveness Summary

1.0 OVERVIEW

In the Proposed Plan released to the public, the Environmental Protection Agency (EPA), with Missouri Department of Natural Resource (MDNR) concurrence, made a preliminary selection for the preferred alternative for remedial action at the Missouri Electric Works site. EPA's recommended alternatives addressed the PCB-contaminated soils and sediments and the contaminated ground water at the Site. The preferred alternative involved excavation and onsite incineration of the PCB-contaminated soils and sediments and extraction and treatment, using an air-stripper, of the contaminated ground water.

Judging from the comments received during the public comment period, the residents of Cape Girardeau generally accepted the preferred alternative as presented. With the exception of one comment, opposition to the preferred alternative for the soils and sediments was not indicated.

2.0 BACKGROUND ON COMMUNITY INVOLVEMENT

EPA and the Missouri Department of Health held meetings with adjacent property owners and other interested citizens in Cape Girardeau, Missouri on July 11 and 12, 1989. The purpose of these meetings was to discuss the Site conditions and the health risks that the Site represented to the general public. EPA staff participated in two local Cape Girardeau, Missouri radio talk shows during July 1989; interested citizens were able to "call-in" and ask questions of the EPA staff concerning the Missouri Electric Works Site and the related activities.

The Administrative Record was placed in the Cape Girardeau Public Library on August 11, 1989. The documents contained in the administrative record identified the need for a Remedial Investigation/Feasibility Study (RI/FS). A public meeting was held in Cape Girardeau on September 19, 1989 to inform the public of the details of the ongoing remedial investigation and to identify possibly remedial alternatives that would be considered during the feasibility study. A second public meeting was held on June 11, 1990 to inform the public of the remedial investigation findings and to again identify the remedial alternatives that would be considered during the feasibility study. Fact sheets, identifying significant Site activities, were issued to everyone on EPA's mailing list for the Site in June, August, and November 1989 and March, May and July 1990.

The RI/FS and Proposed Plan for the Missouri Electric Works Site were released to the public during August 1990. These three documents were made available to the public in the administrative record and its addendum located in the EPA Record Center, Region VII and at the Cape Girardeau, Missouri Public Library. The notice of availability for these three documents was published in the News Guardian and the Southeast Missourian on August 19, 1990. A public comment period was held from August 19 to September 17, 1990. In addition, a public hearing was held on August 30, 1990. At this meeting, representatives from EPA, the Missouri Department of Natural Resources, the Missouri Department of Health and the Agency for Toxic Substances and Disease Registry (ATSDR) were available to answer questions about problems at the Site and the remedial alternatives under consideration.

3.0 SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD

Comments raised during the public comment period on the draft Feasibility Study (FS) and Proposed Plan are summarized below. The Public comment period was held from August 19 to September 17, 1990.

3.1 Comments from Interested Citizens

Comment #1

Ruth Hathaway, Chairman of the Local Emergency Planning Committee, and Bruce Hathaway, Associate Professor of Chemistry at Southeast Missouri State University, wrote to express their support of EPA's preferred alternative of onsite incineration. They indicated that this alternative was an efficient and effective way to dispose of PCBs.

Response

As indicated in the proposed plan, it is EPA's opinion that onsite incineration is the alternative that meets threshold criteria and provides the best balance between the "primary balancing criteria" as identified in the NCP.

Comment #2

Mr. C. J. Morrill, who owns the property adjacent to the MEW property and operates a construction business from that property, asked several questions concerning specific details of the actual remedial action.

Response

The proposed plan indicates that it is estimated that the onsite incineration of PCB-contaminated soils will take about two years; the ground water extraction and treatment is anticipated to continue for approximately 15 years. It is not possible, at this time, to answer the questions regarding the specifics of actual remedial action items since the design has not been initiated nor the contractor selected. The answers will remain unknown until the design for the remedial action has been completed and with respect to ground water, until the cleanup levels are achieved. EPA will be overseeing and monitoring the remedial action efforts while they are performed.

