United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R06-88/034
June1988

EPA

Superfund Record of Decision:

North Cavalcade, TX

50272-101

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North Cavalcade, TX
First Remedial Action - Final

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06/28/88

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U.S. Environmental Protection Agency
401 M Street, S.W.
Washington, D.C. 20460

13. Type of Report & Period Covered
800/000

14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

The 21-acre North Cavalcade site is located in northeast Houston, Texas. The surrounding areas are a mixture of residential, commercial, and industrial properties. Surface water is drained by three stormwater drainage ditches, one of which flows into Hunting Bayou, a limited aquatic habitat as classified by Texas Water Quality Standards. The site was developed in 1946 when Houston Creosoting Company, Inc. (HCCI) established creosote wood preserving operations. Around 1955, HCCI added pentachlorophenol (PCP) wood preservation services and other support facilities. Wood preserving operations ceased in 1961, and the property was sold in 1964. Subsequent property owners divided the site into smaller tracts and sold them to a succession of owners. There has been no industrial activity at this site since 1964. Between September 1985 and November 1987, EPA sampled all environmental media and found PAHs, VOCs, and components of creosote in soil, ground water, and sediments. The area of soil contamination corresponds to where creosote was historically stored, and the point of entry for the contaminants into the ground water. The plume of contamination currently covers approximately 4 acres. Creosote components were found in drainage ditch sediments probably as a result of rainfall runoff during the time of historical operations. The primary contaminants of concerning affecting the ground water, soils, and sediments include: VOCs, benzene, toluene, xylene, and PAHs.
(See Attached Sheet)

17. Document Analysis a. Descriptors
Record of Decision
North Cavalcade, TX
First Remedial Action - Final
Contaminated Media: gw, sediments, soil
Key Contaminants: PAHs, VOCs (benzene, toluene, xylene)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement

19. Security Class (This Report)	21. No. of Pages
None	51
20. Security Class (This Page)	22. Price
None	

(See ANSI-Z39.18) See Instructions on Reverse

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(Formerly NTIS-35)
Department of Commerce

EPA/ROD/R06-88/034
North Cavalcade, TX
First Remedial Action - Final

16. ABSTRACT (continued)

The selected remedial action for this site includes: in-situ biological treatment of 22,300 yd^3 of soil (optimum method will be determined after pilot testing); ground water pump and treatment of 5,600,000 gallons using oil/water separation and carbon adsorption with re-injection into the aquifer or, if necessary to maintain the water balance, discharge into an onsite drainage ditch which discharges into Hunting Bayou; and offsite incineration of all non-aqueous phase liquids (NAPLs) separated out from the ground water. The estimated present worth cost for this remedial action is $4,210,000. There is no O&M associated with this remedy.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VI
1445 ROSS AVENUE, SUITE 1200
DALLAS, TEXAS 75202

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

North Cavalcade Street site, Houston, Texas

STATEMENT OF PURPOSE

This decision document presents the selected remedial action for the North Cavalcade Street site in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 and, the National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR Part 300, November 20, 1985.

The State of Texas (through the Texas Water Commission) has been briefed on the methods of technology and degree of treatment stated by the Record of decision.

STATEMENT OF BASIS

This decision is based upon the administrative record for the North Cavalcade Street site. The attached index identifies the items which comprise the administrative record.

DESCRIPTION OF THE REMEDY

The selected remedy will treat the health- and environment-threatening contamination resulting from historical wood preserving operations at the site. Upon review of the information contained in the administrative record, EPA has decided that oil/water separation and carbon absorption of groundwater and biological treatment of contaminated soils best fulfills the statutory selection criteria. The following is a brief summary of the proposed remedy:

Contaminated surficial soils - Treat onsite using biological treatment to a level of 1 ppm of carcinogenic polynuclear aromatic hydrocarbons. In-place treatment is preferred, but the actual method will be selected from the results of pilot testing during the Remedial Design.

