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Office of
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September 1989

Superfund Record of Decision:

Kem-Pest Laboratories, MO

50272-101

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15. Supplementary Notes

16. Abstract (Limit: 200 words)

The Kem-Pest Laboratories site is a former pesticide manufacturing facility approximately 3-miles northeast of Cape Girardeau, Cape Girardeau County, Missouri. This 6-acre site is in a rural area devoted primarily to agricultural activities. Contamination at the site resulted from the manufacturing of pesticide products from 1965 until 1977. Production activities took place in an onsite concrete block formulation building. Sewage and plant wastes were disposed of in an onsite lagoon which was backfilled with clay in 1981. EPA investigations beginning in 1981 have identified pesticide and volatile and semi-volatile organic contamination in soil, sediment in drainage channels, and in ground water. This operable unit addresses contaminated soil and sediment. Future operable units will address ground water and the formulation building. The primary contaminants of concern affecting the soil and sediment are VOCs including xylenes, other organics including organochlorine and pesticides, and metals including arsenic.

The selected remedial action for this site includes excavating approximately 4,050 cubic yards of contaminated soil and sediment with offsite disposal in a RCRA-approved commercial hazardous waste landfill; sampling to verify that the extent of excavation is
(See Attached Sheet)

17. Document Analysis a. Descriptors

Record of Decision - Kem-Pest Laboratories, MO
First Remedial Action
Contaminated Media: soil, sediment
Key Contaminants: VOCs (xylene), other organics (pesticides), metals (arsenic)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 76
	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

6. Abstract (Continued)

sufficient to meet health based cleanup goals; and backfilling the excavated area with clean soil and revegetating. The estimated present worth cost for this remedial action is $2,600,000 with no O&M required.

RECORD OF DECISION

SOIL AND SEDIMENT OPERABLE UNIT

KEM-PEST LABORATORIES SITE

CAPE GIRARDEAU COUNTY, MISSOURI

Prepared by:

U.S. ENVIRONMENTAL PROTECTION AGENCY

REGION VII

KANSAS CITY, KANSAS

SEPTEMBER 1989

RECORD OF DECISION DECLARATION

SOIL AND SEDIMENT OPERABLE UNIT

SITE NAME AND LOCATION

Kem-Pest Laboratories Site
Cape Girardeau County, Missouri

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for soil and sediment at the Kem-Pest Laboratories site in Cape Girardeau County, Missouri, chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA) and, to the extent practicable, the National Contingency Plan. This decision is based on the administrative record file for this site.

The State of Missouri concurs on the selected remedy.

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, may present a current or potential threat to public health, welfare, or the environment.

DESCRIPTION OF THE REMEDY

Remedial action will be implemented through a series of operable units. This operable unit is the first of three that are planned for the site. The first operable unit will address contaminated soil and sediment. The future operable units will address ground water and the formulation building.

The major components of the selected remedy include:

- Excavation of approximately 4050 cubic yards of contaminated soil and sediment; and

- Disposal at an offsite land disposal facility in compliance with the requirements of Subtitle C of the Resource Conservation and Recovery Act (RCRA) and other applicable laws or regulations.

DECLARATION

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this site. However, because treatment of the principal threats of the site was not found to be practicable, this remedy does not include treatment as a principal element. Treatment of soils at the concentrations detected at this site would result in long-term effectiveness similar to that afforded by containment at a RCRA-approved hazardous waste landfill but at a cost significantly higher than containment. Because the selected remedy will not result in hazardous substances remaining onsite above health-based levels, the five-year review will not apply to this action.

David A. Wagoner
for Morris Kay, Regional Administrator

September 29, 1989
Date

RECORD OF DECISION

SOIL AND SEDIMENT OPERABLE UNIT

DECISION SUMMARY DOCUMENT

KEM-PEST LABORATORIES SITE

CAPE GIRARDEAU COUNTY, MISSOURI

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KANSAS CITY, KANSAS

SEPTEMBER 1989

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1.0 INTRODUCTION

The Kem-Pest Laboratories site is located in Cape Girardeau County, Missouri. From 1965 to 1977, the company formulated pesticide products at the site. Sewage and plant wastes were disposed of in an onsite lagoon. Remedial investigation activities conducted in December 1988 and February and March of 1989 identified pesticide, volatile organic and semivolatile organic contaminants in soil, sediment and ground water and pesticide contamination in the formulation building.

Remedial action will be implemented through a series of operable units, or discrete response actions. The first operable unit addresses contaminated soil and sediment. Future operable units will address ground water and the formulation building.

Remedial alternatives for contaminated soil and sediment were developed in the Operable Unit Feasibility Study (OUFS). In the Proposed Plan, excavation of contaminated soil and sediment and disposal at an offsite hazardous waste landfill was identified as the preferred alternative.

The Record of Decision (ROD) for the Kem-Pest site presents the final remedy selected for the contaminated soil and sediment operable unit, chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and, to the extent practicable, the National Contingency Plan (NCP).

The purpose of this Decision Summary, a major component of the ROD, is to provide an overview of site characteristics, the alternatives evaluated and the rationale for the final remedy selection.

2.0 SITE LOCATION AND DESCRIPTION

BACKGROUND

The Kem-Pest Laboratories site is located in Cape Girardeau County, Missouri, approximately three miles northeast of the City of Cape Girardeau. The site occupies approximately six acres of land. A map of the vicinity and site location is presented on Figure 1.

The surrounding area is predominantly rural. Currently three residences are located within 1,000 feet of the site to the west and southwest; ten additional residences lie within a 1,000-foot radius to the north, northwest and northeast. Adjacent to the site on the south is the St. Louis-San Francisco railroad tracks. The Mississippi River is about 1,000 feet further south. An industrial storage tank facility and agricultural fields are located between the river and railway. Fields are also northeast of the site.

Information from the U.S. Department of the Interior, Fish and Wildlife Service, and the Missouri Department of Conservation indicated there are no sensitive environments within a one-mile radius of the site. Sensitive environments would include wetlands, critical habitats of endangered species, and national wildlife refuges.

A 40 by 100 foot concrete block building is located on the site which housed the Kem-Pest pesticide formulation operation. Six storage tanks used for the storage of solvents and oil are north of the formulation building. A two-celled lagoon used for the disposal of sewage and plant waste is located approximately 40 feet southwest of the building. A scrap pile of miscellaneous debris lies to the northeast of the building. A site map is presented on Figure 2.

SITE GEOLOGY AND HYDROGEOLOGY

The site is located on portions of an alluvial terrace and upland on the west bank of an encroaching meander of the Mississippi River. Borings made during site investigations encountered unconsolidated alluvial deposits consisting of silty clay with localized sand lenses overlying colluvial deposits consisting of gravelly sand with some clay. The silts and clays range in depth from 42 to 55 feet from the ground surface. The thickness of the colluvium is unknown but greater than 15 feet.

Ground water monitoring wells were installed to monitor ground water within both the alluvial and colluvial deposits. Based on data obtained during the remedial investigation (RI), ground water flow is generally to the south-southeast in the silty clay and to the south in the gravelly sand. The RI data also indicates there is one unconfined aquifer system present within the alluvial and colluvial deposits at the site.

TOPOGRAPHY

The topography of the area is characterized by rolling landscape to the west and relatively flat terrain between the site and the Mississippi River. The site is located outside, but immediately adjacent to, the 500-year flood plain.

Runoff from the site, particularly the lagoon area, flows southeast to a drainage channel along the railroad track. This drainage channel flows southwest to a culvert which runs under the tracks. From the culvert, water flow reaches the river about 900 feet away.

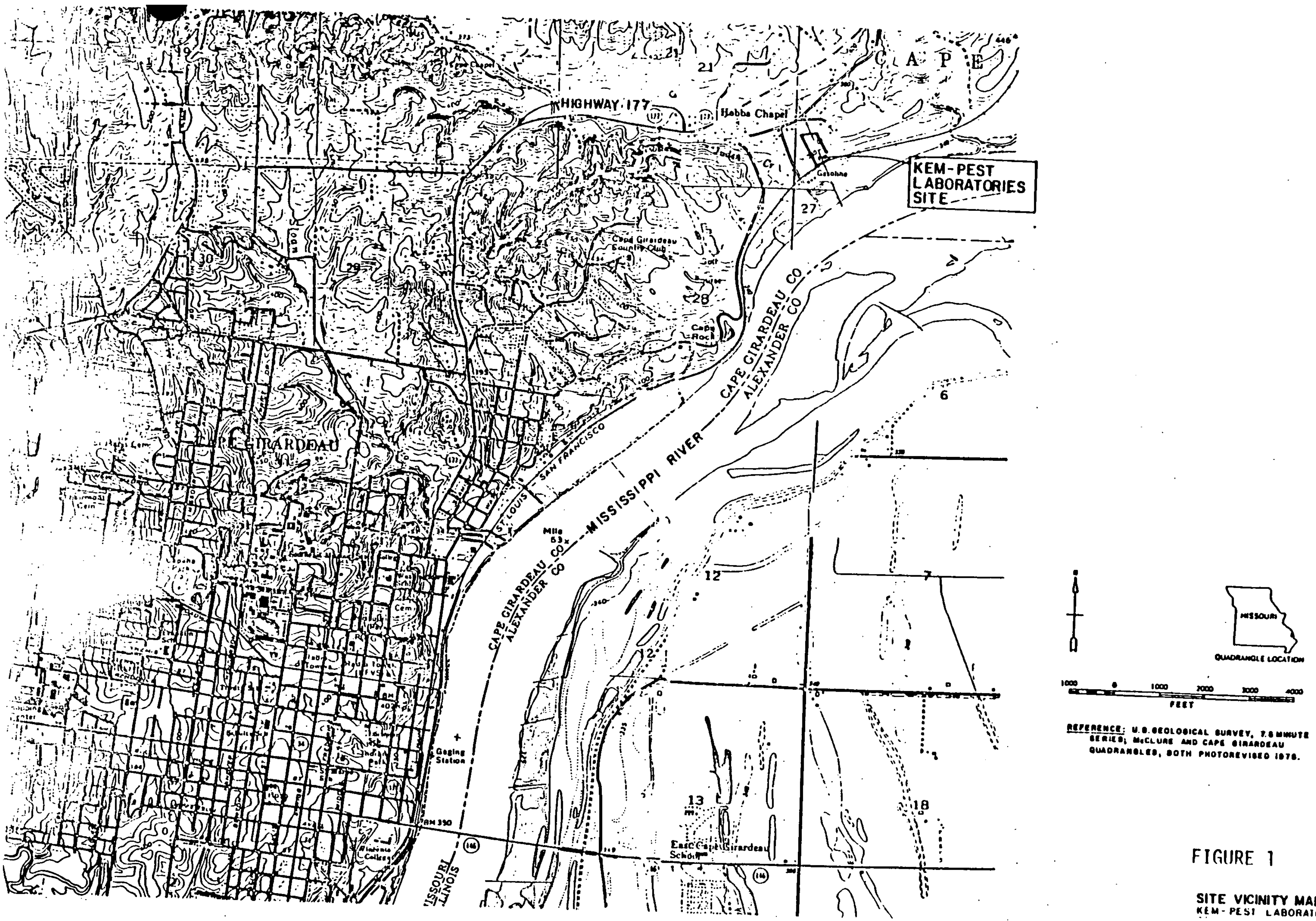
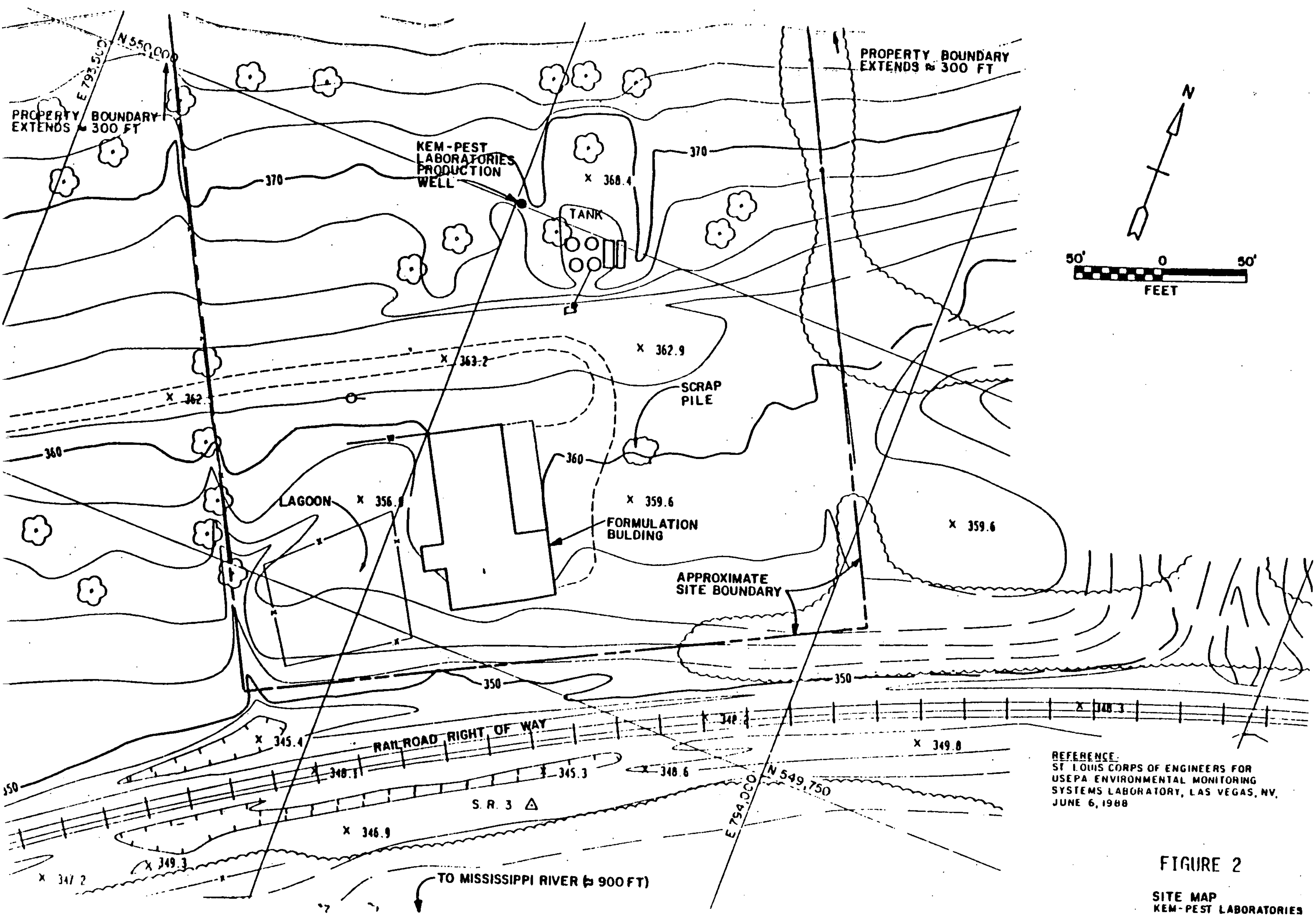


FIGURE 1

SITE VICINITY MAP
KEM-PEST LABORATORIES



REFERENCE:
ST. LOUIS CORPS OF ENGINEERS FOR USEPA ENVIRONMENTAL MONITORING SYSTEMS LABORATORY, LAS VEGAS, NV, JUNE 6, 1988

FIGURE 2

SITE MAP
KEM-PEST LABORATORIES

3.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

The Kem-Pest plant was constructed in 1964. From 1965 to 1977, the company formulated various pesticide products including liquid pesticides, granular insecticide, granular herbicide, and pesticide dust. The plant generated wastes from the formulation of pesticides containing the following: aldrin, dieldrin, 2,4-dichlorophenoxyacetic acid (2,4-D), endrin, heptachlor, methyl parathion and thiuram.