Comment #3

Mr. Morrill also asked some questions regarding onsite incineration. Specifically, he wanted to have a detailed explanation of what incineration involves; how it would be completed; how the materials would be handled; how emissions would be handled; when would the "burning" take place; what would happen to the residues; what type of backfill material would be used; would the area be revegetated; and concerns about his employees' health and safety during remediation.

Response

There are five basic components to a rotary kiln incinerator (which is the most common type of incinerator and may be chosen for the remedial action). These components are: 1) the rotary kiln (primary combustion chamber); 2) secondary combustion chamber; 3) heat recovery boiler; 4) air pollution control train; and 5) effluent neutralization chamber. The soil is fed in to the rotary kiln that is mounted on an incline. Temperatures range from 1,200 to 1,800 degrees Fahrenheit and the residence time depends on the contaminants being treated. Typical feed rates for soils is 1,300 to 1,400 pounds per hour. The soil is removed at the lower end of the kiln and the vapors removed from the soil. The vapors are then processed through the secondary chamber at temperatures of 1500 to 3000 degrees Fahrenheit, to complete oxidation. As the exhaust gases exit the secondary chamber, they are directed through a pollution control train which may consist of a water quench, a packed scrubbing tower or an injection scrubber system. Details of what is anticipated for the onsite incineration system at the MEW Site are presented on pages 47 through 51 of the Decision Summary and graphically on Figure 11.

Conceptually, there are no plans to stop the onsite incineration process once it begins. The soils will be excavated, processed, incinerated, tested and used as backfill on the MEW property.

Conceptual plans would be to stockpile excavated contaminated soils on the MEW property to await incineration. Only very short haul distances are anticipated.

As indicated above, emissions from the incinerator would be processed through a pollution control train to ensure that any releases to the atmosphere are minimized and are in compliance with the standards set by the Clean Air Act and the Toxic Substances Control Act. Frequent monitoring of the emissions will be performed. Analytical testing of the exhaust gases will be done frequently.

The actual hours during the day that the incinerator will be operating cannot be identified at this time. It is a question that can be better answered after remedial design is completed and the remedial action is underway.

The soil "ash" which remains after incineration will be tested using Toxicity Characteristic Leaching Procedure (TCLP) test methods. (A fact sheet on the final Toxicity Rule is attached). This testing procedure will identify if the ash is hazardous. It is anticipated that the ash will not be hazardous, and, thus, it will be used as a backfill material on the MEW property. A clean soil cap will be placed over the ash.

Specifics of Site restoration are not available and will not be available until after the remedial design are complete. It is anticipated that the excavated areas outside the MEW property will be backfilled using a verified non-contaminated soil from a relatively local borrow source. After backfilling operations are complete, the area will be revegetated.

Compliance with the ARARs will minimize any risk during the remedial action, as discussed in the Record of Decision. Risks to Morrill Construction employees, on Morrill property, is not anticipated to be significantly different during the remedial action than they are now. Morrill employees should stay away from the excavation and backfill operations on Morrill property until they are complete. Morrill employees should also stay away from the incinerator and associated operations. After the remedial action, the threat to human health and the environment posed by the PCB-contamination will be eliminated.

Comment #4

Mr. Brian Gardner, legal representative of Hall Street Associates which owns property adjacent to MEW property, expressed concerns regarding the specific areas which would be cleaned during the remedial action. His client was concerned since EPA had notified it during 1987 that PCBs at concentrations of 88 ppm had been detected on the Hall Street Association property. Mr. Gardner was also concerned since his client had not received analytical data from samples obtained during the remedial investigation.

Response

The 10 ppm isoconcentration line indicated in the Proposed Plan is only an estimate of the extent of remedial action for the soils. All surface soils contaminated with PCBs at concentrations exceeding 10 ppm will be excavated as part of the soil remedial action.

Analytical results from samples, if any, collected from the Hall Street Association property will be forwarded to Mr. Gardner, by EPA.

3.2 Comments from Potentially Responsible Parties

Comment #1

Dr. T. R. West, representing 12 Rural Electric Cooperatives from the States of Illinois, Indiana, Ohio, and Tennessee, made the following comments on EPA's Proposed Plan:

A. Dr. West contends that the onsite incineration of the PCB-contaminated soils will eliminate the source of contamination in the ravine area. Natural attenuation by the clay soil and chemical dispersion of the organic contaminants with time and distance will reduce contaminant concentrations in the ground water to the proposed action levels.