Contaminated groundwater - Extract and treat onsite using oil/water separation and carbon absorption until all non-aqueous phase liquids (NAPLs) are completely removed and benzene concentrations do not exceed 5 ug/l; incinerate the NAPLs offsite.

EPA will later decide the optimal means for remediating contamination from polychlorinated biphenyls in the drainage ditch on the eastern boundary of the site.

DECLARATION

The selected remedy is protective of human health and the environment, attains Federal and State requirements that are applicable or relevant and appropriate, and is cost-effective. This remedy satisfies the preference for treatment that reduces toxicity, mobility or volume as a principal element. Finally, it is determined that this remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent praticable.

6-25-88
Date

Robert E. Layton Jr.
Robert E. Layton Jr., P.E.
Regional Administrator

NORTH CAVALCADE STREET
Record of Decision Concurrences

The North Cavalcade Street Record of Decision has been reviewed and I concur:

Allyn M. Davis, Director
Hazardous Waste Management Division (6H)

Robert E. Hannesschlager, P.E., Chief
Superfund Enforcement Branch (6H-EE)

Larry D. Wright, P.E., Chief
Superfund Enforcement Section (6H-EE)

Bennett Stokes, Chief
Solid Waste and Emergency Response Branch (6C-H)

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

NORTH CAVALCADE STREET SITE

HOUSTON, TEXAS

JUNE 1988

U. S. ENVIRONMENTAL PROTECTION AGENCY

REGION VI, DALLAS, TEXAS

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1. SITE LOCATION AND DESCRIPTION

The North Cavalcade Street site is located in northeast Houston, Texas about one mile southwest of the intersection of Interstate Loop 610 and U.S. Route 59 (Figure 1). The site boundaries are Loop 610 to the north, Cavalcade Street to the south, and the Missouri and Pacific railroad lines to the east and west. The site is triangular in shape with a base of approximately 600 feet, an apex of 3,000 feet, and an area of 21 acres.

The site is generally flat with several small mounds and depressions. It is drained by three stormwater drainage ditches. Two of these flank the site on the east and west sides, and drain water to the third ditch which bisects the site into northern and southern sections. The third ditch drains into a flood control ditch which discharges into Hunting Bayou, a tributary of the Houston Ship Channel. Hunting Bayou is currently classified in the Texas water quality standards as a limited aquatic habitat.

The site is now used by two commercial enterprises which have erected two buildings on the southern part of the site. The remainder of the site is not currently used. The surrounding areas are residential, commercial, and industrial properties. The nearest residential area, an old low-income neighborhood, is directly to the west. Commercial properties are located along the major thoroughfares as well as onsite.