The plant wastes were disposed of in the onsite lagoon. The lagoon was backfilled with clay by the property owner in 1981. There have been no production, treatment or disposal activities at the site since 1977. The building has been used for storage of equipment and materials.

The U.S. Environmental Protection Agency (EPA) conducted a preliminary assessment of the facility in September 1981. Erosion of the lagoon cover and chemical odors were noted. In March 1983, soil samples were obtained from the lagoon area and ground water samples were collected from the plant production well and two private wells in the area. Pesticide contamination was detected in the soil samples; no contamination was identified in these wells.

In April 1984, EPA installed five monitoring wells onsite and collected ground water, soil and sediment samples. Pesticides, volatile and semivolatile organics were detected in soil, sediment and ground water onsite. The Kem-Pest site was proposed for the National Priorities List (NPL) in January 1987.

Pursuant to an Administrative Order on Consent entered into in November 1988, the potentially responsible parties (PRPs) conducted sampling of soils from the lagoon and the formulation building in December 1988.

In February and March 1989, EPA conducted the RI field activities which included collection of soil and sediment samples, installation of six downgradient monitoring wells, and collection of ground water samples from onsite and offsite monitoring wells and two private wells in the immediate area.

4.0 COMMUNITY PARTICIPATION ACTIVITIES

Prior to the initiation of the RI, a community relations plan was developed based on interviews conducted by the community relations staff with residents and local officials. The plan documented the issues of concern to the community and outlined future community relations activities.

At the start of RI field activities, the EPA remedial project manager met with the Cape Girardeau County Commission and other local county and city officials to discuss the field work. The project manager also conducted informal interviews at nearby residences to inform them of site activities and to answer questions. Fact sheets about the project were mailed to residents, local officials and the media. During field work, nearby residents and local officials were provided updated information on activities.

In August 1989, the RI and OUFS reports and Proposed Plan were made available to the public in the administrative record located at the Cape Girardeau Public Library and at EPA Region VII offices in Kansas City. A public notice was issued announcing the availability of documents, the start of the public comment period and the date of the public meeting. The public notice was published in the Southeast Missourian on August 18, 1989, and in the Cape Girardeau News Guardian on August 23, 1989.

Fact sheets were also mailed to residents, local officials and the media announcing the availability of documents, the public comment period and the public meeting.

The public comment period was held from August 18, 1989, through September 18, 1989. A public meeting was held in Cape Girardeau on September 5, 1989. At the meeting, representatives from EPA, the Agency for Toxic Substances and Disease Registry (ATSDR) and the Missouri Department of Natural Resources (MDNR) provided information on the site and discussed the remedial alternatives under consideration. During an extension of the comment period, the EPA community relations staff conducted interviews with concerned citizens.

A response to comments received during the public comment period is provided in the Responsiveness Summary, which is a part of this Record of Decision.

5.0 SCOPE AND ROLE OF OPERABLE UNIT

Remedial action at the Kem-Pest site will be implemented through a series of operable units, or discrete actions. The phasing of cleanup actions will provide the opportunity to achieve significant risk reduction more quickly than addressing the entire site at one time. This first operable unit addresses contaminated soil and sediment. Future operable units will address ground water and the formulation building.

This first operable unit addresses contaminated subsurface soil in the lagoon, surface soil in the lagoon area and near the formulation building, and sediment in drainage channels on and off the site. These areas pose the principal threat to human health and the environment due to the potential for dermal contact, ingestion and inhalation.

The objectives of this first operable unit are to remove or reduce to a protective level the risks posed by dermal contact, ingestion or inhalation of contaminated soil and sediment, to eliminate or reduce the potential for offsite transport of contaminated material, and to remediate contaminated soil and sediment in a manner which will not adversely affect future remedial actions, if required.

6.0 SUMMARY OF SITE CHARACTERISTICS

The EPA conducted RI field work in February and March 1989 to determine the nature and extent of contamination and the need for remedial action. The PRPs also conducted sampling in December 1988. This section summarizes information obtained by these activities; soil sample locations and results are provided in Attachment A.

6.1 NATURE AND EXTENT OF CONTAMINATION

SUBSURFACE SOIL

Ten borings were drilled in the area of the lagoon, ranging from 3 to 14 feet in depth. A total of 28 subsurface soil samples were submitted for analysis.

Based on the boring data, pesticide concentrations generally decreased with depth below the base of the lagoon (5-6 feet below the surface). Contamination was greatest in the 6-9 foot level. Pesticides identified most often and at highest concentrations included gamma-chlordane (74,500 micrograms per kilogram (ug/kg)), heptachlor (45,700 ug/kg), and endrin (14,000 ug/kg).

Volatile organics identified frequently and at the highest concentrations included xylenes (28,000 ug/kg), ethylbenzene (5000 ug/kg), and 1,2-dichloroethane (700 ug/kg). Concentrations generally increased with depth below the lagoon, with maximum levels below the ground water table. Semivolatiles detected included pentachlorophenol (19,000 ug/kg) and 2,4-dichlorophenol (8600 ug/kg); semivolatiles generally decreased with depth. The only metal of concern to health detected above regional maximum background levels was arsenic at 160 milligrams (mg)/kg.

SURFACE SOIL

To better characterize the entire site, 26 composite samples were collected from two grid systems and analyzed for pesticides. One grid consisted of 50 by 50 foot squares in the area of the lagoon and formulation building with samples obtained from 0-6 and 6-12 inches. The second grid consisted of 100 by 100 foot squares over areas which may have been affected by site operations; samples were obtained from the 0-6 inch depth.

For the 0-6 inch depth interval, pesticide contamination was greatest in grids adjacent to the building. Pesticides detected most often and at the highest concentrations included heptachlor (76,000 ug/kg), dieldrin (58,000 ug/kg) and gamma-chlordane (39,000 ug/kg). For the 6-12 inch interval, contamination was also greatest in grids near the building; heptachlor (94,000 ug/kg), gamma-chlordane (80,000 ug/kg) and endrin (26,000 ug/kg).

Discrete surface soil samples from 0-6 inches were obtained from several site locations including southeast of the lagoon, the storage tank area and scrape pile area. Analyses included volatiles, semivolatiles, pesticides, total metals and cyanide.

Heptachlor at 32,000 ug/kg and gamma-chlordane at 21,000 ug/kg were detected in soil southeast of the lagoon. Relatively low pesticide concentrations were found at the other locations. Volatiles and semivolatiles were not detected at significant levels. Arsenic (170 mg/kg) and lead (110 mg/kg) were detected at one location, exceeding site background and regional maximum concentrations.

SEDIMENT

Composite sediment samples at depths of 0-6 and 6-12 inches were collected by EPA in drainage channels on the Kem-Pest property and in the offsite drainage channel immediately southeast of the property (parallel to the railroad tracks) to assess the extent of contaminant migration. The composite sediment samples were analyzed for pesticides.

Pesticide concentrations above background were detected in all but one sample. Significant concentrations were detected in drainage channels from the south corner of the building and from the southeast corner of the lagoon.

The highest concentrations for the 0-6 inch interval were detected in the offsite channel which runs parallel to the tracks. The channel segment located southeast of the building had the highest concentrations (20,000 ug/kg heptachlor, 58,000 ug/kg aldrin, 34,000 ug/kg dieldrin and 26,000 ug/kg gamma-chlordane). Concentrations in this channel generally decreased with distance downgradient (to the southwest).

Significant contamination was detected in 6-12 inch samples from the same drainage channels identified above. The highest concentrations were also in the offsite channel, with levels again generally decreasing to the southwest.

6.2 CONTAMINANT FATE AND TRANSPORT

Based on the results of the site investigations, sources of contamination are the waste disposal lagoon and areas where hazardous substances may have spilled or leaked which include the formulation building, storage tanks, loading areas and piping to the lagoon. The lagoon and soil south, southeast and southwest of the building appear to be the most significantly contaminated.

The potential routes of migration include infiltration and direct migration through surface and subsurface soil, ground water transport, erosion and surface runoff, and air transport.

The subsurface conditions at the site indicate that sorption will retard the migration of contaminants due to the organic content and low hydraulic conductivity of the alluvial material. Residual contamination by the more strongly adsorbed compounds may remain for decades in the alluvial material. Subsurface contamination in the lagoon area remains a source that could continue to release contaminants to ground water through infiltration and leaching mechanisms.

The organochlorine pesticides are very insoluble in water and are readily adsorbed to soil particles. These pesticides are very immobile and are extremely persistent. Biodegradation does not occur significantly in the field. Volatile organics are generally water soluble and less readily adsorbed to the soil and are more mobile in ground water systems than pesticides. The solubility and adsorptive tendencies of semivolatile compounds fall between those of the pesticides and the volatiles.

Surface runoff may transport contaminants either in solution or adsorbed to eroded soil particles. The potential mechanisms for air transport of contaminants are volatilization and fugitive emissions of particulates on which contaminants are adsorbed.

7.0 SUMMARY OF SITE RISKS

To evaluate the potential impacts to human health in the absence of remedial action, a risk assessment was conducted as part of the RI. Both current and future land use scenarios were evaluated. This section summarizes the Agency's findings concerning risks from exposure to contaminated soils and sediment at the site. The complete risk assessment is contained in Volume II of the RI report.

METHODOLOGY

A total of 39 chemicals detected in the soil and sediment were identified as chemicals of concern. A summary table of the chemicals of concern is provided in Attachment B.

Exposure pathways by which humans could be exposed to chemicals of concern were identified based on reasonable assumptions regarding current and future uses of the site. For current land-use conditions, direct contact with surface soils and sediments by children trespassing onto the site was evaluated.

With respect to future land uses, both residential and industrial land uses were evaluated. For future residential use, direct contact with soils and sediments were evaluated, in addition to potential inhalation exposures. For future industrial land-use conditions, both direct contact and inhalation exposures were also evaluated.

In order to assess these exposures, detected concentrations from sampling or, in the case of volatilization of contaminants, contaminant transport modeling was used to estimate the concentration at the exposure point.

Chronic daily intakes (CDIs) to humans were estimated by using the exposure point concentrations and exposure parameters (such as soil ingestion rates and frequency of exposure) available from EPA or assumed based on reasonable assumptions about potential site uses. Potential exposures were estimated using average parameters and geometric mean concentrations of chemicals to derive an average case exposure; the maximum concentration and higher exposure parameters were used to calculate a maximum plausible case exposure. Maximum concentrations were used in cases where mean concentrations were not available.

Excess lifetime cancer risks were estimated for each exposure case using CDIs and chemical-specific cancer potency factors. A cancer risk level of 1×10^{-7}, the lowest end of the risk range that EPA considers protective of human health, was used as a benchmark for comparison to the estimated cancer risk levels. Potential risks of noncarcinogenic health effects were estimated by comparing the CDIs to the reference doses (RfDs). The hazard index (HI) is the sum of the CDI:RfD ratios for all the chemicals evaluated in a given area. In general, hazard indices which are less than one are not likely to be associated with any health risks.

RISK ASSESSMENT RESULTS

The results of the risk assessment indicate that concentrations of contaminants in soil and sediment at several locations on and adjacent to the site result in excess lifetime cancer risks as high as 7×10^{-5} for current land use and 1×10^{-3} for future residential land use. The estimated risks of cancer and noncarcinogenic risks are summarized by land use and exposure pathway in Attachment B.

The EPA has determined that actual or threatened releases of hazardous substances from this site, if not addressed by remedial action, may present a current or potential threat to public health, welfare, or the environment.

8.0 DESCRIPTION OF ALTERNATIVES

The remedial alternatives evaluated in detail in the OUFS report are described below. This description identifies engineering components, institutional controls, implementation requirements, estimated costs, and major applicable or relevant and appropriate requirements (ARARs) associated with each option.

8.1 NO ACTION

As required by the National Contingency Plan, the no action alternative was evaluated. This alternative provides a baseline for comparing the effectiveness of the other remedial alternatives. Under this option, no further action would be taken to prevent exposure to contaminated soil and sediment or migration of contamination from the site. The site would remain in its present condition. There would be no costs associated with this alternative.

8.2 EXCAVATION AND ONSITE INCINERATION

This alternative would include the excavation and thermal treatment of approximately 4,050 cubic yards of contaminated soil and sediment. The amount of contaminated material to be excavated was determined by calculating protective soil contaminant concentrations based on the maximum case exposure conditions for future residential use of the site for a cancer risk level of 1×10^{-5}. A more detailed discussion regarding the determination of protective soil concentrations is provided in Section 10.2. Areas requiring excavation are identified in Figure C-1 in Attachment C.

Soil and sediment with contaminant concentrations above the protective soil concentrations would be excavated using conventional earthmoving equipment then thermally treated in an onsite mobile incinerator. Engineering controls such as dust suppressants and berms would be implemented during excavation to minimize fugitive dust and surface runoff.

Soil sampling would be conducted to confirm that the horizontal and vertical extent of excavation was sufficient to remove contamination above cleanup levels. Following excavation, clean soil would be placed in the excavated areas, compacted and graded. Vegetation or gravel would be applied to minimize erosion.

Additional site activities would include site preparation for the mobile incinerator and onsite assembly of the incinerator and material handling equipment. Operation of the unit would include safety and emissions control equipment. Completion of remediation activities would include demobilization of the incineration facility, decontamination and removal of temporary structures, equipment, etc., and regrading and seeding.

This alternative would comply with the Resource Conservation and Recovery Act (RCRA) requirements and technical standards of 40 CFR Part 264. Residual ash would be delisted as a hazardous waste to allow disposal in a sanitary landfill offsite. The alternative would comply with the Clean Air Act and Occupational Safety and Health Administration (OSHA) requirements. State requirements would include the Missouri Air Conservation Law, Missouri Air Pollution Control Regulations, and the Missouri Air Quality Standards.

The estimated time to implement this alternative was approximately 27 months which includes 5 months for excavation and incineration and 12 for delisting. The present worth cost for this option, revised based on additional information presented during the public comment period, was estimated at approximately $7.6 million.

8.3 EXCAVATION AND OFFSITE INCINERATION

An offsite permitted hazardous waste incineration facility would be used to thermally treat the 4,050 cubic yards of contaminated soil and sediment. Excavation and restoration activities would be performed as previously described.

As required by commercial facilities, contaminated soil would be placed in fiber drums and transported in 15-20 cubic yard trucks to the offsite incinerator. The exterior of trucks would be decontaminated prior to leaving the site. Waste manifests would accompany the waste shipments. Following incineration, residual ash would be disposed of by the offsite treatment facility.

The offsite transportation of hazardous materials would comply with Department of Transportation (DOT) and RCRA Part 263 requirements. OSHA requirements for the protection of workers would be met. The offsite RCRA facility must be in compliance with the CERCLA offsite policy.

The time required to implement this alternative was estimated to be 11-29 months. The variability is due to the availability and capacity of the offsite incinerator. The present worth cost for this alternative was estimated to be approximately $16.5 million.

8.4 EXCAVATION AND ONSITE LANDFILL

A RCRA hazardous waste landfill would be constructed onsite to dispose of the 4,050 cubic yards of contaminated material. As required by RCRA, the unit would be constructed above grade to maintain a separation of at least 10 feet between the bottom of the landfill and the shallow ground water at the site. Excavation and restoration would be performed as previously described.

The major landfill components would include a multiliner system, a leachate collection and removal system, and a RCRA multilayer cap. Post-closure activities would include semi-annual inspections, cap maintenance, and ground water monitoring. Land and ground water use restrictions would also be required for the onsite landfill facility.

This alternative would comply with the land disposal restrictions of RCRA Part 268 since placement of a RCRA listed waste would occur. The onsite landfill would comply with the technical standards and post-closure requirements of RCRA Part 264 and Missouri Hazardous Waste Management Law and Rules. OSHA requirements for the protection of workers would be met.