B. Dr. West states that the volatile organics contaminating the ground water are industrial cleaning solvents and not constituents from transformer oil or oil from other electrical equipment.

C. The group of twelve rural electric cooperatives assert that the transformers sent to MEW by them were sent before the TSCA regulations became effective in 1979. Therefore, they have no obligation to cleanup the Site.

D. Dr. West states that based on the information gathered during the remedial investigation, the water bearing zone tested does not qualify as an aquifer. It is not possible, according to this commentor, for a sustaining well to be developed in this zone. Therefore, there is no public health or environmental threat to ground water, and no need to collect and treat ground water from this water-bearing zone.

Response

A. EPA concurs with the fact that onsite incineration will eliminate the PCB contamination and any volatile organic contamination that is present in the soils to be incinerated. However, the depth to the ground water at the Site is almost 40 feet. It is not anticipated that soils will be excavated and incinerated to these depths. Furthermore, volatile organic contamination was found in the soils adjacent to the MEW structure and in the ground water northwest of the ravine area. This indicates that there may be multiple sources of volatile organics which are contaminating the ground water. Onsite incineration of the PCBs will not necessarily remove the volatile organic compound sources of ground water contamination. Monitoring of the ground water will not actively reduce the threats posed by the contaminants present.

B. The question of liability for the contamination at the Site is not pertinent to the remedy selection and this Record of Decision. Accordingly, this comment will not be addressed at this time.

C. See Response to #1 - B above.

D. MDNR has identified the ground water monitored at the MEW Site as an aquifer. The information in the possession of MDNR indicates that there is not a continuous aquiclude in the bedrock, in the area of the MEW Site, for a depth of approximately 1,000 feet. Contamination in ground water migrates both vertically and horizontally, which could impact existing or future drinking water wells. There is no information in the record or in Dr. West's letter that refutes the MDNR data. Construction of deep exploratory borings with subsequent installation of monitoring wells to be conducted in the hydrogeological investigation during the remedial design will provide information about the presence or absence of an aquiclude in the bedrock in the vicinity of the MEW Site as well as provide data regarding the vertical extent of ground water contamination. Therefore, EPA disagrees with the statement "Therefore, there is no public health or environmental threat to groundwater, and no need to collect and treat ground water from this water-bearing zone."

Comment #2

Stuart Hunt, legal counsel for Missouri Electric Works, Inc., submitted the following comments regarding EPA's proposed plan:

A. Mr. Hunt indicated that the most glaring deficiency of the Proposed Plan was that it recommends a remedy for the PCB-contaminated soils that is not cost-effective when other treatments are available that are equally protective of human health and the environment.

B. Mr. Hunt indicated that the Proposed Plan did not address the air pollution that would be emitted from the incinerator and its possible adverse effects to human health and the environment and interfere with the ongoing businesses in the area of the MEW Site.

C. Mr. Hunt further states that according to EPA guidance concentrations of PCBs at industrial sites below 500 parts per million represent "low threat" and could be addressed with containment and site security. MEW believes that institutional controls, fencing, asphalt capping and deed restrictions would adequately protect human health and the environment at a far lower cost.

Response

A. For the reasons set forth in the Record of Decision, the best balance between the primary balancing criteria identified in the NCP, including cost-effectiveness, is provided by onsite incineration. The stabilization/fixation alternative provided some reduction in the mobility of the PCB-contamination, it did not reduce the toxicity and actually increases the volume of PCB-contaminated materials. Its long-term effectiveness is less certain as a result of erosion, possible seismic events and weather variations that may threaten the integrity of the monolith. The costs presented for solvent extraction do not include the construction of a water treatment unit, which could amount to over $1 million.

   Again, onsite incineration provided the best balance of trade-offs, particularly with respect to long-term effectiveness and the permanent reduction of toxicity, mobility and volume.