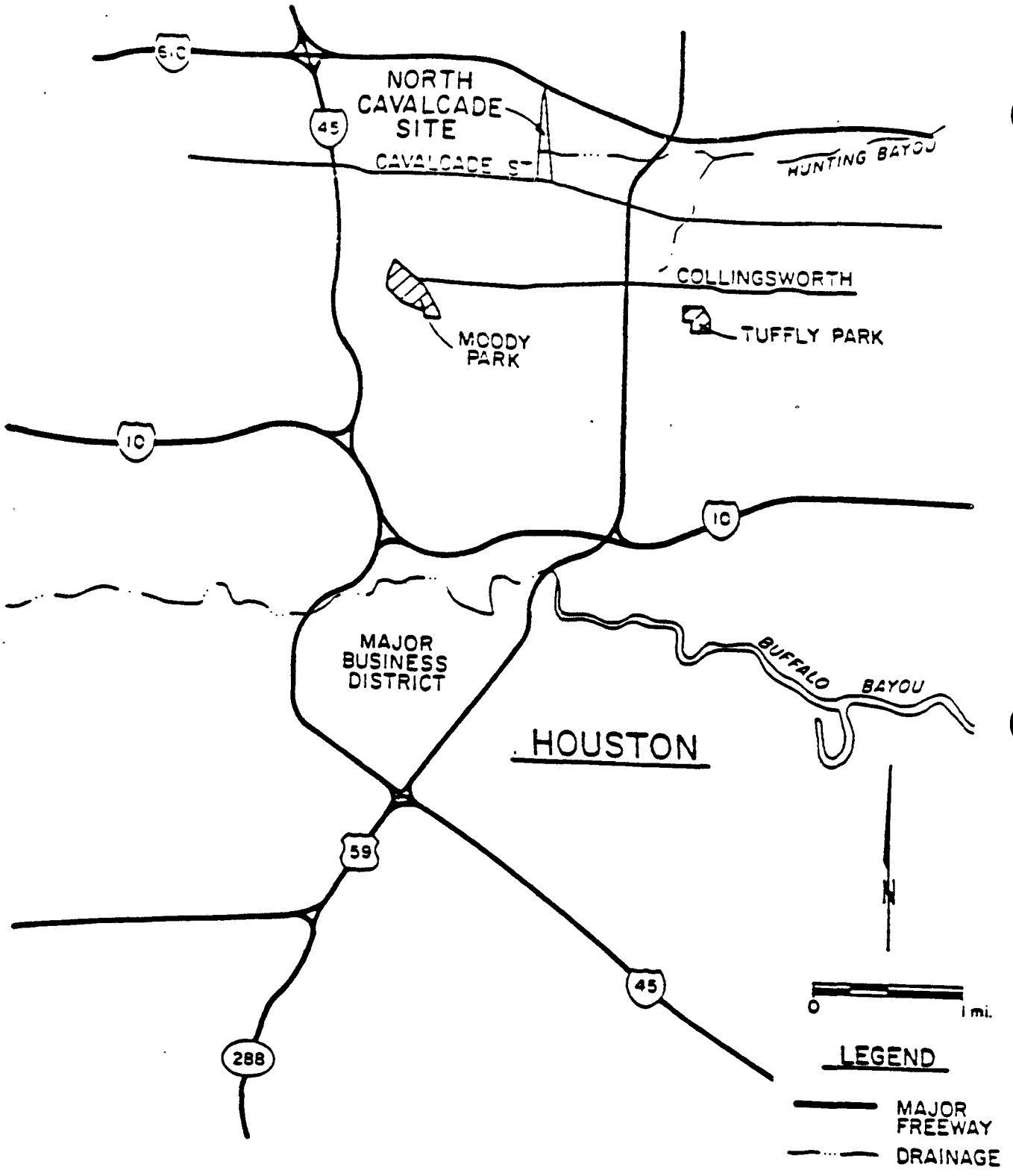
2. SITE HISTORY

2.1 PREVIOUS SITE USE

The North Cavalcade Street site was not developed until Mr. Leon Aron acquired the site in 1946 and established on it a small wood preserving business, Houston Creosoting Company, Inc. (HCCI). The HCCI business initially included creosote wood preserving operations. In about 1955, HCCI added pentachlorophenol (PCP) wood preservation services and other support facilities.

In 1961, the East End Bank of Houston foreclosed on the property and wood preserving operations ceased. In 1964, the bank sold the property to the Monroe Ferrell Concrete Pipe Company. There has been no industrial activity since 1964.

Subsequent property owners divided the site into smaller tracts and sold them to a succession of owners. The property is now owned by two companies and two individuals. The Great Southern Life Insurance Company owns 1.6 acres in the southwest corner of the site and has constructed a building. The Coastal Casting Company owns two tracts consisting of 4.7 acres in the southern area of the site; the company built a building used for engine repair upon the westernmost tract. These tracts encompass the operations and waste pit areas of the old wood preserving facility. Two other tracts are owned by R. D. Eichenour (3.9 acres) and A. D. Dover (2.) acres), and represent the remainder of the site. Figure 2 shows the current and historical site features.