The estimated time required to implement this alternative was approximately 16-18 months. The present worth cost was estimated to be approximately $2.5 million.

8.5 EXCAVATION AND OFFSITE LANDFILL

This alternative would involve the excavation of the 4,050 cubic yards of contaminated material and transportation to a RCRA-approved commercial hazardous waste landfill. Excavation and restoration would be performed as previously described.

Contaminated material would be transported to the offsite facility in bulk shipments by covered trucks with capacity to hold up to 22 tons. The exterior of the trucks would be decontaminated prior to leaving the site. Waste manifests would accompany the waste shipments.

The offsite landfill facility must meet the RCRA technology requirements for land disposal which include double liner, leachate detection and collection system and ground-water monitoring.

This alternative must comply with the land disposal restrictions of RCRA Part 268 since placement of a RCRA-listed waste would occur. The transportation of hazardous waste must comply with DOT and RCRA Part 263 requirements. OSHA requirements for the protection of workers, and the Missouri Hazardous Waste Management Law and Rules would be met. The offsite facility must be in compliance with the CERCLA offsite policy.

The time required to implement this alternative was estimated to be 7-9 months. The estimated present worth cost was approximately $2.6 million.

8.6 EXCAVATION AND CAPPING

This alternative would include excavation of approximately 1,130 cubic yards of contaminated material (offsite drainage channel and soil along the south-southeast portion of the site) and consolidation onsite. A RCRA multilayer cap (compacted clay, synthetic membrane, drainage layer and vegetative layer) would be placed over the consolidated material and other areas where the levels of contaminants exceed protective soil concentrations. The cap would extend over some areas which do not exceed cleanup levels to facilitate drainage and divert surface water.

Following construction of the cap, vegetation would be established to prevent erosion. Long-term maintenance and monitoring would be required. Semiannual inspections, monthly maintenance and ground water monitoring would be performed. Land and ground water use restrictions would also be required.

This alternative would comply with RCRA landfill closure requirements in Part 264. OSHA requirements for worker protection would also be met.

The time required to implement this alternative was estimated to be approximately 12 months. The present worth cost was estimated at approximately $1.1 million.

9.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

Nine evaluation criteria have been developed by EPA to address CERCLA statutory requirements and technical, cost, and institutional considerations. The evaluation criteria serve as the basis for selecting an appropriate remedial action. The remedial alternatives developed and evaluated in the OUFS are described below in relation to the evaluation criteria.

9.1 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

With the exception of the no-action alternative, all the alternatives provide protection of human health and the environment by removing, reducing, or controlling risk through treatment, engineering controls, or institutional controls. The no-action alternative will not be discussed further since it is not protective of human health and the environment.

Both onsite and offsite thermal treatment offer the same level of protection. Risks posed by contaminated soil and sediment above protective soil concentrations would be permanently eliminated by destruction of contaminants through incineration.

The offsite landfill alternative would eliminate risks at the site by the excavation and removal of contaminated soil and sediment to a RCRA-approved offsite hazardous waste landfill. The offsite landfill, through containment, would reduce risks posed by the contaminated material by reducing the potential for contaminant migration and direct contact with or inhalation of contaminants. RCRA technical requirements for the landfill facility include double liner, leachate detection and collection system and monitoring.

The onsite landfill and capping alternatives would not eliminate risks at the site, but would reduce risks by reducing the potential for contaminant migration and direct contact with or inhalation of contaminants through containment. Long-term management, which would include site inspections, maintenance and monitoring, would be required for both alternatives. Land and ground water use restrictions would also be required.

9.2 COMPLIANCE WITH ARARS

Contaminant-specific ARARs with regard to soil have not been promulgated and no location-specific ARARs were identified. As discussed in the Section 8.0, the alternatives would comply with federal and state action-specific ARARs.

The thermal treatment alternatives would comply with RCRA Part 264 requirements and technical standards. Additional ARARs would include the Clean Air Act and Missouri Air Pollution Control Regulations.

The alternatives which include offsite transportation would comply with RCRA Parts 262 and 263, and DOT requirements. The land disposal alternatives would be required to comply with the requirements and technical standards of RCRA Parts 264 and 268.

9.3 LONG-TERM EFFECTIVENESS AND PERMANENCE

The thermal treatment alternatives would permanently eliminate risks associated with the contaminated soil and sediment. Both alternatives would require no long-term management or institutional controls at the site.

The removal of contaminated soil and sediment to a RCRA-approved hazardous waste landfill would eliminate long-term risks at the site. Containment provided by an offsite facility meeting the technical requirements for double liner, leachate detection and collection and monitoring would provide a high degree of long-term effectiveness for contaminated soil with the concentrations detected at this site. In addition, containment at an offsite facility would reduce the volume of contaminated material at the site and provide an overall reduction in mobility. The offsite landfill alternative would also not require long-term management or institutional controls at the site.

Containment of contaminated soil and sediment provided by the onsite landfill alternative and by the capping option may reduce but would not eliminate long-term risks at the site. The onsite landfill would provide an overall reduction in mobility through containment. Both alternatives would require long-term management including maintenance and ground water monitoring. Land and ground water use controls would also be required for the life of both alternatives. The capping alternative does not completely address potential threats posed by contaminated subsurface soils to the ground water; the potential for future release and exposure would have to be considered.

9.4 REDUCTION OF TOXICITY, MOBILITY, OR VOLUME

This criteria addresses the degree to which alternatives employ treatment which reduce toxicity, mobility, or volume. Only the incineration alternatives utilize treatment to reduce toxicity, mobility, or volume.

As described above, both the offsite and onsite landfill alternatives provide an overall reduction in mobility through containment.

9.5 SHORT-TERM EFFECTIVENESS

All the alternatives would present similar short-term risks to workers and the community during excavation and soil handling operations. Potential exposures to fugitive emissions and surface runoff can be effectively minimized and controlled by implementing engineering controls (dust suppressants, berms, etc.) and complying with action-specific ARARs.

The thermal treatment alternatives involve additional risks and impacts associated with potential malfunctions during operation or incomplete destruction of contaminants resulting in releases of hazardous emissions. Implementation of engineering controls and compliance with ARARs would effectively minimize and control potential risks and impacts.

The two offsite alternatives involve additional risks and impacts associated with offsite transport. Again, implementation of engineering controls and compliance with ARARs would effectively minimize and control potential risks and impacts.

The alternatives vary considerably in the length of time required to implement the remedial action. The offsite landfill alternative would require approximately 7-9 months. Capping would take 12 months and onsite disposal would require 16-18 months. Offsite incineration was estimated to take from 11-29 months, and onsite incineration would require about 27 months. Alternatives requiring a longer period of time to implement have a greater opportunity for short term impacts.

9.6 IMPLEMENTABILITY

Implementation of the offsite landfill alternative would involve conventional construction technologies. Operation and maintenance and monitoring following implementation of the remedy would not be required at the site. Future remedial actions, if required, would not be difficult to implement. The number and capacity of commercial landfills which are permitted to receive hazardous waste is limited, but four facilities currently in compliance were identified in the OUFS.

Onsite disposal and capping would also employ conventional construction technologies. Construction of the cap around the building and securing the cap to the structure would, however, be more technically complex. Implementation would be labor intensive for both alternatives. Site inspections, maintenance and ground water monitoring following implementation of the remedy would be required for both alternatives. Since onsite landfill and capping would require institutional controls for the life of the remedy, coordination requirements between local, county and state and federal agencies would be increased. For the capping alternative, the implementation of future remedial actions would be more difficult, especially for remedies addressing potential impacts on ground water by the contaminated subsurface soils.

The thermal treatment alternatives would be complex to implement. The capacity and availability of offsite commercial or mobile incinerators could be limited; facilities currently available were identified in the OUFS. Operation and maintenance at the site and institutional controls would not be required following completion of thermal treatment. Future remedial actions, if required, would not be difficult to implement.

9.7 COST

The capping alternative was estimated to be the least costly at $1.1 million. The cost for onsite landfill was estimated at $2.5 million. The offsite landfill alternative was estimated at $2.6 million. The estimated costs for the thermal treatment alternatives were the highest. The revised cost estimate for onsite thermal treatment was $7.6 million; offsite incineration was estimated to cost approximately $16.5 million.

9.8 STATE ACCEPTANCE

In a letter of concurrence, the State of Missouri supported the offsite RCRA-approved hazardous waste landfill alternative.

9.9 COMMUNITY ACCEPTANCE

During the public comment period, the Agency received three written comments from the community addressing the remedial alternatives. Two residents expressed support for the offsite landfill alternative and the PRPs supported the capping alternative.

Responses to all comments received during the public comment period are provided in the Responsiveness Summary, a component of the Record of Decision.

10.0 SELECTED REMEDY

Based upon an evaluation of the relative performance of each alternative with respect to the evaluation criteria, and consideration of comments received during the public comment period, both EPA and the State of Missouri have determined that excavation and offsite landfill is the most appropriate remedy for contaminated soil and sediment at the Kem-Pest site.

10.1 DESCRIPTION

Approximately 4,050 cubic yards of contaminated soil and sediment would be excavated and transported to a RCRA-approved commercial hazardous waste landfill for disposal. The offsite landfill facility would provide long-term management through double liner containment, a leachate detection and collection system and monitoring.

Sampling would be conducted to confirm that the horizontal and vertical extent of excavation was sufficient to remove contamination above the health-based cleanup goals. Following excavation, clean soil would be placed in the excavated areas, compacted and graded. Vegetation or gravel would then be applied to minimize erosion.

Since this remedy will not result in hazardous substances remaining onsite above health-based levels, environmental monitoring, security, and operation and maintenance would not be required for soils and sediments after remedial activities are completed.

The time required to implement this remedy was estimated to be approximately 7-9 months. The estimated present worth cost was estimated at approximately $2.6 million. The major cost components are transportation at $671,000 and disposal at $853,000. Capital costs for each major component and indirect costs are summarized in Table D-1 in Attachment D.

10.2 REMEDIATION GOALS

The objectives of this first operable unit are to remove or reduce to a protective level the risks posed by dermal contact, ingestion or inhalation of contaminated soil and sediment, to eliminate or reduce the potential for offsite transport of contaminated material, which includes reducing the threats posed by contaminated subsurface soils on ground water, and to remediate contaminated soil and sediment in a manner which will not adversely affect future remedial actions, if required.

A risk assessment was conducted to evaluate the potential impacts to human health for current and future land use scenarios. The results of the risk assessment indicate that concentrations of contaminants in soil and sediment at several locations on and adjacent to the site result in excess lifetime cancer risks as high as 7×10^{-5} for current land use and 1×10^{-3} for future residential land use.

There are no federal or state standards for soil contamination. When a health-based standard does not exist, EPA considers a range of 10^{-4} to 10^{-7} individual lifetime excess cancer risk to be protective of human health. The 10^{-6} level is generally used as the point of departure for establishing cleanup levels.

Protective contaminant concentrations for soil at 1×10^{-6}, 1×10^{-5}, and 1×10^{-4} were determined for chemicals of concern at the site. These concentrations were calculated using risk assessment techniques that combine scenario-specific exposure parameters with an estimated protective chronic daily intake (CDI) for each chemical of concern. The protective contaminant concentrations for the three cancer risk levels for both surface soil and subsurface soil exposures are provided in Tables D-2 and D-3 in Attachment D.

The protective soil concentrations for the maximum case at the 10^{-5} cancer risk level were determined to represent a reasonable maximum exposure scenario.

Reasonable maximum exposure scenario reflects a situation which is more conservative than an average case but is not the absolute worst case scenario. The maximum case soil concentrations for the 10^{-5} cancer risk level fall between the concentration range established be the average case and maximum case for the 10^{-6} cancer risk level. As explained in Agency guidance, the reasonable maximum exposure scenario is developed to reflect the types and extent of exposures that could occur, based on the likely or expected use of the site in the future.

The EPA has therefore determined that removing contaminated soil and sediment to the contaminant concentrations for the 10^{-5} risk level will reduce potential exposures to protective levels.

11.0 STATUTORY DETERMINATIONS

Section 121 of CERCLA establishes statutory requirements and preferences for remedial actions. These specify that when complete, the selected remedy must be protective of human health and the environment, comply with applicable or relevant and appropriate federal and state requirements, be cost-effective and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.

In addition, the statute includes a preference for remedies which employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes as their principal element. This section discusses how the selected remedy meets these statutory requirements.

PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

The selected remedy will eliminate risks at the site by the excavation and removal of contaminated soil and sediment to a RCRA-approved offsite hazardous waste landfill. The offsite landfill, through containment, will reduce risks posed by the contaminated material be reducing the potential for contaminant migration and direct contact with or inhalation of contaminants. The landfill facility will provide secure containment by meeting RCRA technical requirements which include double liner, leachate detection and collection system and monitoring.

The RI risk assessment concluded that concentrations of contaminants in soil and sediment at several locations on and adjacent to the site result in excess lifetime cancer risks as high as 7×10^{-5} for current land use and 1×10^{-3} for future residential land use.

By excavation and removal of contaminated soil and sediment to protective contaminant concentrations, cancer risks will be reduced to 1×10^{-5}. This cancer risk level represents a reasonable maximum exposure scenario and is within the range 10^{-4} to 10^{-7} individual lifetime excess cancer risk considered protective of human health.

There are no short-term threats associated with the selected remedy that cannot be controlled by implementing engineering controls and complying with ARARs. No adverse cross-media impacts are expected from this remedy.

COMPLIANCE WITH ARARS

The selected remedy complies with federal and state requirements that are applicable or relevant and appropriate to the operable unit. Contaminant-specific ARARs with regard to soil have not been promulgated and no location-specific ARARs were identified. Action-specific ARARs include:

RCRA 40 CFR Part 262 - Standards applicable to generators of hazardous waste.

RCRA 40 CFR Part 263 - Standards applicable to transporters of hazardous waste.

RCRA 40 CFR Part 264 - Standards for owners and operators of hazardous waste treatment, storage, and disposal facilities.

RCRA 40 CFR Part 268 - Land Disposal Restrictions.

OSHA 40 CFR Sect. 300.38 - Worker health and safety.

Hazardous Materials Transportation Regulations 40 CFR Parts 107, 171-177.

CERCLA Offsite Disposal Policy

Missouri Hazardous Waste Management Law and Rules

Other criteria, advisories or guidance to be considered for this remedial action include the protective soil concentrations for soil and sediment based on the risk assessment scenarios developed in the public health evaluation.

COST-EFFECTIVENESS

The selected remedy is cost-effective because it has been determined to provide overall effectiveness proportional to its costs, estimated at $2.6 million. Regarding the least costly alternative, capping, the selected remedy is cost-effective when the overall relationship between cost and effectiveness is compared to the cost/effectiveness relationship of capping. The selected remedy assures a higher degree of certainty that the remedy will be effective in the long-term. Capping would require long-term management at the site and institutional controls. In addition, capping would not address potential threats posed by the impact of contaminated subsurface soils on the ground water.

Based on the concentrations of hazardous substances in the soil and sediment detected at this site, thermal treatment of soils would result in long-term effectiveness similar to that afforded by containment at a RCRA-approved hazardous waste landfill.

UTILIZATION OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES (OR RESOURCE RECOVERY TECHNOLOGIES) TO THE MAXIMUM EXTENT PRACTICABLE

EPA has determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner. Of those alternatives that are protective of human health and the environment and comply with ARARs, EPA has determined that the selected remedy provides the best balance of tradeoffs in terms of long-term effectiveness and permanence, reduction in toxicity, mobility, or volume achieved through treatment, short-term effectiveness, implementability, cost and considering State and community acceptance.