B. Air pollution from the onsite incinerator is addressed in the Record of Decision. A pollution control train will be part of the onsite incinerator. The emissions from the incinerator will be monitored frequently to ensure proper operation. It is unlikely that improper operation of the incinerator would occur with the amount of oversight and monitoring that will be performed. Attempts will be made to minimize the amount of interference with the business activities of ongoing businesses, to the extent practicable. The primary purpose of the remedial action is to cleanup the Site and to remove the threat to human health and the environment. In accomplishing this directive, some short-term interference may occur.

C. The arithmetic mean of the sampling performed at the MEW Site during the Remedial Investigation is over 500 parts per million. As such the contamination at the MEW Site does not represent "low threat" concentrations. Construction of fences, warning signs and an asphalt cap over the contaminated area would not be protective of human health or the environment nor would it met applicable or relevant and appropriate regulations (ARARs) which is the threshold criteria that must be met according to the NCP. This remedial alternative was eliminated from further consideration during the comparative analysis in the Proposed Plan because it did not meet threshold criteria.

Comment #3

Mr. Thomas Siedhoff, as representative of the MEW's PRP Steering Committee, submitted several comments on the Proposed Plan. These comments are summarized below:

A. The Steering Committee believes that stabilization of PCB-contaminated soils satisfies the statutory requirements of CERCLA §121 and meets the selection criteria of the NCP.

B. The Steering Committee states that the arithmetic mean concentration of the PCB-contamination within the 10 ppm isoconcentration line is roughly 522 ppm; the geometric mean is about 20 ppm within this area. The blended soils will have an average concentration of less than 50 ppm which would "logically be considered to be below the threshold of TSCA incineration limits."

C. The Steering Committee believes that incineration is a very expensive option and feel that stabilization/fixation of the soils and the long-term management controls for onsite disposal should be minimal and should not be viewed as a significant disadvantage.

D. The Steering Committee states that the ground water is contaminated with chlorinated solvents. None of the PRPs sent chlorinated solvents to MEW and therefore should not be responsible for the ground water contamination. They feel that the remedial action can and should be divided into two operable units; one for soil and one for ground water contamination. They indicate that EPA should select an appropriate ground water remedy.

E. The Steering Committee state that the MDNR Leaking Underground Storage Tank Guidelines define an aquifer as a ground water unit having a flow of 5 gallons per minute (gpm) or more as a "usable" aquifer. The hydraulic data generated during the RI indicates that the monitoring wells provided water volumes substantially less than 5 gpm (about 1 gpm). It questions whether the ground water contamination poses any future risks to human health or the environment.

F. While the Steering Committee admits that data gaps exist regarding the vertical extent of the ground water contamination and the hydraulic parameters below a depth of 60 feet, it believes that remediation of the soil contamination will likely mitigate the source of the ground water contamination. The existing ground water contamination should be allowed to attenuate naturally after the soils have been remediated or the ground water remedy should be selected after the results of a supplemental hydrogeologic assessment of the Site and surrounding area have been made.

G. The Steering Committee believes that it would be prudent for EPA to defer the final selection of a ground water alternative until a more complete evaluation of the ground water regime has been performed and a more thorough assessment of the actual current and potential future risks posed by ground water are evaluated.

Response

A. For the reasons set forth in the Record of Decision, the best balance between the primary balancing criteria identified in the NCP, including cost-effectiveness, is provided by onsite incineration. The stabilization/fixation alternative provided some reduction in the mobility of the PCB-contamination, it did not reduce the toxicity and actually increases the volume of PCB-contaminated materials. Its long-term effectiveness is less certain as a result of erosion, possible seismic events and weather variations that may threaten the integrity of the monolith. The costs presented for solvent extraction do not include the construction of a water treatment unit, which could amount to over $1 million. Again, onsite incineration provided the best balance of trade-offs, particularly with respect to long-term effectiveness and the permanent reduction of toxicity, mobility and volume.

B. EPA expressed its concerns regarding the apparently low value of the arithmetic and geometric means for PCB-contamination concentration levels in its comment letter on the Remedial Investigation report. The calculated arithmetic and geometric mean identified in this comment represent only discrete sampling points, most of which were obtained during RI sampling. The analytical data from EPA composite samples were not included. It is EPA's opinion that the arithmetic and geometric means presented by the Steering Committee underestimate the concentrations of PCBs contaminating the soils, particularly on the MEW property. The PCB concentrations in the soils, in EPA's our evaluation of the data, justify selection of the onsite incineration remedy.