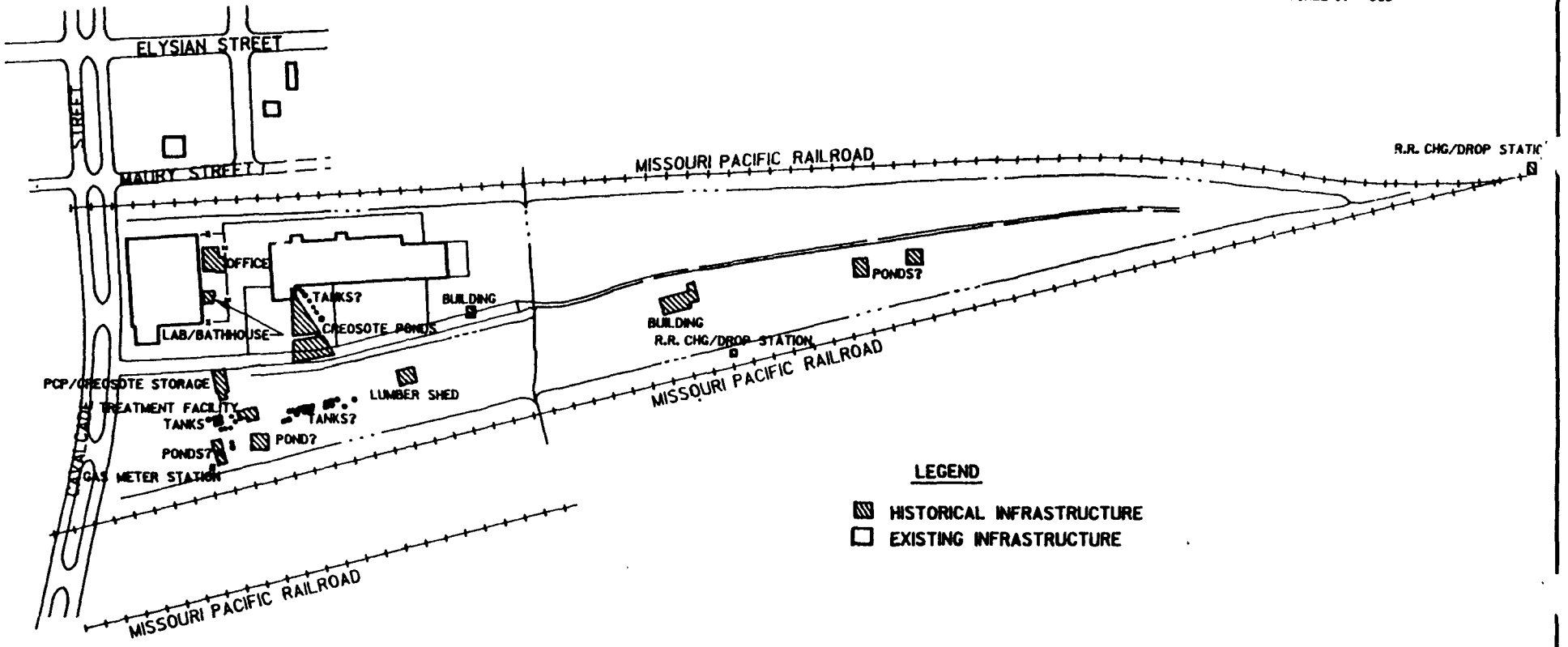
SITE LOCATION MAP

HORIZONTAL DATUM IS TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE. NORTH AMERICAN DATUM 1927.

N

100 80 0 100 200 300 400 500

SCALE 1" = 365'



NOTE: INFORMATION FROM 1955, 1965 AND 1985 AERIAL PHOTOGRAPHS

COMPOSITE OF HISTORICAL AND CURRENT SITE FEATURES

2.2 GEOLOGY AND HYDROGEOLOGY

The North Cavalcade Street site is in the southeast Texas Coastal Plain. This region is underlain with Holocene and Pleistocene deposits to a depth of roughly 2400 feet. The aquifers used to supply water for domestic, industrial and agricultural purposes are the Lower Chicot and Evangeline, both confined aquifers isolated from surface recharge. Public water supply wells are screened in the Evangeline Aquifer at depths greater than 600 feet. Industrial water users have wells screened in both aquifers at depths ranging from 50 to 576 feet.