The selected remedy provides a higher degree of long-term effectiveness and permanence than the onsite landfill or capping alternative. The selected remedy would require no long-term management or institutional controls at the site. In addition, capping would not completely address potential threats posed by contaminated subsurface soils to ground water; the potential for future release and exposure would have to be considered. Containment provided by an offsite facility meeting the technical requirements for double liner, leachate detection and collection and monitoring would provide a high degree of long-term effectiveness for contaminated soil with concentrations above health-based standards but not at significantly high concentrations. The selected remedy would therefore result in a similar degree of long-term effectiveness that would be provided by the thermal treatment of soils with these concentrations.

The selected remedy reduces both the volume and mobility of contaminated soil and sediment located at the site. The contaminated material removed from the site would be effectively contained as described above. The capping alternative would not reduce the volume of contaminated material on the site and the mobility of contaminants in the subsurface soil would remain a concern.

The selected remedy is more effective than the other alternatives in the short-term, requiring only 7-9 months to implement as compared to a year for capping, 16-18 months for onsite landfill, 11-29 months for offsite incineration and 27 months for onsite incineration. Alternatives requiring a longer period of time to implement have a greater opportunity for short term impacts.

The selected remedy is significantly less costly than the onsite and offsite incineration alternatives, and is comparable to the onsite disposal option.

With respect to implementability, the selected remedy will involve conventional construction technologies and will have fewer technical difficulties associated with implementation. The thermal treatment alternatives are technically complex to implement. Capping will be difficult to implement due to the need to construct the cap around the building and secure the cap to the structure. Future remedial actions, if required, would not be difficult to implement, as opposed to capping. With respect to administrative feasibility, the selected remedy will not require long-term management or institutional controls at the site. Both the onsite landfill and capping alternatives would require long-term management and institutional controls, increasing the complexity of coordination with local, county, state and federal agencies.

The selected remedy would utilize permanent solutions and alternative treatment technologies to the maximum extent practicable. Treatment is usually practicable for wastes which cannot be reliably contained or controlled in place such as liquids, highly mobile materials such as solvents, and high concentrations of toxic compounds. The wastes at the Kem-Pest site are soils and sediments with concentrations above health-based levels, but not at high concentration levels. Also, the principal contaminants at the site, pesticides, have a high affinity for attachment to soil particles and could be reliably contained by a hazardous waste landfill facility meeting the RCRA technical requirements which include double liner, leachate detection and collection system and monitoring. Offsite disposal in a RCRA-approved hazardous waste landfill would provide similar long-term effectiveness at substantially less cost than thermal treatment. Other potential treatment technologies were determined not to be feasible since contaminants and soil types present at the site were not amenable to physical or chemical treatment technologies. For these reasons, treatment is not practicable at the Kem-Pest site.

The selected remedy was supported by the State of Missouri. The State indicated that capping was the least preferred alternative due to concerns regarding the potential impact of contaminated subsurface soil on the ground water. With respect to community acceptance, two residents expressed support for the offsite landfill alternative and the PRPs favored capping.

PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT

This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this site. However, because treatment of the principal threats of contaminated soil and sediment was not found to be practicable, as explained above, this remedy does not include treatment as a principal element for this first operable unit.

RECORD OF DECISION

DECISION SUMMARY DOCUMENT

ATTACHMENTS

ATTACHMENT A

SAMPLE RESULTS SUMMARY TABLES

SAMPLE LOCATION FIGURES

TABLE A-1

Summary of Chemicals Detected in the
Subsurface Soil Samples from the Former Lagoon Area at the Kem-Pest Laboratories Site
(Organics-ug/kg, Inorganics-mg/kg)

Chemical	Frequency of Detection (a)	Geometric Mean	Maximum Detected
LAGOON 1.5-9 FEET			
Organics:			
acetone	4/8	32.0	300.0 J
* aldrin	6/14	89.7	3,500.0
* alpha-BHC	1/9	16.9	750.0 J
* benzene	2/8	5.5	67.0
* beta-BHC	1/6	6.8	23.8 J
bis(2-ethylhexyl)phthalate	3/7	528.5	2,698.1
* 2-butanone	1/5	8.2	27.0 J
* carbon disulfide	1/8	3.1	4.0 J
* chlordane	10/14	1,102.5	74,500.0
* chlorobenzene	2/8	5.4	120.0
* chloroform	2/8	7.6	150.0 J
* DDT	2/13	178.2	8,490.0
* delta-BHC	1/6	5.8	9.4 J
* 3,3'-dichlorobenzidine	1/7	684.8	950.0 J
* 1,1-dichloroethane	1/8	3.3	6.0 J
* 1,2-dichloroethane	3/8	7.3	87.0
* 2,4-dichlorophenol	4/7	1,019.2	8,600.0
* 2,4-dimethylphenol	1/7	419.9	680.0
* dieldrin	6/11	90.2	1,800.0 J
* endrin	8/13	146.4	14,000.0
endrin ketone	5/12	68.8	1,300.0 J
endosulfans I and II	1/13	342.7	104,800.0
- ethylbenzene	3/8	20.4	1,700.0
* gamma-bhc	1/7	7.5	11.0
* heptachlor	7/14	261.0	45,700.0
* heptachlor epoxide	2/7	7.8	38.0 J
* hexachlorobutadiene	1/7	453.6	3,500.0
* methoxychlor	1/7	65.8	320.0 J
methylene chloride	2/2	1.6	2.4 J
* 2-methylphenol	1/2	246.6	320.0 J
* n-Nitrosodiphenylamine	2/7	478.3	4,400.0
* ncpah	2/7	1,023.9	9,900.0
* pentachlorophenol	3/7	2,785.2	19,000.0
* toluene	2/8	5.3	37.0
* 1,1,1-trichloroethane	1/8	3.4	9.0 J
* 2,4,5-trichlorophenol	1/1	NA	260.0 J
* xylene (total)	3/8	29.1	11,000.0
Inorganics:			
aluminum	7/7	11,821.4	16,000.0
* arsenic	6/7	17.9	160.0
barium	7/7	199.9	300.0
beryllium	5/7	0.48	1.0 M
cadmium	3/7	0.9	4.3
calcium	7/7	2,857.5	4,500.0
chromium	7/7	19.4	29.0
cobalt	6/7	10.3	18.0
copper	4/7	16.0	37.0
iron	7/7	20,785.8	31,000.0
lead	7/7	15.0	23.0 J
magnesium	7/7	3,472.1	4,800.0
manganese	7/7	774.0	1,200.0
nickel	7/7	24.3	48.0
potassium	7/7	923.3	1,500.0
selenium	2/5	0.61	.8 M
sodium	3/3	169.9	250.0 M
thallium	1/2	1.17	1.2 M
vanadium	7/7	28.4	48.0
zinc	7/7	73.7	110.0

TABLE A-1 (cont.)

Summary of Chemicals Detected in the
Subsurface Soil Samples from the Former Lagoon Area at the Kem-Pest Laboratories Site
(Organics-ug/kg, Inorganics-mg/kg)

Chemical	Frequency of Detection (a)	Geometric Mean	Maximum Detected
LAGOON >9 FEET			
Organics:			
acetone	3/5	20.4	24.0 J
* aldrin	9/12	16.5	130.0 J
* alpha-BHC	3/10	8.1	13.0 J
* benzene	2/5	5.5	15.0 J
bis(2-ethylhexyl)phthalate	2/6	524.2	2,400.0
* carbon disulfide	1/5	3.6	5.0 J
* chlordane	10/12	228.2	5,360.0 J
* chlorobenzene	4/5	9.3	14.0
* chloroform	3/5	18.4	210.0 J
* DDT	1/12	60.6	43.5 J
* delta-BHC	1/8	6.3	14.0 J
* 1,1-dichloroethane	3/5	3.1	5.0 J
* 1,2-dichloroethane	5/5	90.5	700.0 J
* 2,4-dichlorophenol	5/6	1,066.8	8,900.0
* dieldrin	6/12	29.1	130.0
* endrin	5/12	36.7	1,300.0 J
* endrin ketone	3/12	24.7	370.0 J
* ethylbenzene	3/5	23.3	5,000.0 J
* gamma-BHC	4/10	13.3	68.0
* heptachlor	10/12	112.9	14,000.0
* methoxychlor	2/9	82.2	240.0
methylene chloride	2/2	2.5	3.0 J
* pentachlorophenol	2/6	NR	400.0 J
* toluene	1/5	5.4	36.0 J
* 2,4,5-trichlorophenol	1/1	NA	470.0 J
* xylene (total)	3/5	65.1	28,000.0 J
Inorganics:			
aluminum	6/6	11,916.1	14,000.0
* arsenic	4/6	8.2	23.0
barium	6/6	240.2	390.0
beryllium	6/6	0.7	1.2 J
cadmium	1/6	0.8	1.9
calcium	6/6	8,807.2	31,000.0
chromium	6/6	20.6	23.0
cobalt	6/6	15.1	29.0
copper	6/6	25.5	35.0
iron	6/6	23,804.0	33,000.0
lead	6/6	14.0	30.0 J
magnesium	6/6	6,326.2	11,000.0
manganese	6/6	1,542.8	4,700.0 J
nickel	6/6	34.9	45.0
potassium	6/6	1,425.0	2,300.0
selenium	3/6	0.6	0.6 M
sodium	5/5	202.3	230.0 M
vanadium	6/6	30.1	41.0
zinc	6/6	84.4	110.0

Notes:

J = Estimated value.
M = Chemical was detected at level below CRQL; similar to J value.

NA = Not applicable since only one sample.

NR = The geometric mean was not reported (NR), as this concentration was greater than the maximum detected value (as a result of including detection limits that exceeded two times the maximum detected value in calculating the geometric mean).

(a) The number of samples in which the contaminant was detected divided by the total number of samples analyzed. In determining the frequency of detected, samples flagged with an "R" (rejected) were not included.

* = Selected as chemical of potential concern for the risk assessment.

TABLE A-2

Summary of Chemicals Detected in Surface
Soils at the Kem-Pest Laboratories Site Based on Composite Samples (d)
(ug/kg)

Area/Chemical	Frequency of Detection (a)	Geometric Mean	Maximum Detected
GRIDS 1-4			
Organics:			
* aldrin	1/4	NR	0.9 J
* chlordane	4/4	14.6	29.9 J
* DDT	3/4	29.0	29.4 J
* dieldrin	4/4	6.3	17.0 J
* endosulfan sulfate	4/4	4.1	6.8 J
* endrin	1/4	NR	7.1 J
* heptachlor	4/4	3.1	6.1 J
* heptachlor epoxide	4/4	10.2	38.0
GRID 5			
Organics:			
* chlordane	1/1	NA	4,930.0
* dieldrin	1/1	NA	290.0
* heptachlor	1/1	NA	2,600.0
* heptachlor epoxide	1/1	NA	620.0
* toxaphene	1/1	NA	46,000.0
GRID 6			
Organics:			
* beta-BHC	1/1	NA	2.2 J
* chlordane	1/1	NA	27.0 J
* DDT	1/1	NA	121.0 J
* dieldrin	1/1	NA	23.0
* endrin ketone	1/1	NA	60.0
* heptachlor	1/1	NA	31.0
* heptachlor epoxide	1/1	NA	7.3 J
GRID 7			
Organics:			
* chlordane	1/1	NA	39,000.0 J
* DDT	1/1	NA	41,950.0
* dieldrin	1/1	NA	58,000.0
* endrin ketone	1/1	NA	2,100.0 J
* heptachlor	1/1	NA	22,000.0
* heptachlor epoxide	1/1	NA	600.0 J
GRID 8			
Organics:			
* chlordane	1/1	NA	24,000.0 J
* DDT	1/1	NA	985.0 J
* dieldrin	1/1	NA	3,200.0
* endosulfan sulfate	1/1	NA	66.0 J
* endrin ketone	1/1	NA	130.0 J
* heptachlor	1/1	NA	12,000.0
* heptachlor epoxide	1/1	NA	2,600.0

TABLE A-2 (cont.)

Summary of Chemicals Detected in Surface Soils at the Kem-Pest Laboratories Site Based on Composite Samples (d) (ug/kg)

Area/ Chemical	Frequency of Detection (a)	Geometric Mean	Maximum Detected
GRIDS 1A-4A			
Organics:			
* aldrin	2/8	NR	2.2 J
* chlordane	4/8	NR	63.2 J
* DDT	6/8	24.4	25.3 J
* dieldrin	6/8	6.1	29.0
* endosulfan sulfate	1/8	NR	6.1 J
* endrin	2/8	NR	4.6 J
* endrin ketone	2/8	NR	1.2 J
* heptachlor	8/8	1.9	2.9 J
* heptachlor epoxide	4/8	5.9	27.0
EAST LAGOON AREA (b)			
Organics:			
* aldrin	5/11	113.7	17,000.0
* chlordane	11/11	4,898	92,000.0
* DDT	7/11	656.3	9,100.0 J
* dieldrin	10/11	732.7	13,000.0
* endosulfan sulfate	3/8	30.4	210.0 J
* endrin	11/11	747.5	26,000.0
* endrin ketone	8/11	166.6	6,300.0
* heptachlor	11/11	2,353	94,000.0
* heptachlor epoxide	11/11	444.5	4,800.0
* methoxychlor	1/6	81.7	190.0 J
WEST LAGOON AREA (c)			
Organics			
* chlordane	5/6	115.8	1,110.0 J
* DDT	2/6	84.9	328.0 J
* dieldrin	4/6	30.9	53.0
* endrin	1/6	NR	5.7 J
* gamma-BHC	1/1	NA	2.3 J
* heptachlor	3/6	10.8	60.0
* heptachlor epoxide	5/6	27.1	330.0 J

Notes:

J = Estimated value

NA = Not applicable since only one sample.

NR = The geometric mean was not reported (NR), as this concentration was greater than the maximum detected value (as a result of including detection limits that exceeded two times the maximum detected value in calculating the geometric mean).

(a) The number of samples in which the contaminant was detected divided by the total number of samples analyzed. In determining the frequency of detection, samples flagged with a data qualifier of "I" (Invalid) were not included.

(b) Includes composite samples from Grids 6A, 7A, 8A, and 9A and Warzyn discrete sampling locations SS03 and SS04.

(c) Includes composite sample from Grid 5A and Warzyn discrete samples SS01, SS02, and SS05.

(d) Only pesticides and PCBs were analyzed for in these samples.

* = Selected as chemical of potential concern for the risk assessment.

TABLE A-3

Summary of Chemicals Detected in Surface
Soils at the Kem-Pest Laboratories Site Based on Discrete Sampling Locations
(Organics-ug/kg, Inorganics-mg/kg)

Location/Chemical	Frequency of Detection (a)	Geometric Mean	Maximum Detected
BARE AREA (in Grid 8)			
Organics:			
* aldrin	1/1	NA	12
* chlordane	1/1	NA	33 J
* DDT	1/1	NA	128
* dieldrin	1/1	NA	32
* heptachlor	1/1	NA	36
* heptachlor epoxide	1/1	NA	300
methylene chloride	1/1	NA	5.0 J
Inorganics:			
aluminum	1/1	NA	8,100.0
barium	1/1	NA	72.0
calcium	1/1	NA	1,100.0 J
chromium	1/1	NA	13.0
iron	1/1	NA	13,000.0
lead	1/1	NA	49.0 J
magnesium	1/1	NA	1,600.0
manganese	1/1	NA	320.0 J
nickel	1/1	NA	14.0
potassium	1/1	NA	750.0 J
vanadium	1/1	NA	20.0
zinc	1/1	NA	110.0
BURNT AREA (in Grid 8)			
Organics:			
acetone	1/1	NA	2.0 J
* aldrin	1/1	NA	5,900
* beta-BHC	1/1	NA	260
* chlordane	1/1	NA	761
* DDT	1/1	NA	3,480
* dieldrin	1/1	NA	2,600
* endosulfan II	1/1	NA	130
* endrin	1/1	NA	1,100
* endrin ketone	1/1	NA	1,300
* heptachlor	1/1	NA	180
* heptachlor epoxide	1/1	NA	100
* methoxychlor	1/1	NA	3,300
methylene chloride	1/1	NA	2.0 J
Inorganics:			
aluminum	1/1	NA	5,700.0
* arsenic	1/1	NA	170.0 J
barium	1/1	NA	83.0
calcium	1/1	NA	1,900.0 J
chromium	1/1	NA	11.0
cobalt	1/1	NA	8.0 J
iron	1/1	NA	11,000.0
* lead	1/1	NA	110.0 J
magnesium	1/1	NA	1,400.0
manganese	1/1	NA	680.0 J
nickel	1/1	NA	12.0
potassium	1/1	NA	580.0 J
vanadium	1/1	NA	17.0
zinc	1/1	NA	75.0

TABLE A-3 (cont.)