The arithmetic mean of the sampling performed at the MEW Site during the Remedial Investigation is over 500 parts per million. As such the contamination at the MEW Site does not represent "low threat" concentrations.

C. The stabilization/fixation alternative relies on encapsulation of the contamination in a stabilized monolith. The relative low leachability of the encapsulated materials relies on the significantly reduced surface area available to the leaching process. As mentioned in the Proposed Plan, shrinkage cracks or fractures in the monolith as a result of seismic activity as well as weathering forces will increase the surface area susceptible to leaching. Over time these weathering forces could significantly reduce the integrity of the stabilized mass, thereby making it less effective as a containment or encapsulating medium. As explained in the Record of Decision, EPA considers onsite incineration of the PCB-contaminated soils to be cost-effective.

D. The question of liability for the contamination at the Site is not pertinent to the remedy selection and this Record of Decision. Accordingly, this comment will not be addressed at this time.

Based on the data gathered during the various investigations at the Site and the information in the possession of MDNR regarding the hydrogeologic regime in the vicinity of the Site, it was the opinion of EPA that both remedies can and therefore should be selected at this time. However, provision has been made for additional investigation and monitoring of ground water at the Site during the remedial design process.

E. According to the State of Missouri, Geologic Survey, there is no confining layer, such as a continuous shale bed, in the vicinity of the MEW Site for a depth of 1,000 feet. This means that there is no barrier between the contamination detected in the upper 30+ feet of bedrock and the ground water being used in the lower portions of the aquifer. Therefore, EPA and MDNR believes that the contamination present in the upper portion of the aquifer does represent a risk to human health and the environment.

F. EPA agrees that additional information about the hydrogeologic regime in the vicinity of the Site would be helpful to effectively design the remedy. A provision for additional investigation into the ground water conditions, i.e, horizontal and vertical extent of contamination, direction of ground water flow, depth to a confining layer, etc. has been included in the Record of Decision, in the selected ground water remedy. These studies would be performed prior to the initiation of ground water treatment.

   EPA concurs with the fact that onsite incineration will eliminate the PCB contamination and any volatile organic contamination that is present in the soils to be incinerated. However, the depth to the ground water at the Site is almost 40 feet. The volatile organic compounds detected in the ground water are classified as "sinkers"; which means that these chemical compounds are heavier than water and tend to sink to a confining layer and flow along it with dispersion into the water as they sink. The data at the Site indicates that there may be multiple sources of ground water contamination. The onsite incineration of the contaminated soils may not remove all source areas and therefore should not be considered a "fix" for the ground water contamination.

G. EPA does not agree that the decision regarding the ground water remedy selection should be deferred. Enough information exists from which to select a ground water remedy. However, EPA will consider additional data gathered in the hydrogeological investigation during the remedial design process.

United States Environmental Protection Agency
Office of Solid Waste and Emergency Response Washington DC 20460
EPA/530-SW-89-045 March 1990
Office of Solid Waste

EPA

Environmental Fact Sheet

TOXICITY CHARACTERISTIC RULE FINALIZED

The final Toxicity Characteristic rule adds 25 organic chemicals to the eight metals and six pesticides on the existing list of constituents regulated under RCRA. The rule also establishes regulatory levels for the new organic chemicals listed, and replaces the Extraction Procedure leach test with the Toxicity Characteristic Leaching Procedure. Generators must comply with this regulation within six months of the date of notice in the Federal Register; *small quantity generators must comply within one year.*

BACKGROUND

On June 13, 1986, the Environmental Protection Agency (EPA) proposed to revise the existing toxicity characteristic, one of four characteristics used by the Agency to identify hazardous waste to be regulated under Subtitle C of the Resource Conservation and Recovery Act (RCRA). The proposed rule was designed to refine and broaden the scope of the RCRA hazardous waste regulatory program, and to fulfill specific statutory mandates under the Hazardous and Solid Waste Amendments of 1984.