The site-specific geology of the upper 50 feet is shown in Figure 3. It consists of four distinct layers:

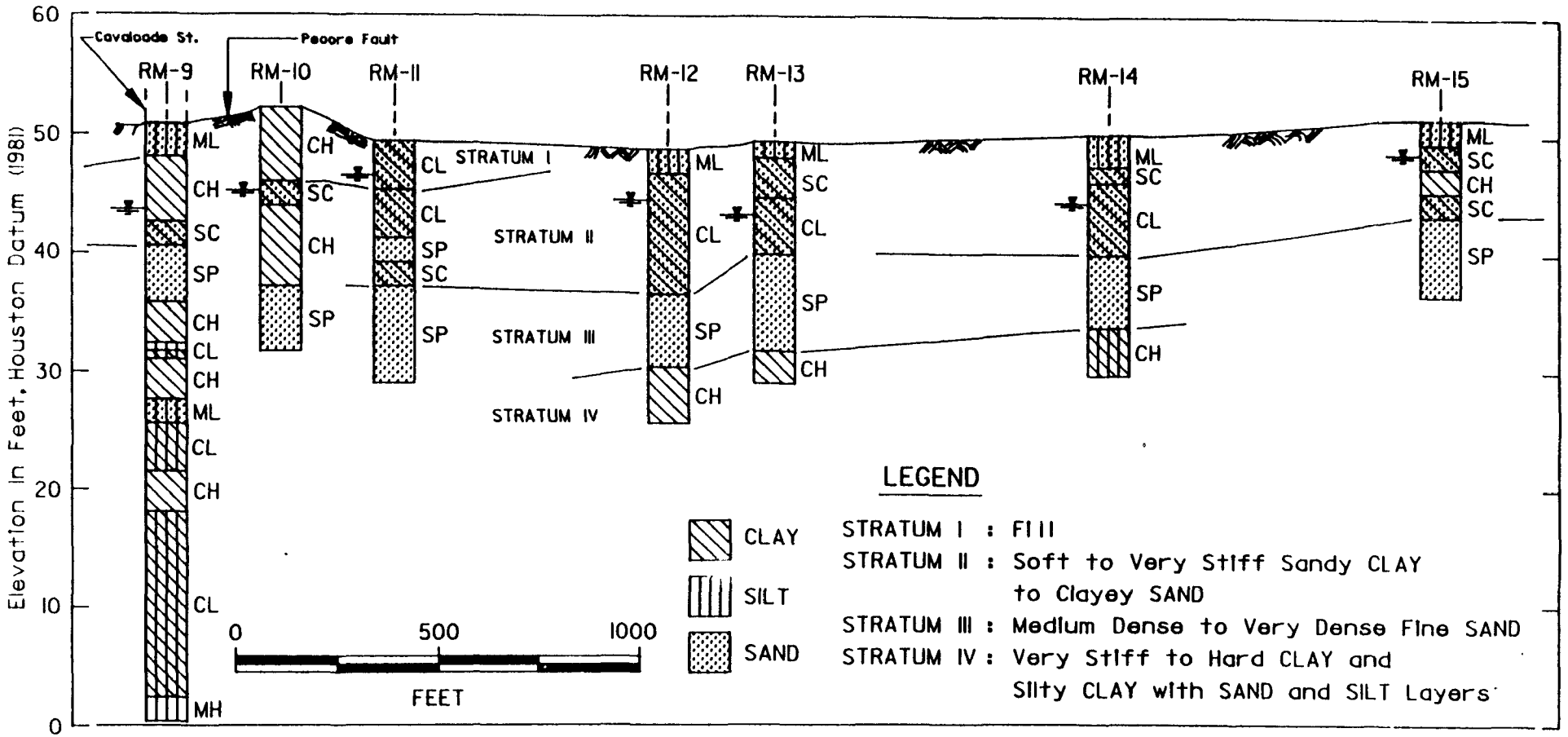
Stratum	Depth (ft)	Description
I	0-5	Sandy silt and sandy clay
II	5-12	Soft to very stiff sandy clay and clayey sand
III	12-26	Medium dense to dense fine sand
IV	26-80	Very stiff to hard clay and silty clay with sand and silt layers