Summary of Chemicals Detected in Surface
Soils at the Kem-Pest Laboratories Site Based on Discrete Sampling Locations
(Organics-ug/kg, Inorganics-mg/kg)

Location/ Chemical	Frequency of Detection (a)	Geometric Mean	Maximum Detected
SCRAP PILE (in Grid 6)			
Organics:			
* chlordane	1/1	NA	648
* DDT	1/1	NA	17
* dieldrin	1/1	NA	62
* endrin	1/1	NA	88
* endrin ketone	1/1	NA	160
* heptachlor	1/1	NA	50
* heptachlor epoxide	1/1	NA	510
Inorganics:			
aluminum	1/1	NA	7,400.0
barium	1/1	NA	150.0
calcium	1/1	NA	1,700.0 J
chromium	1/1	NA	12.0
cobalt	1/1	NA	11.0 J
iron	1/1	NA	9,500.0
lead	1/1	NA	12.0 J
magnesium	1/1	NA	1,100.0 J
manganese	1/1	NA	1,900.0 J
nickel	1/1	NA	17.0
potassium	1/1	NA	680.0 J
vanadium	1/1	NA	19.0
zinc	1/1	NA	56.0
STORAGE TANKS (in Grid 4)			
Organics:			
acetone	1/1	NA	3.0 J
bis(2-ethylhexyl)phthalate	2/2	106.3	130.0 J
* di-n-butylphthalate	1/3	626.6	1,500.0
* ethylbenzene	1/3	14.2	360.0 J
* heptachlor	1/3	5.3	9.3
methylene chloride	2/2	2.4	2.8 J
* xylene (total)	1/3	38.2	5,900.0
Inorganics:			
aluminum	3/3	6,878.1	7,703.2
barium	3/3	161.0	290.0
calcium	3/3	1,924.2	2,700.0 J
chromium	3/3	12.0	12.0
cobalt	2/3	7.5	9.8 J
iron	3/3	8,981.2	9,697.9
lead	3/3	10.2	11.0 J
magnesium	3/3	1,181.4	1,249.0 J
manganese	3/3	980.9	1,179.8 J
nickel	3/3	15.0	16.0
potassium	3/3	645.1	700.0 J
vanadium	3/3	18.5	19.0
zinc	3/3	40.6	42.0

Notes:

J = Estimated Value

NA = Not applicable since only one sample.

(a) The number of samples in which the contaminant was detected divided by the total number of samples analyzed. In determining the frequency of detection, samples with a data qualifier of "I" (Invalid) were not included.

* = Selected as a chemical of potential concern for the risk as

TABLE A-4

Summary of Chemicals Detected in the
Drainage Channel Sediments at the Kem-Pest Laboratories Site (b)
(ug/kg)

Chemical	Frequency of Detection (a)	Geometric Mean	Maximum Detected
Organics:			
* aldrin	40/48	114.1	58,000.0
* alpha-BHC	2/25	5.4	24.0
* beta-BHC	2/23	5.2	19.0 J
* chlordane	47/48	1114.7	45,900.0
* DDT	38/48	314.2	44,490.0
* dieldrin	40/48	280.0	34,000.0
* endosulfans I and II	9/46	252.5	4,600.0 J
* endosulfan sulfate	1/21	7.3	21.0
* endrin	40/48	196.0	11,000.0 J
* endrin ketone	27/47	63.1	4,500.0 J
* gamma-BHC	7/23	4.0	21.0
* heptachlor	44/48	345.8	240,000.0
* heptachlor epoxide	43/48	136.3	2,800.0
* methoxychlor	4/38	121.3	2,100.0 J

Notes:

J = Estimated value.

NA = Not applicable since only one sample.

NR = The geometric mean was not reported (NR), as this concentration was greater than the maximum detected value (as a result of including detection limits that exceeded two times the maximum detected value in calculating the geometric mean).

(a) The number of samples in which the contaminant was detected divided by the total number of samples analyzed. In determining the frequency of detection, samples flagged with a data qualifier of "I" (Invalid) were not included.

(b) Only pesticides and PCBs were analyzed for in these samples.

* = Selected as chemical of potential concern for the risk assessment.

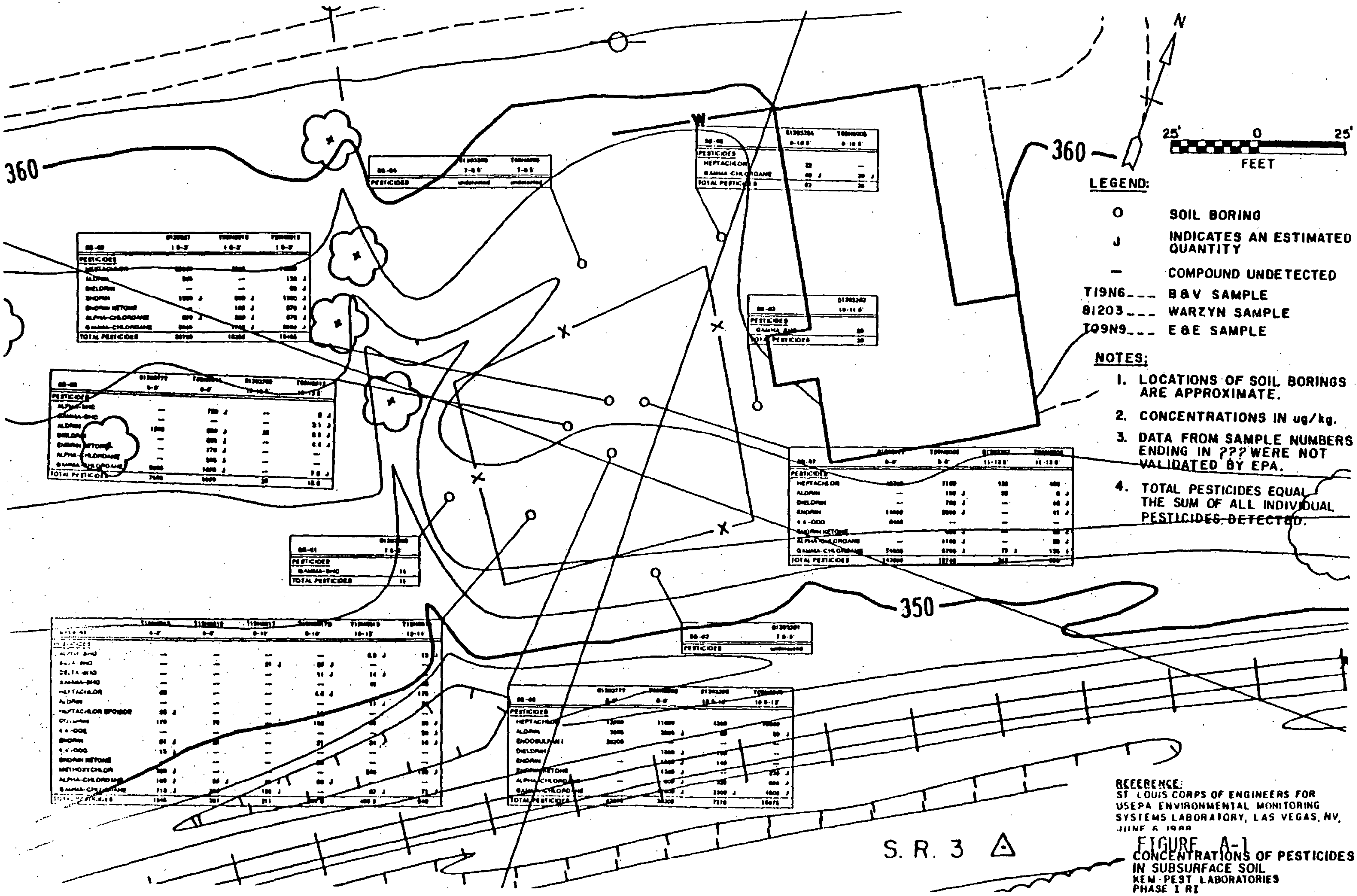


FIGURE A-1
CONCENTRATIONS OF PESTICIDES IN SUBSURFACE SOIL
KEM-PEST LABORATORIES
PHASE I RI

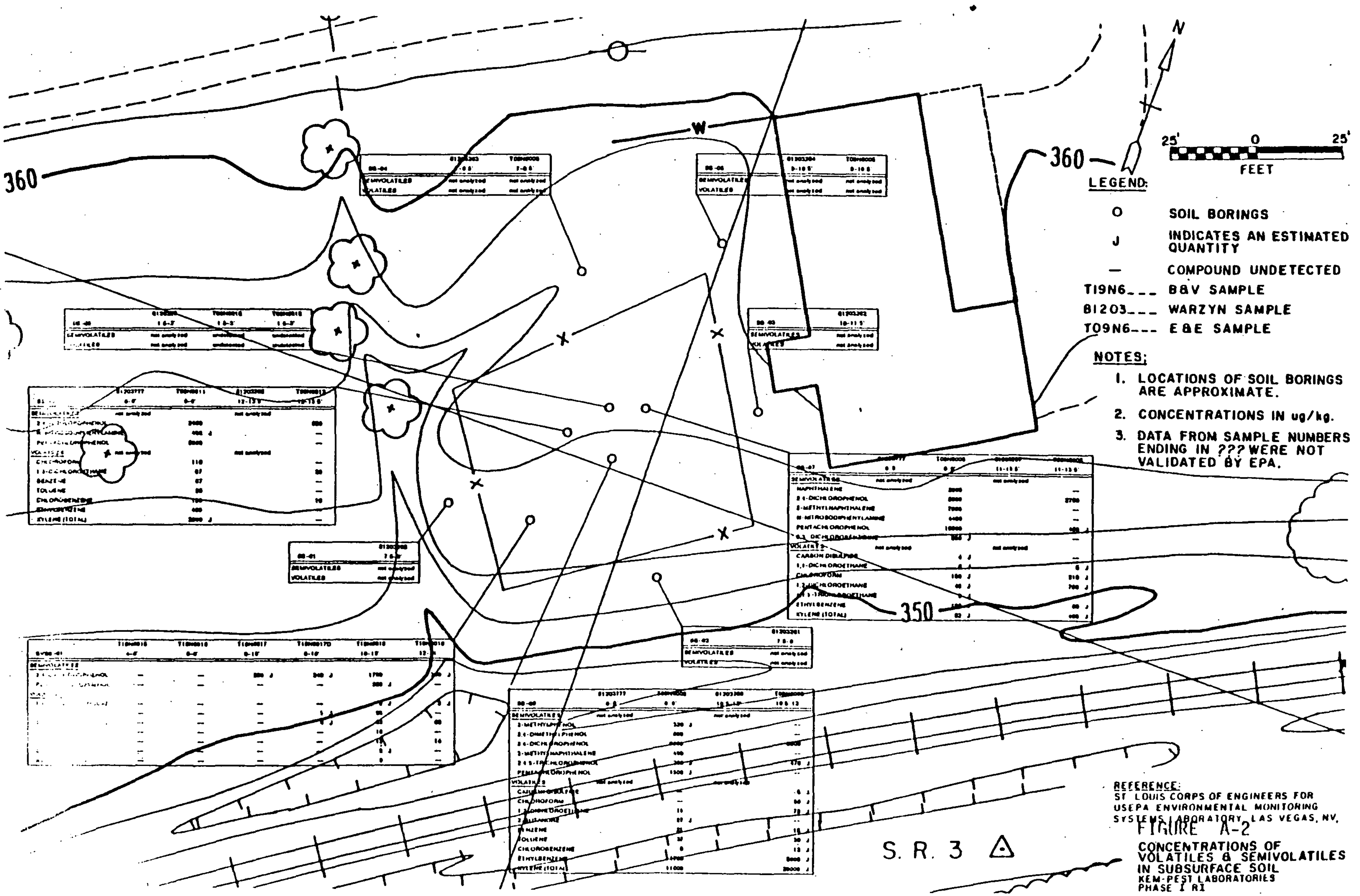
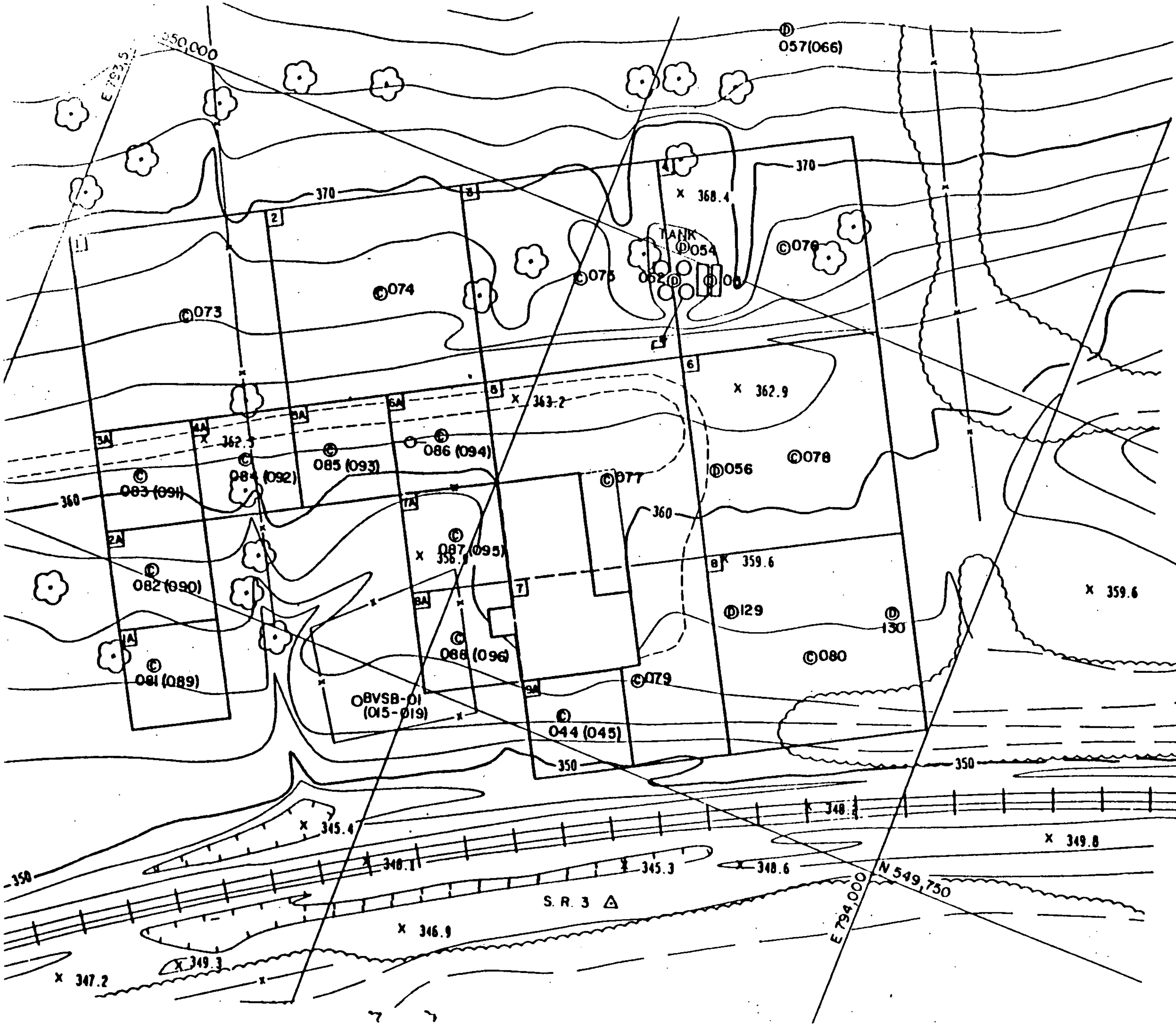