Under current regulations, EPA uses two procedures to define wastes as hazardous: *listing* and *hazardous characteristics*. The listing procedure involves identifying industries or processes that produce wastes that pose hazards to human health and the environment. The second procedure involves identifying properties or "characteristics" that, if exhibited by any waste, indicate a potential hazard if the waste is not properly controlled. Toxicity is one of four characteristics that must be considered when identifying a waste as hazardous. The others are ignitability, reactivity, and corrosivity.

The proposed version of the new rule added 38 new substances to the Toxicity Characteristic list; 13 of these constituents are not included in the final version due to technical difficulties in establishing appropriate regulatory levels. EPA bases all regulatory levels for hazardous chemicals on health-based *concentration thresholds* and a *dilution/attenuation factor* specific to each chemical. A concentration threshold indicates how much of the chemical adversely affects human health, while the dilution/attenuation factor indicates how easily the chemical could seep (or "leach") into ground water. The levels set in the Toxicity Characteristic (TC) rule were determined by multiplying the health-based number by a dilution/attenuation factor of 100.

The introduction of the TC rule in 1986 generated extensive public comment on a variety of issues. The TC involves a new "modeling" approach, a mathematical computer model, to simulate what happens to hazardous waste in a landfill. Results from the Toxicity Characteristic Leaching Procedure (TCLP), a new test that is part of the TC rule, are more reproducible than results from the old Extraction Procedure (EP) leach test, and the new test is easier to run.

Following the 1986 proposal, EPA published several supplemental notices in an effort to evaluate and incorporate public comments before finalizing the rule.

ACTION

EPA is finalizing the regulatory levels for 25 of the 38 constituents of concern that were identified in the proposed Toxicity Characteristic rule. Regulatory levels for the remaining 13 constituents will be proposed at a later date.

A waste may be a "TC waste" if any of the chemicals listed below are present in waste sample extract or leachate resulting from application of the TCLP to that waste. If chemicals are present at or above the specified regulatory levels, the waste *is* a "TC waste," and is subject to all RCRA hazardous waste requirements. Regulatory levels established under the EP toxicity characteristic remain the same, but require application of the new test.

Waste generators who have already notified the Agency that they generate other hazardous wastes and who have obtained an EPA identification number for their facility are not required by this rule to notify EPA that they now generate a "TC waste." Facilities that are permitted to treat, store, or dispose of hazardous waste, however, may require new or modified permits to handle "TC waste," and should contact their EPA Regional office for more information.

Implementation of the TC rule will initially be the responsibility of EPA's Regional offices. State hazardous waste programs must modify their regulations to reflect the requirements of the TC rule before they can be authorized for implementation.

The following constituents are now regulated under the Toxicity Characteristic rule. Waste generators must determine the levels present in their waste sample extract or leachate, based either on their knowledge of their processes or by application of the TCLP.

New Constituents/Regulatory levels

Benzene . . . 0.50 mg/l
Carbon tetrachloride . . . 0.50 mg/l
Chlordane . . . 0.03 mg/l
Chlorobenzene . . . 100.0 mg/l
Chloroform . . .6.0 mg/l
m-Cresol . . . 200.0 mg/l*
o-Cresol . . . 200.0 m g/l
p-Cresol . . . 200.0 mg/l
1,4-Dichlorobenzene . . . 7.5 mg/l
1,2-Dichloroethane . . . 0.50 mg/l
1,1-Dichloroethylene . . . 0.70 mg/l
2,4-Dinitrotoluene . . .o.13 mg/l**
Heptachlor (and
its hydroxide) . . . 0.008 mg/l
Hexachloro-1,3-butadiene . . . 0.5 mg/l
Hexachlorobenzene . . .0.13 mg/l**
Hexachloroethane . . . 3.0 mg/l
Methyl ethyl ketone . . . 200.0 mg/l
Nitrobenzene . . . 2.0 mg/l
Pentachlorophenal . . . 100.0 mg/l***
Pyridine . . . 5.0 mg/l**
Tetrachloroethylene . . . 0.7 mg/l
Trichloroethylene . . . 0.5 mg/l
2,4,5-Trichlorophenol . . . 400.0 mg/l
2,4,6-Trichlorophenol . . . 2.0 mg/l
Vinyl chloride . . . 0.20 mg/l