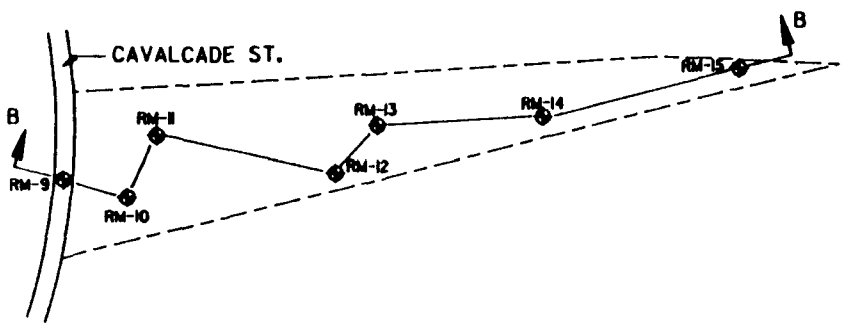
The fine sand in Stratum II is the principal water bearing unit at the North Cavalcade Street site. This unit is not currently used as a source of water within Houston because the water yield is low. The potentiometric surface developed during the Remedial Investigation shows that the groundwater flow is toward the west and is recharged by the ditches crossing the site.

2.3 REMEDIAL INVESTIGATION RESULTS

The U. S. Environmental Protection Agency (USEPA) sampled five different types of environmental media at the North Cavalcade Street site between September 1985 and November 1987. These included air, surface water, sediments, soils, and groundwater. The samples collected during this period were analyzed for toxic substances characteristic of wood preserving sites.

The USEPA found polynuclear aromatic hydrocarbons (PAHs) and volatiles (benzene, toluene, and xylenes) in soils, groundwater, and sediments at levels above those natural to this area on the southern 10 acres of the site. These compounds are components of creosote, one of the wood preserving mixtures used at the site. The other wood preserving chemical used at this site, pentachlorophenol, was not found. Inorganic metals were infrequently found at levels above background. Tables 1 and 2 show the maximum concentrations of analyzed compounds in soils and groundwater and their frequency of detection above background levels.





NOTE: Information presented here was obtained from McClelland Engineers Report No. 0181-0546-2 dated September 30, 1982.

GENERALIZED SOIL PROFILE

CAMP DRESSER & McKEE INC.

TABLE 1

SOIL CONTAMINANT CONCENTRATIONS

Contaminant	Number of Detections[1] Above 10 feet	Number of Detections[1] Below 10 feet	Maximum Concentration[2] Above 10 feet	Maximum Concentration[2] Below 10 feet
Arsenic	0	0	nd[3]	nd
Cadmium	0	0	nd	nd
Chromium	0	2	nd	70
Copper	0	3	nd	41
Lead	0	4	nd	27
Zinc	0	1	nd	132
Benzene	-	4	na[4]	<1
Toleune	-	27	na	1
Xylenes	-	7	na	2
Pentachlorophenol	-	0	i[5]	nd
2-Methylnaphthalene	-	18	na	400
Naphthalene	16	19	4,503	9,187
Acenaphthylene	7	-	38	na
Acenaphthene	-	3	na	370
Fluorene	-	14	na	240
Phenanthrene	19	16	2,060	3,583
Anthracene	-	14	na	120
Fluoranthene	18	13	830	1,475
Pyrene	-	14	na	180
Benzo(a)anthracene	12	10	95	57
Chrysene	13	9	112	75
Benzo(b)fluoranthene	12	8	201	142
Benzo(k)fluoranthene	-	8	na	0.6
Benzo(a)pyrene	7	7	34	18
Ideno(1,2,3-cd)pyrene	4	2	88	7
Total PAHs			5,563	14,394
Total Carcinogenic PAHs			407	299