FIGURE A-2
CONCENTRATIONS OF VOLATILES & SEMIVOLATILES IN SUBSURFACE SOIL
KEM-PEST LABORATORIES
PHASE I RI



N

50 0 50
FEET

LEGEND:

© COMPOSITE SURFACE SOIL SAMPLE

Ⓓ DISCRETE SURFACE SOIL SAMPLE

088(096) SAMPLE NUMBER 0-6" (SAMPLE NUMBER 6-12")

O SOIL BORING

[9] GRID NUMBER AND GRID LIMITS

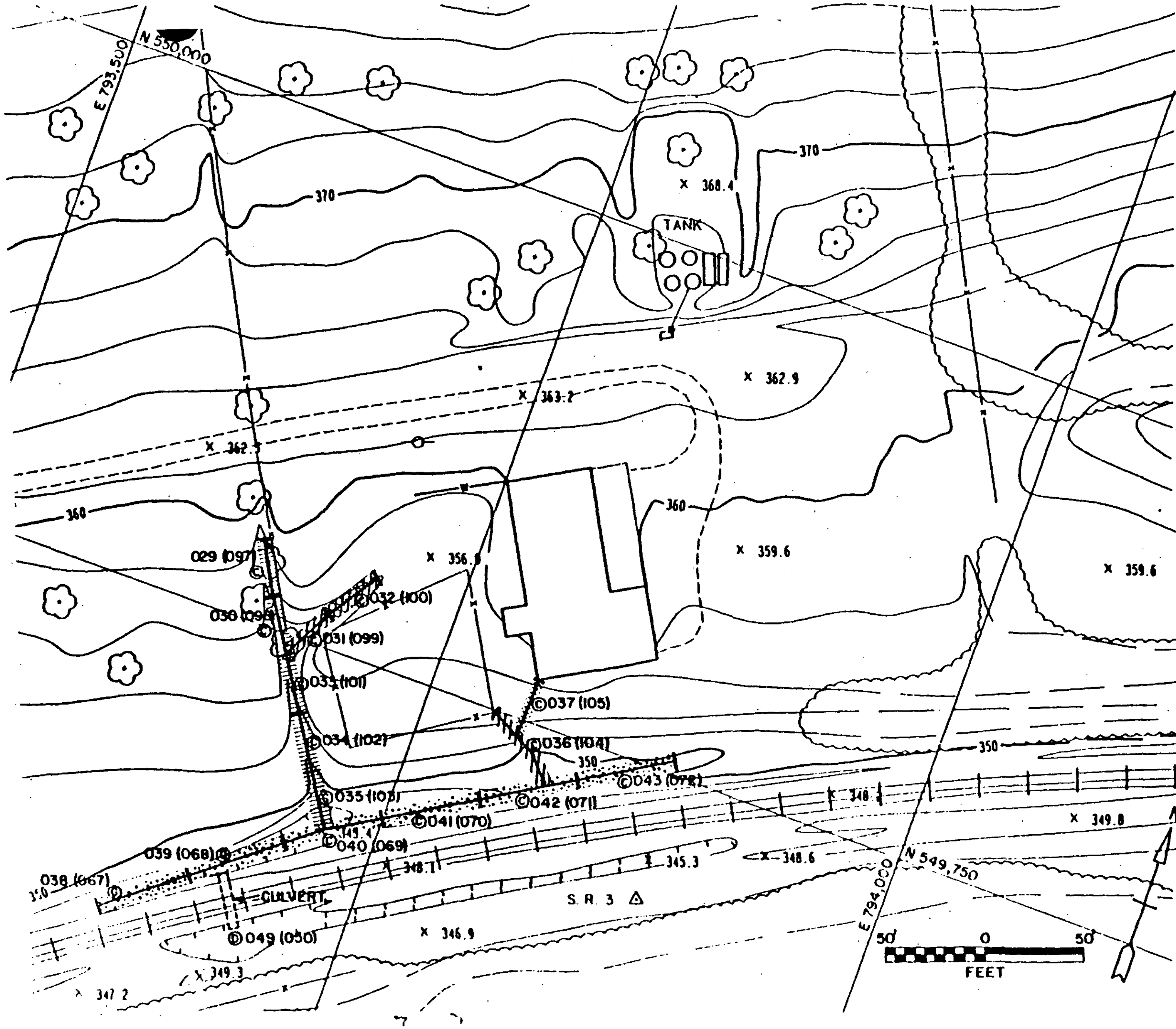
NOTE:

1. SAMPLE LOCATIONS ARE IDENTIFIED BY THE LAST THREE DIGITS OF THE EPA SAMPLE NUMBER. THE PREFIX FOR ALL SAMPLES IS T19N6.

REFERENCE:
ST LOUIS CORPS OF ENGINEERS FOR USEPA ENVIRONMENTAL MONITORING SYSTEMS LABORATORY, LAS VEGAS, NV, JUNE 6, 1988

FIGURE A-3

SOIL SAMPLE LOCATIONS
KEM-PEST LABORATORIES
PHASE I RI



LEGEND:

©	COMPOSITE SEDIMENT SAMPLE
Ⓓ	DISCRETE SEDIMENT SAMPLE
(crosshatch)	DRAINAGE CHANNEL 1
(vertical lines)	DRAINAGE CHANNEL 2
(diagonal lines)	DRAINAGE CHANNEL 3
(dense stipple)	DRAINAGE CHANNEL 4
(light stipple)	DRAINAGE CHANNEL 5
(line with ticks)	END POINT OF SAMPLING INTERVAL
037 (105)	SAMPLE NUMBER 0-6" (SAMPLE NUMBER 6-12")

NOTE:

1. SAMPLE LOCATIONS ARE IDENTIFIED BY THE LAST THREE DIGITS OF *THE EPA SAMPLE NUMBER. THE* PREFIX FOR ALL SAMPLES IS T19N6.

REFERENCE:
ST. LOUIS CORPS OF ENGINEERS FOR USEPA ENVIRONMENTAL MONITORING SYSTEMS LABORATORY, LAS VEGAS, NV, JUNE 6, 1988

FIGURE A-4

SEDIMENT SAMPLE LOCATIONS
KEM-PEST LABORATORIES
PHASE I RI

ATTACHMENT B

CHEMICALS OF CONCERN SUMMARY TABLE

POTENTIAL RISKS SUMMARY TABLE

TABLE B-1

Summary of Selected Chemicals of Potential Concern
for the Kem-Pest Laboratories Site

CHEMICAL	SURFACE SOIL (Discrete Samples)	SURFACE SOIL (Composite Samples)	SEDIMENTS	SUBSURFACE SOIL	BUILDING SAMPLES (all media)
ORGANICS					
Aldrin (a)	X	X	X	X	X
Benzene (b)				X	
Alpha-BHC (a)			X	X	
Beta-BHC (a)	X	X	X	X	
Delta-BHC (a)				X	
Gamma-BHC (a)		X	X	X	X
2-Butanone (b)				X	
Carbon disulfide (b)				X	
Chlordane (a)	X	X	X	X	X
Chlorobenzene (b)				X	
Chloroform (b)				X	
DDT (a)	X	X	X	X	X
3,3-Dichlorobenzidine (c)				X	
1,1-Dichloroethane (b)				X	
1,2-Dichloroethane (b)				X	
2,4-Dichlorophenol (c)				X	
Dieldrin (a)	X	X	X	X	X
2,4-Dimethylphenol (c)				X	
Di-n-butylphthalate (c)	X				
Endosulfan sulfate (a)		X	X		
Endosulfan I & II (a)	X		X	X	
Endrin (a)	X	X	X	X	X
Endrin ketone (a)	X	X	X	X	X
Ethylbenzene (b)	X			X	
Heptachlor (a)	X	X	X	X	X
Heptachlor epoxide (a)	X	X	X	X	
Hexachlorobutadiene (c)				X	
Methoxychlor (a)	X	X	X	X	X
2-Methylphenol (c)				X	
N-Nitrosodiphenylamine (c)				X	
ncPAHs (c)				X	
Pentachlorophenol (c)				X	
Toluene (b)				X	
Toxaphene (a)		X			X
1,1,1-Trichloroethane (b)				X	
2,4,5-Trichlorophenol (c)				X	
Xylene (total) (b)	X			X	
INORGANICS					
Arsenic	X			X	
Lead	X				

(a) Pesticide
(b) Volatile Organic
(c) Semivolatile Organic

TABLE B-2

SUMMARY OF POTENTIALLY SIGNIFICANT (a) RISKS ASSOCIATED WITH THE KEM-PEST SITE

Land Use Exposure Pathway/Area	Total Upperbound Lifetime Excess Cancer Risk		Noncarcinogenic Hazard Index	
	Average	Plausible Maximum	Average	Plausible Maximum
Current Land Use				
Children Trespassing Onsite - Direct Contact with Surface Soil				
Grid 5	4E-07	2E-06	--	--
Grid 7	5E-06	3E-05	--	--
Grid 8	7E-07	4E-06	--	--
East Lagoon Area	2E-07	3E-05	--	1
West Lagoon Area	4E-09	2E-07	--	--
Children Trespassing Onsite - Direct Contact with Sediment	5E-08	7E-05	--	1
Future Residential Land Use				
Residents - Direct Contact with Surface Soils				
Grids 1-4	1E-08	3E-07	--	--
Grid 5	4E-06	3E-05	--	--
Grid 6	3E-08	2E-07	--	--
Grid 7	5E-05	4E-04	--	2
Grid 8	8E-06	6E-05	--	--
Grids 1A-4A	1E-08	3E-07	--	--
East Lagoon Area	2E-06	4E-04	--	3
West Lagoon Area	5E-08	2E-06	--	--
Bare Area (in Grid 8)	2E-07	1E-06	--	--
Burnt Area (in Grid 8)	9E-05	2E-04	--	--
Scrap Pile (in Grid 6)	3E-07	2E-06	--	--
Residents - Direct Contact with Sediment	5E-07	1E-03	--	3
Residents - Inhalation of Volatile Organics from Surface Soils	6E-08	5E-07	--	--
Residents - Inhalation of Volatile Organics from Subsurface Soils	1E-05	9E-05	--	--
Future Industrial Land Use				
Construction Workers - Direct Contact with Subsurface Soils	1E-07	2E-06	--	--
Industrial Workers - Direct Contact with Surface Soils				
Grid 5	1E-07	3E-06	--	--
Grid 7	2E-06	5E-05	--	--
Grid 8	3E-07	7E-06	--	--
East Lagoon Area	6E-08	5E-05	--	--
West Lagoon Area	2E-09	2E-07	--	--
Bare Area (in Grid 8)	6E-09	2E-07	--	--
Burnt Area (in Grid 8)	3E-06	2E-05	--	--
Scrap Pile (in Grid 6)	1E-08	3E-07	--	--
Industrial Workers - Direct Contact with Sediments	2E-08	1E-04	--	--

TABLE B-2 (cont.)

SUMMARY OF POTENTIALLY SIGNIFICANT (a) RISKS ASSOCIATED WITH THE KEM-PEST SITE

Land Use Exposure Pathway/Area	Total Upperbound Lifetime Excess Cancer Risk		Noncarcinogenic Hazard Index	
	Average	Plausible Maximum	Average	Plausible Maximum
Future Industrial Land Use (Cont.)				
Industrial Workers - Inhalation of Volatile Chemicals from Surface Soils	4E-08	4E-07	--	--

(a) Cancer Risks greater than 1E-07, Hazard Indices greater than or equal to 1.

-- Means less than one.

ATTACHMENT C

EXCAVATION AREAS FIGURE

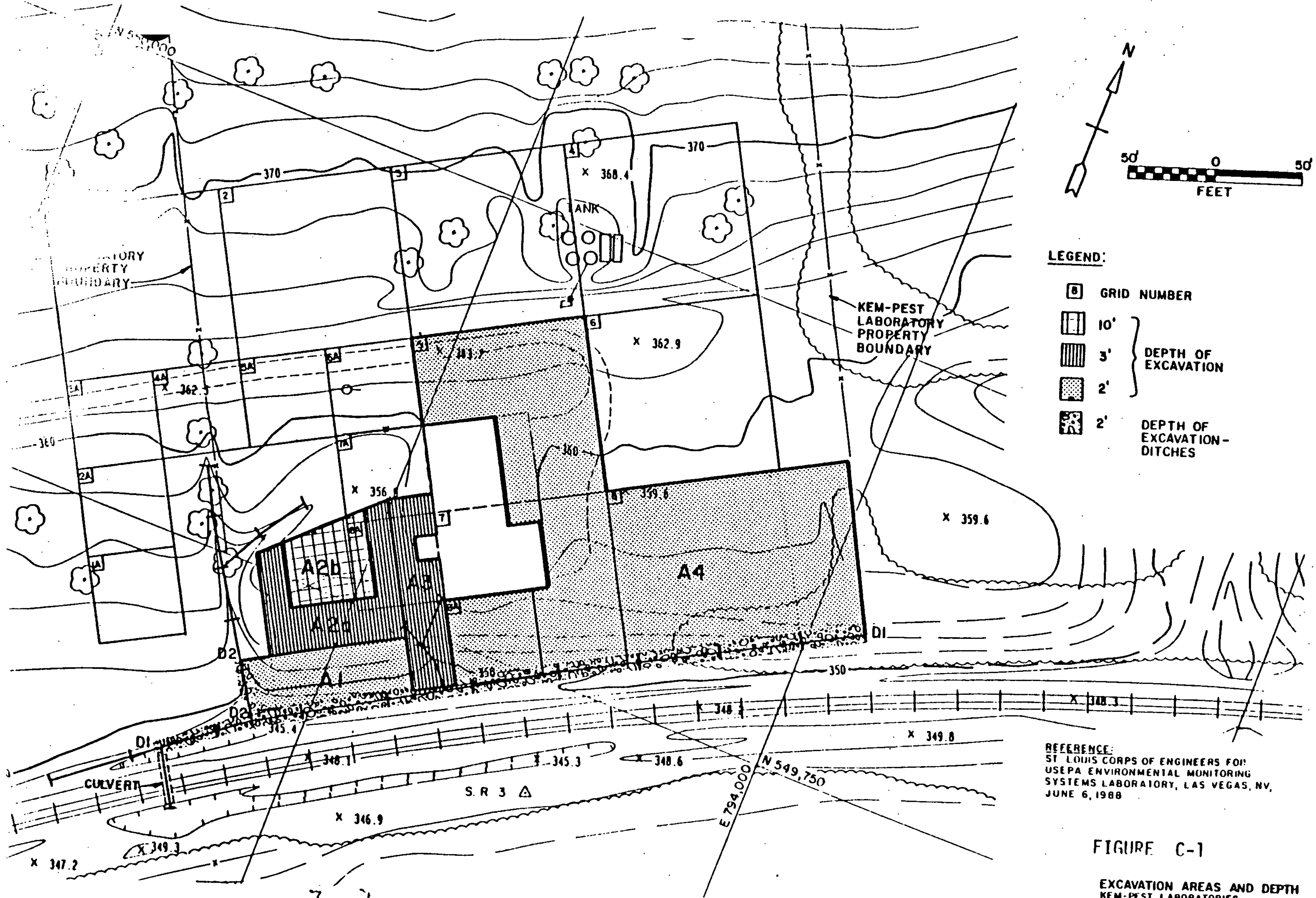


FIGURE C-1

EXCAVATION AREAS AND DEPTH
KEM-PEST LABORATORIES
OPERABLE UNIT FS

ATTACHMENT D

COST ESTIMATES SUMMARY TABLE

REMEDIATION GOALS FOR SURFACE SOIL SUMMARY TABLE

REMEDIATION GOALS FOR SUBSURFACE SOIL SUMMARY TABLE

TABLE D-1

DETAILED COST ESTIMATE
OFFSITE DISPOSAL

ITEM	QUANTITY	UNITS	UNIT COST	COST ($)
SOIL REMOVAL/SITE RESTORATION				
Excavate Contaminated Soil	4,050	CU YD	2.45	9,923
Confirmation Sampling/Analysis	10	SAMPLE	250.00	2,500
Labor	4	WEEK	800.00	3,200
Native Borrow, compacted for fill	4,050	SQ YD	12.00	48,600
Topsoil	840	CU YD	14.70	12,348
Grading	5,020	SQ YD	1.12	5,622
Revegetation	5,020	SQ YD	0.60	3,012
				$85,000
MATERIAL LOADING				
Equipment Rental	6	WEEK	580.00	3,480
Hourly Operation	240	HOUR	6.15	1,476
Labor, 2 workers, 1 supervisor	240	HOUR	48.00	11,520
				$16,000
TRANSPORTATION	298	LOAD	2,250	671,000
DISPOSAL (Unit Wt = 120 lb/cu ft)	6,561	TON	130.00	853,000
PROTECTIVE CLOTHING - Level D	370	SET	30.00	11,000
DECONTAMINATION				
Decontamination Area Construction				
2 vehicle, 1 personnel	1	LS	44000.00	44,000
Decon Water Disposal				
Offsite Disposal	20,000	LS	2.10	42,000
Transportation	4	LOAD	750.00	3,000
				$89,000

Table D-1 (cont.)