Old EP Constituents/Regulatory levels

Arsenic . . . 5.0 mg/l
Barium . . . 100.0 mg/l
Cadmium . . . 1.0 mg/l
Chromium . . . 5.0 mg/l
Lead . . . 5.0 mg/l
Mercury . . . 0.2 mg/l
Selenium . . . 1.0 mg/l
Silver . . . 5.0 mg/l
Endrin . . . 0.02 mg/l
Lindane . . . 0.4 mg/l
Methoxychlor . . . 10.0 mg/l
Toxaphene . . . 0.5 mg/l
2,4-Dichlorophenoxycetic acid . . 10.0 mg/l
2,4,5-Trichlorophenoxypropionic
acid . . . 1.0 mg/l

Many Underground Storage Tank (UST) sites are regulated under Subtitle I of RCRA. The Toxicity Characteristic rule will not apply to UST petroleum-contaminated media and debris regulated under Subtitle I until the Agency completes a number of studies of the impacts of the TC on these wastes. During the study period, UST sites will continue to be regulated under Subtitle I of RCRA.

Listed wastes, unlike characteristic wastes such as a "TC waste," can be removed from EPA's lists of hazardous wastes through a process called

* If o-,m-, and p-Cresol concentrations cannot be differentiated, the total cresol concentration is used. The regulatory level for total cresol is 200.0 mg/L

** Quantitation limit is greater than the calculated regulatory level. The quantitation limit, therefore, becomes the regulatory level.

*** The Agency will propose a new regulatory level for this constituent, based on the latest toxicity information.

delisting. Delisting determinations are made on a case-by-case, site-specific basis. Although it is not discussed in the preamble to the TC rule, the guidance for submitting delisting petitions will be modified in the near future to reflect the replacement of the EP leach test with the Toxicity Characteristic Leaching Procedure. Notification of the effective date for this change will appear in a future *Federal Register* notice.

Hazardous W
Information I
US EPA Regic
Philadelphia,

CONCLUSION

Based on consideration of 12 affected industries, EPA estimates that the Toxicity Characteristic rule will bring a significant volume of additional wastewaters, solid waste, and sludge under the control of its hazardous waste regulations. The rule will bring a large number of waste generators under Subtitle C regulation for the first time, and many treatment, storage, and disposal facilities will require new or modified permits to handle "TC waste."

The Agency strongly encourages industry to reduce the generation of all hazardous wastes through pollution prevention and waste minimization practices. For information and publications on pollution prevention options, contact the toll-free RCRA Hotline number listed below.

TC Impact on Used Oil Regulation

Used oil that is disposed of, rather than recycled or burned for energy recovery, is regulated as a hazardous waste under Subtitle C if it exhibits any of the four characteristics described above. The Toxicity Characteristic rule adds a number of substances to the toxicity list that may bring previously "nonhazardous" used oil under Subtitle C regulation.

Currently, hazardous used oil that is recycled by being burned for energy recovery is minimally regulated under RCRA (a variety of administrative requirements must be met). Used oil that is recycled in any other way is currently exempt from Subtitle C regulation. These regulations for recycled oil are not affected by the Toxicity Characteristic rule. The Agency is currently determining how best to regulate used oil, and is working to develop standards to ensure proper management of used oil that may pose a threat to human health or the environment.

CONTACT

EPA is distributing information materials to trade associations representing those industries potentially affected by the Toxicity Characteristic rule. These materials describe constituents of concern specific to each affected industry, and include compliance guidelines for newly regulated generators. To order copies of these materials, a copy of the *Federal Register* notice, or for further information, contact the RCRA Hotline Monday through Friday, 8:30 a.m. to 7:30 p.m. EST. The national toll-free number is (800) 424-9346; for the hearing impaired, the number is TDD (800) 553-7672. In Washington, D.C., the number is (202) 382-3000 or TDD (202) 475-9652.