DETAILED COST ESTIMATE
OFFSITE DISPOSAL

ITEM	QUANTITY	UNITS	UNIT COST	COST ($)
SUBTOTAL - CONSTRUCTION, EQUIPMENT, TRANSPORTATION, LABOR, DISPOSAL				$1,725,000
BID CONTINGENCIES (15%)				259,000
SCOPE CONTINGENCIES (15%)				259,000
CONSTRUCTION TOTAL				$2,243,000
PERMITTING AND LEGAL (5%)				112,000
CONSTRUCTION SERVICES (5%)				112,000
TOTAL IMPLEMENTATION COST				$2,467,000
ENGINEERING DESIGN COSTS (5%)				112,000
TOTAL CAPITAL COST/PRESENT WORTH				$2,579,000

TABLE D-2

NUMERICAL VALUES FOR OTHER CRITERIA, STANDARDS, OR GUIDANCE
TO BE CONSIDERED FOR SELECTED COMPOUNDS DETECTED IN SURFACE SOIL AND SEDIMENT

Compound	Maximum Concentrations Detected Kem-Pest Laboratories site (mg/kg)		Acceptable Contaminant Concentrations in Soil Maximum Plausible Case at Selected Cancer Risk Levels (mg/kg)[a]			MDOH Recommended Safe Soil Levels Unrestricted Future Use (mg/kg)
	Surface Soil	Sediment	1×10^{-6}	1×10^{-5}	1×10^{-4}	
Aldrin	17	68	0.2	1.6	16.5	0.104
Dieldrin	58	34	0.2	1.7	17.5	0.087
Heptachlor epoxide	4.8	2.8	0.3	3.1	30.8	1.9
alpha-BHC	U	0.024	0.4	4.4	44.4	--
Heptachlor	94	240	0.6	6.2	62.2	3.8
Arsenic	170	--	1.1	11.3	113.0	--
beta-BHC	0.002	0.019	1.6	15.6	156.0	--
Chlordane	39	39	2.2	21.5	215.0	1.285
gamma-BHC	0.002	0.021	2.0	20.0	200.0	--
Toxaphene	46	U	2.5	25.5	254.0	1.42
DDT	37	32	8.2	82.3	824.0	0.001

U = Undetected

a = Maximum plausible case for residential use of the site. Assumes 30 years of exposure, 210 days/yr., 120 mg soil ingested per day (weighted average over exposure period), contact with hands and forearms (1,760 cm^2); bioavailability for oral ingestion is 50% for pesticides and 80% for arsenic; bioavailibility for dermal contact is 2% for DDT, 2.7 % for gamma-BHC, 2% for other pesticides, and no absorption of arsenic.

TABLE D-3

ESTIMATED ACCEPTABLE CONTAMINANT CONCENTRATIONS FOR SUBSURFACE SOIL BASED ON MAXIMUM CASE INHALATION EXPOSURES TO FUTURE RESIDENTS.

Chemical	Acceptable Contaminant Concentration (mg/kg)		
	$1x10^{-4}$	$1x10^{-5}$	$1x10^{-6}$
Aldrin	4.6	0.46	0.046
Alpha-BHC	39	3.9	0.39
Beta-BHC	1700	170	17
Chlordane	62	6.2	0.62
DDT	31,000	3,100	310
Dieldrin	4.0	0.40	0.040
Gamma-BHC	45	4.5	0.45
Heptachlor	0.72	0.072	0.0072
Heptachlor Epoxide	5.1	0.51	0.051

RECORD OF DECISION

SOIL AND SEDIMENT OPERABLE UNIT

RESPONSIVENESS SUMMARY DOCUMENT

KEM-PEST LABORATORIES SITE

CAPE GIRARDEAU COUNTY, MISSOURI

Prepared by:

U.S. ENVIRONMENTAL PROTECTION AGENCY

REGION VII

KANSAS CITY, KANSAS

SEPTEMBER 1989

TABLE OF CONTENTS

1.0 INTRODUCTION

This Responsiveness Summary presents responses of the U.S. Environmental Protection Agency (EPA) to public comments received regarding remedial action for contaminated soil and sediment at the Kem-Pest Laboratories site in Cape Girardeau County, Missouri.

A brief outline of the Responsiveness Summary is provided below:

- Section 2.0 provides background information on the Proposed Plan which presented the remedial alternatives developed for the site and the preferred alternative for cleanup. This section also briefly discusses the selected remedy.

- Section 3.0 describes community participation in the selection of the final remedy for contaminated soils and sediment.

- Section 4.0 includes a summary of comments received from all interested parties, including potentially responsible parties (PRPs). A response by EPA to each comment summary is provided.

- Attachment A provides a summary of comments submitted by the PRPs and the responses provided by the Agency. The summary of comments and responses are being provided as an attachment due to the length and detail of the comments.

2.0 PROPOSED PLAN/SELECTED REMEDY

PROPOSED PLAN

On August 18, 1989, EPA issued the Proposed Plan for the Kem-Pest Laboratories site. The plan presented excavation and disposal in an offsite hazardous waste landfill as the preferred alternative for the cleanup of contaminated soil and sediment at the site. The plan also provided background information on the nature of the problem at the site and described other remedial alternatives which were considered.

In addition to describing remedial options for cleanup, the plan also outlined how the public could participate in selection of the final remedy.

SELECTED REMEDY

Based on an evaluation of the relative performance of each alternative with respect to nine evaluation criteria, and consideration of comments received from the community, including the PRPs, EPA and the State of Missouri selected excavation and disposal in an offsite hazardous waste landfill as the most appropriate remedy for contaminated soil and sediment at the site.

A risk assessment was conducted to evaluate the potential effects to human health for current and future land use scenarios. The results of the risk assessment indicated that concentrations of contaminants in soil and sediment at several locations on and adjacent to the site result in excess lifetime cancer risks as high as 7×10^{-5} current land use and 1×10^{-3} for future residential land use.

Protective contaminant soil concentrations were calculated using risk assessment techniques for chemicals of concern at the site. Based on the protective soil concentrations, approximately 4,050 cubic yards of contaminated soil and sediment would be excavated and transported to a RCRA-approved commercial hazardous waste landfill for disposal. The RCRA facility would provide secure, long-term management through specially designed covers, multi-liner systems, leachate detection and collection components and monitoring.

3.0 COMMUNITY PARTICIPATION

Prior to the initiation of the remedial investigation (RI), a community relations plan was developed based on interviews conducted by the community relations staff with residents and local officials. The plan documented the issues of concern to the community which included the need for information on future site activities and potential threats to human health.

At the start of RI field activities, the EPA remedial project manager met with the Cape Girardeau County Commission and other local county and city officials to discuss the field work. The project manager also conducted informal interviews at nearby residences to inform them of site activities and to answer questions.

Fact sheets about the project were mailed to residents, local officials and the media. During field work, nearby residents and local officials were provided updates.

In August 1989, the RI and Operable Unit Feasibility (OUFS) reports and Proposed Plan were made available to the public in the administrative record located at the Cape Girardeau Public Library and at EPA Region VII offices in Kansas City. A public notice was issued announcing the availability of documents, the start of the public comment period and the date of the public meeting. The public notice was published in the Southeast Missourian on August 18, 1989, and in the Cape Girardeau News Guardian on August 23, 1989.

Fact sheets were also mailed to residents, local officials and the media announcing the availability of documents, the public comment period and the public meeting.

The public comment period was held from August 18, 1989, through September 18, 1989. A public meeting was held in Cape Girardeau on September 5, 1989. At the meeting, representatives from EPA, the Agency for Toxic Substances and Disease Registry (ATSDR) and the Missouri Department of Natural Resources (MDNR) provided information on the site and discussed the remedial alternatives under consideration. During an extension of the comment period, the EPA community relations staff conducted interviews with concerned citizens.

4.0 SUMMARY OF PUBLIC COMMENTS AND AGENCY RESPONSES

This section provides a summary of comments received from the community, including the PRPs, and presents the Agency's response. Statements made at the public meeting are summarized first with EPA's responses to the statements. Written comments received by EPA and the Agency's responses are provided next.

COMMENTS RECEIVED AT PUBLIC MEETING

A. A commentor asked why information regarding the February and March sampling had not been provided by the Agency. The commentor noted that when her well was sampled in 1987, she received information in the mail. The commentor explained that in February and March a field crew was on her farm, located immediately north of the site.

EPA RESPONSE: The remedial investigation field activities conducted by EPA in February and March of 1989 did not include any sampling or other field activities on the commentor's property, located north of the Kem-Pest site. Field activities were conducted by EPA on the northern portion of the Kem-Pest site; no field activities were conducted north of the site property boundary. Information obtained during the field activities, including sample results, are provided in the Remedial Investigation Report, available for review at the Cape Girardeau Public Library.

B. A commentor asked where public comments should be submitted.

EPA RESPONSE: The commentor was provided the name and mailing address of the EPA contact. The commentor was also informed of the toll free number on the back of the Fact Sheet.

C. The Cape Girardeau Presiding County Commissioner stated that that a week was not enough time for residents to comment. The Commissioner emphasized that if the residents have comments to make, the Agency should listen.

EPA RESPONSE: On August 18, 1989, the Agency issued a public notice in the Southeast Missourian announcing the start of a 21-day public comment period. The public notice was again published on August 23, 1989, in the Cape Girardeau News Guardian. The public notices also provided information regarding the public meeting on September 5, and the availability of EPA reports at the local library.

Prior to publication of the two public notices, the County Commissioner's office and other county and city offices were notified of the public comment period.

Fact sheets were also sent to residents, local officials and the media announcing the public comment period, the public meeting and the availability of documents at the library.

Nevertheless, in response to the County Commissioner's concern regarding the opportunity for residents to submit comments, the EPA extended the public comment period from September 8 to September 18. In addition, EPA community relations staff met with area residents in Cape Girardeau to listen to and receive oral or written comments.

WRITTEN COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD

A. A local resident expressed support for the preferred alternative. The commentor also expressed concern regarding long-term health effects to current and former area residents. The commentor noted that several families obtained water from a shallow well at a house which had been located directly across from the site; the house was demolished several years ago.

EPA RESPONSE: Remedial action at the site is being implemented through a series of operable units, or discrete response actions. This first operable unit addressed the threats posed by contaminated soils and sediments. Operable units addressing ground water and the formulation building will be initiated soon. A risk assessment will be conducted to evaluate the potential threats posed by ground water. EPA will provide the results of this evaluation when completed.

The Agency for Toxic Substances and Disease Registry (ATSDR) is also conducting a Health Assessment to assess impacts on public health. This Health Assessment will include a determination regarding the need for follow-up health effects studies of exposed populations. ATSDR will be asked to contact the commentor regarding the Health Assessment conclusions.

B. A former resident expressed support for the preferred alternative. The commentor also expressed concern regarding the lack of health assessments for persons who have lived in the vicinity of the site. The commentor noted that on numerous occasions children were seen playing at the lagoon and, on at least one occasion, a child was seen in the lagoon.

EPA RESPONSE: As discussed in the previous response, a risk assessment addressing ground water and a Health Assessment will be completed for the site. ATSDR will be asked to contact the commentor regarding the Health Assessment conclusions.

C. An extensive comment package was submitted by the potentially responsible parties. This comment package identified several areas of concern. Due to the length and detail of the PRPs' comments and the responses provided by the Agency, the summary of comments and responses are provided as an attachment to this document. The entire (PRP) comment package and the Agency's response to each comment are provided in a separate document which is available for review in the Administrative Record located at the Cape Girardeau Public Library.

RESPONSIVENESS SUMMARY ATTACHMENT

SUMMARY OF PRP COMMENTS AND EPA RESPONSES

PRP COMMENT LETTER DATED 9/12/89

A. The Excavation and Off-Site Disposal of Soils and Sediments Is Not Cost-Effective.

- EPA must select excavation/capping remedy because the OUFS indicates it is expected to achieve the health-based goals at a cost of $1.1 million which is significantly less expensive.

EPA RESPONSE TO A:

The EPA has developed nine evaluation criteria to address CERCLA statutory requirements and technical, cost, and institutional considerations. The evaluation criteria serve as the basis for conducting the detailed analyses of alternatives during the OUFS and for subsequently selecting an appropriate remedy.

Overall protection of human health and the environment and compliance with applicable or relevant and appropriate requirements (ARARs) are threshold criteria that must be satisfied in order for an alternative to be eligible for selection. Long-term effectiveness and permanence, reduction of toxicity, mobility, or volume, short-term effectiveness, implementability, and cost are the primary balancing factors used to evaluate the major trade-offs between the alternatives.

As stated in the OUFS, all the alternatives, with the exception of no action, would attain health-based goals. However, based upon an evaluation of the relative performance of each alternative with respect to the primary balancing criteria, and consideration of comments received during the public comment period, both EPA and the State of Missouri determined that excavation and offsite landfill was the most appropriate remedy for contaminated soil and sediment at the Kem-Pest site.

The selected remedy provides a higher degree of long-term effectiveness and permanence than the capping alternative. The selected remedy would not require long-term management or institutional controls at the site. A RCRA-permitted hazardous waste facility would provide more secure, long-term containment through a double liner system, leachate detection and collection system and monitoring programs. In comparison, capping provides a lesser degree of long-term effectiveness and permanence. This option would require long-term maintenance and monitoring at the site. Land use and ground water use restrictions for the life of the alternative would be required. Moreover, capping does not address potential threats posed by contaminated subsurface soils to ground water; the potential for future release and exposure would have to be considered.

The selected remedy reduces both the volume and mobility of contaminated material located at the site. The contaminated soil and sediment removed from the site would be effectively contained at the offsite facility meeting RCRA design and operating requirements including double liner, leachate detection and collection system, and monitoring. Capping, on the other hand, does not reduce the volume of contaminated material on the site. The mobility of contaminants in the subsurface soils would remain a concern.

The selected remedy is more effective than the capping alternative in the short-term, requiring 7-9 months to implement as compared to a year for capping.

The selected remedy has fewer technical difficulties associated with implementation. In addition, the selected remedy would not present any significant problems if future remedial actions were required. The capping alternative, in comparison, would be more difficult to implement. Construction of the cap around the building would be technically complex. The cap would also make it more difficult to implement additional remedial actions, if required.

The selected remedy is cost-effective when the overall relationship between cost and effectiveness is compared to the cost/effectiveness relationship of capping. As described above, the selected alternative provides a higher degree of long-term effectiveness and permanence, short-term effectiveness and technical feasibility, and provides for a reduction of mobility and volume.

The selected remedy was supported by the State of Missouri. The State indicated that capping was the least preferred alternative due to concerns regarding the potential impact of contaminated subsurface soil on the ground water.

During the public comment period, the Agency received two written comments from area residents. Both comments expressed support for the offsite hazardous landfill alternative.

Based on an evaluation of the relative performance of each alternative with respect to the evaluation criteria, and consideration of comments received during the public comment period from the State of Missouri and the community, excavation and offsite landfill is the most appropriate remedy for contaminated soil and sediment at the Kem-Pest site.

B. The Remedy Proposed by EPA is Unreasonable, Arbitrary and Capricious Because it Does Not Consider Relevant Data.

1. OUFS overestimates alleged health and environmental effects of pesticides because it assumes future residential use.

2. OUFS unreasonably assumes that the soils and sediments are a RCRA hazardous waste.

3. OUFS does not consider background levels of pesticides in agricultural and residential areas, pesticide levels in soils when applied according to accepted practices, or the rate at which the pesticides naturally degrade.

EPA RESPONSE TO B-1:

The Public Health Evaluation addresses the potential impacts on human health associated with the site under the no-action alternative. Evaluation of the no-action alternative is required by the National Contingency Plan. The no-action alternative assumes that no remedial actions and no land use restrictions would be applied to the site.

An exposure assessment, a component of the Public Health Evaluation, was conducted to identify the potential pathways by which human populations could be exposed to contaminants. In identifying potential pathways of exposure, both current and future land use was considered. Future residential use was evaluated in order to provide an upper bound on exposure and risk estimates for soils and sediments from future use of the site.

Residential use of the site may be less likely to occur than industrial use given the area is zoned for industrial use and other institutional controls restricting land use may be available. However, future residential use represents a reasonable maximum exposure scenario.

A review of past and present land use in the immediate vicinity indicated that residential use is a primary use of land in the area. Over a dozen residences are currently located within a 1000 foot radius of the site. The closest residence is within 500 feet of the site. With respect to past use of the land, a home was located less than 300 feet from the site entrance during the period of plant operations.

In addition, there are legitimate concerns regarding institutional controls. Zoning changes could conceivably occur. Implementation, enforceability, reliability, and long-term effectiveness are additional issues relating to the use of institutional controls.

EPA RESPONSE TO B-2:

EPA has determined that the wastes generated at the Kem-Pest site are RCRA hazardous wastes. As stated in the PRPs' comment, aldrin, dieldrin, heptachlor, chlordane, DDT, lindane and toxaphene are listed under Section 261.33(f), commercial chemical products. Information provided by the PRPs to EPA in their Notification of Hazardous Waste Site pursuant to Section 103 of CERCLA and their response to EPA's Information Request under Section 104(e) of CERCLA stated that spills of commercial chemical products were washed down the drain of the formulation building and disposed of in the lagoon. Accordingly, there was disposal of a RCRA hazardous waste in the lagoon. Furthermore, any wastes generated from the treatment, storage or disposal of a hazardous waste is a hazardous waste. None of the exemptions or exclusions set forth in 40 CFR 261.3 or 261.4 were found to be applicable to the wastes generated at the Kem-Pest site.

EPA RESPONSE TO B-3:

The surface application of chlordane and heptachlor was used extensively in agriculture and around the home for controlling a variety of insects until banned by the EPA in the mid-1970's, based on evidence that these substances caused tumors in laboratory animals and were persistent in the environment. Due to the presence of elevated levels of chlordane in air samples inside the home, and continued concern with health effects, the Agency recently banned the further sale, distribution and commercial application of the pesticides chlordane and heptachlor for termite control.

The pesticides at the Kem-Pest site are very persistent in soils and are expected to degrade very slowly, thus the overall risks are not expected to be significantly affected because of degradation. Degradation rates can widely vary from one location to another and are affected by a wide range of variables such as soil type, soil temperature, soil moisture, precipitation, soil microorganisms and percent sunshine. For example, Table 1 in Exhibit 6 of the comments indicates that houses #5 and #6 (both located on clay soils in the Piedmont region of North Carolina) presumably each had 378 liters of chlordane (Termide) applied in 1979 and approximately four years later the residues in soil (at 0-10 cm) were very different at the two sites, 1,890 ppm for #5 and 852 ppm for #6. Thus, there is much uncertainty associated with using degradation rates from areas with different soil types, etc., than the Kem-Pest site.

We agree that the OSHA Standards should have been identified as ARARs for inhalation exposures to workers and that the estimated air concentrations are less than the OSHA standards. However, the proposed remediation of surface soils is based on estimated risks from direct contact exposures and is not dependent on the estimated risks from inhalation exposures since these risks are lower. Thus, the use of the OSHA values as ARARs would not affect the results of the feasibility study.

The interim guideline levels recommended by the National Academy of Sciences are not enforceable criteria for the site and are not available for all the chemicals of concern at the site, thus cleanup levels were not derived based on these values, but were derived using quantitative risk assessment methods.

C. The Remedy Proposed by EPA is Unreasonable, Arbitrary and Capricious Because it is Based Upon Inadequate Data.

1. The method used to derive subsurface soil cleanup levels has not been demonstrated to be applicable to pesticides.

2. The RI contains data that have not been adequately quality assured.

3. The use of unfiltered water samples provides unreliable data.

4. The remedies analyzed in the OUFS contain inadequate design and cost assumptions.

5. The RI contains unsubstantiated speculation to the source of materials at the site.

EPA RESPONSE TO C-1:

The exposure parameters used for the maximum exposure scenario are not unreasonable for some portions of the population, such as persons who work at home. Although some of these people may spend several hours per week away from home, or even several days per year, the reduction in lifetime dose would be quite small. The exposure period of 30 years represents the upper-bound time (90th percentile) at one residence as cited in the "Exposure Factors Handbook", EPA 1988. The "Exposure Factors Handbook" is widely used as a source for exposure parameters for risk assessment.

The Hwang volatilization model used in the Kem-Pest Public Health Evaluation is appropriate for use with chemicals that have limited aqueous solubility and a high soil affinity such as the pesticides found at this site. Therefore, the use of this model to estimate pesticide volatilization is appropriate. Dr. Hwang, author of the model, is a recognized expert in the field of volatilization. He has developed many models for volatilization that have been recommended for use by the EPA. The Hwang model used for this risk assessment was presented in a document that was subjected to the EPA's peer review policies and was approved for publication.

EPA RESPONSE TO C-2:

As noted in the response to the comment on Page 4-1, last paragraph (Attachment B), "it is not standard practice to include data validation memoranda in the RI report. The Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (EPA/540/G-89/004, page 3-31) lists "Analytical Data and QA/QC Evaluation Results" as an appropriate appendix for the RI report. The analytical data and QA/QC evaluation results for the Phase I RI are included in Appendix G, Volume III, of the Phase I RI report. All data qualified as a result of the data validation procedures are identified by flags in the tables and the flags are defined at the beginning of the appendix. The data quality discussions at the beginning of each of the subsections in Section 4.0 of the Phase I RI report provide additional explanation of the results of the data validation. The data validation memoranda are a part of the public record for the Kem-Pest Laboratories site and are available upon request from EPA Region VII."

As stated on page 4-3 of the Phase I RI report with regard to the subsurface soil samples (and again on page 4-40 with regard to the sediment samples), "overall correlation between the original samples, splits and duplicates for the subsurface soil is not very good. However, these discrepancies are characteristic of analytical results for soil samples and are generally attributed to media effects. Because soil is not homogeneous and because many contaminants adsorb strongly to soil particles, contaminants are not uniformly distributed in this medium." Therefore, such variability in analytical results from soil samples is to be expected and such results are considered acceptable.

As discussed on pages 4-23 through 4-25 of the Phase I RI report, the decision to collect a second round of ground water samples for pesticides was based primarily on the fact that:

1) The technical holding time for the samples was exceeded by 20 days; and

2) Since the matrix spike/matrix spike duplicate analyses were unsuccessful and the surrogate was diluted out in five of the eight samples, there was not an adequate measure of precision and accuracy on these samples.

The variability between the unfiltered duplicate and the original unfiltered sample for monitoring well MW-2 was discussed as possibly providing evidence of the impact of the exceeded holding times, as indicated by this quote from page 4-24 of the

Phase I RI: "The correlation between the pesticide analytical results for the unfiltered duplicate sample from well MW-2 and those for the original unfiltered sample from this well (which was analyzed with another group of samples for which the holding time was not exceeded) is very poor. This could be the result of matrix effects since a significant amount of suspended sediment was present in the water from this well. However, the very low concentrations identified in the duplicate could also be a result of the exceeded holding time. If it is possible that the pesticides have degraded over time, this calls into question the analytical results from the offsite wells MW-7B and MW-6A, where no pesticides were detected. Therefore, in order to ensure that valid data are used to evaluate pesticide presence and possible migration from the site, a second round of unfiltered ground water samples will be collected and analyzed for pesticides and PCBs." However, the variability between the results of the analyses of these two samples was not the primary justification for the decision to collect a second round of samples.

It is standard practice to use estimated (J-flagged) data for evaluating the nature and extent of the contamination and in conducting the risk assessment. This practice is based upon the fact that data are generally flagged as estimated values as a result of minor deviations from laboratory protocol. Minor deviations include such things as serial dilution, matrix spike recovery or duplicate relative percent difference being outside control limits. Any major deviation from laboratory protocol would result in data being invalidated. The minor deviations identified above result in analytical concentrations that are generally within a small range of the true values. As discussed in the responses to Attachment B, comments page 4-34 - Section 4.3.2, Soil Samples from 0 to 6 inches and page 4-44 - first paragraph, the conclusions regarding the nature and extent of the contamination can generally be justified without the use of J-flagged data.

The quality of the Kem-Pest data from a laboratory perspective was very high. The data for this site which have been reported with "J" qualifiers as estimated data were qualified either because 1) the reported values were below the laboratory's contract required quantitation limit (CRQL) or 2) quality control requirements were not met for initial or continuing calibration verification. With regard to the second reason for qualification, no gross deviations in instrument sensitivity or accuracy of calibration were observed. Thus, these data points are acceptable in a semiquantitative sense.

A high degree of variation was noted for field duplicate results. Laboratory duplicate precision was excellent. The laboratories analyzed matrix spike and matrix spike duplicate samples for each matrix and analysis type. The results for the spiking compounds for some sample sets could not be evaluated since the spike amount was low relative to original sample concentration. However, for analytes detected in the samples which were not spiking compounds, duplicate precision was excellent. This indicates that the variance in field duplicate results was most likely due to nonhomogeneous sample matrix.

Qualification of results is performed using guidelines which try to cover every possible data usage. Depending on the nature of the QA/QC outlier(s) and number of outliers affecting any given data point, a range of quantitative variability may be represented by a "J" qualifier. The represented variability may or may not be significant relative to other considerations related to data usage. In this case, it appears that the degree of variance referred to by the "J" qualifier for sample concentrations greater than the CRQL is significantly less than the variance of contaminants in the soil matrix. The use of these concentrations to represent ranges of contamination as in fig.4-6A through 4-6B is an acceptable use of estimated data.

Data collected for the Kem-Pest site were subject to complete QA/QC: sample collection was documented on field sheets; field QC samples such as field duplicates and equipment rinsates were collected; samples were processed using chain-of-custody documents; approved laboratory calibration and analytical procedures were defined and followed; internal laboratory quality control was satisfactorily performed; and data were reviewed, validated and reported in Region VII EPA format. In addition, analyses were largely conducted by laboratories participating in the contract laboratory program (CLP). CLP laboratories analyze performance evaluation EPA audits quarterly and annually. They perform internal QA/QC in accordance with the contract specified revision of the "Statement of Work for Organics Analysis - Multi-Media, Multi-Concentration."

The comments of PRPs state a concern that the "cumulative effect (of inadequate QA/QC) is substantial." This concern is unfounded.

EPA RESPONSE TO C-3:

As discussed in the responses to the specific comments included in Attachment C, it is standard practice to analyze unfiltered ground water and to use such results in evaluating the nature and extent of the contamination and in conducting the risk assessment. Since water from rural wells is often unfiltered, analytical results from unfiltered samples provide a more realistic basis for risk assessment purposes than do filtered samples. The Agency for Toxic Substances and Disease Registry requests the results of analyses of unfiltered samples when conducting health assessments.

EPA RESPONSE TO C-4:

The general response to comments in Attachment D states: "As stated on pages 4-5 and 4-6 of the Soil and Sediment Operable Unit Feasibility Study (OUFS), the OUFS cost estimates are order-of-magnitude level estimates, which are defined by the American Association of Cost Engineers as an approximate estimate made without detailed engineering data. Examples include an estimate from cost capacity curves and estimates using scale-up or scale-down factors and/or approximate ratio estimates. It is normally expected that an estimate of this type would be accurate to +50 percent and -30 percent for given unit quantities. The actual cost of the project would depend on the final scope of the remedial action, the schedule of implementation, actual labor and material costs at the time of implementation, competitive market conditions and other variable factors that may impact the project costs.

This approach to feasibility study costs is consistent with the RI/FS guidance which states on page 6-12 that study estimate costs made during the FS are expected to provide an accuracy of +50 percent to -30 percent.

In addition, the primary purposes of cost estimates in a feasibility study are 1) to provide a basis for comparison between alternatives and to determine a relative ranking of alternatives on the basis of costs and 2) to provide a basis for EPA to allocate funding for remedial action.

Based on these purposes and the requirements for feasibility study estimates stated on the previous page, the comments on the feasibility study costs in Section D are generally inappropriate. Many of the comments, including the comments associated with borrow soil, decontamination, protective clothing, monitoring and onsite transportation apply to several or all of the alternatives so they have no impact on the relative ranking of the alternatives. The comments also imply that the cost estimates are too conservative. However, if the cost estimates are to serve as a basis for allocating funding for remedial action, a conservative estimate is required in order to ensure that adequate funds are made available. For instance, since the OUFS is based on the assumption that EPA would hire a contractor to perform the required services, it could not be assumed that fill, topsoil, etc., would be available from the site under those circumstances.

A few errors in the costs were identified. These errors have been corrected and the new costs noted in the response to the comments in Attachment D; none of the changes altered the relative ranking of the alternatives.

EPA RESPONSE TO C-5:

As stated in the response to all comments in Attachment E relating to Section 4.0: "The objectives of the Phase I RI included evaluating 1) the sources of contamination and 2) the specific contaminants of concern. In evaluating the nature and extent of the contamination, certain anomalies were noted in results of analyses of the environmental samples. These anomalies included 1) identification of contaminants not consistent with existing information relating to site activities or with the results of previous investigations and 2) identification of contaminants in areas where contamination was not anticipated, based on existing information relating to site activities and the results of previous investigations. These anomalies are of concern because they may indicate the existence of unidentified sources of pathways requiring further investigation. The 'speculation' referenced in the comments in Attachment E represents an attempt to find a logical explanation for these anomalies and to evaluate whether or not they require further investigation. In all cases, the wording of the discussions in the RI report make it clear that the analyses are not statements of fact."