(1) 102 borings above 10 feet, 65 borings below 10 feet

(2) units of parts per million (ppm)

(3) nd = not detected above background concentration,
Background = the 95th percentile of borings in the northern part of the site and off-site beyond the extent of the contaminant plume.

(4) na = not analyzed

(5) i = interferences invalidate the data

TABLE 2

GROUNDWATER CONTAMINANT CONCENTRATIONS

Contaminant	Number of Detections[1]	Maximum Concentration[2]	Federal and State Standards[3]
Arsenic	1	129	50
Cadmium	0	nd[4]	10
Chromium	0	nd	50
Copper	0	nd	1000
Lead	0	nd	50
Zinc	0	nd	5000
Benzene	4	79	5
Ethylbenzene	2	79	680
Toluene	3	620	2000
Xylenes	3	280	440
Pentachlorophenol	0	nd	220
2-Methylnaphthalene	2	14,000	
Dibenzofuran	3	8,900	
Naphthalene	4	39,000	
Acenaphthylene	4	460	
Acenaphthene	6	18,000	
Fluorene	4	14,000	
Phenanthrene	3	32,000	
Anthracene	3	5,000	
Fluoranthene	3	16,000	
Pyrene	4	7,300	
Benzo(g,h,i)perylene	0	nd	
Benzo(a)anthracene	2	2,300	
Chrysene	2	2,000	
Benzo(b)fluoranthene	2	2,000	
Benzo(k)fluoranthene	2	730	
Benzo(a)pyrene	2	560	
Ideno(1,2,3-cd)pyrene	0	nd	
Dibenzo(a,h)anthracene	0	nd	
Total PAHs		147,800	
Total Carcinogenic PAHs		4,960	0.03

(1) 18 total wells

(2) units of micrograms per liter (ug/l)

(3) lowest of final and proposed drinking water and ambient water quality standards (10^{-5} risk level), units of ug/l

(4) nd = not detected above background concentration,
Background = the 95th percentile of groundwater in the northern part of the site and off-site beyond the extent of the contaminant plume.

The contamination in soil and the upper groundwater unit describes the way in which historical operations contributed to the contamination. USEPA first found creosote-type contaminants in surficial soil in two areas corresponding to the historical operation area and creosote lagoon; these areas cover approximately 1 acre. These data show that creosote stored in these areas was allowed to seep into the soil and thereby became the source of further contamination. The surficial soil is a sandy clay which allows a pathway for vertical migration. The creosote became adsorbed onto the soils until they were saturated. At that point, the creosote entered the groundwater in the surface aquifer.

The surface aquifer is a layer of sand which provides a pathway for further migration. As in the surficial soil, the creosote became adsorbed onto the sand until the sand was saturated. The creosote then encountered a hard clay below the aquifer. Also, the compounds which comprise creosote became partially dissolved and were transported westward with the groundwater flow. The volatile compounds such as benzene are the more soluble; these traveled the farthest. The dissolved contaminants in the groundwater now form a plume covering approximately 4 acres.

As stated above, the creosote encountered a layer of hard clay below the surface aquifer and spread along the top of the clay to cover an area of approximately 6 acres. The contamination in this clay layer consists of both soil with adsorbed PAHs and a non-aqueous phase liquid (NAPL) characteristic of denatured creosote. The clay layer in general retards further vertical migration. The permeability of this layer is reported in other geological investigations of this area as roughly 10^{-9} cm/sec.

USEPA also found creosote-type contaminants in the sediments of ditches draining the site. The concentrations of PAH compounds in the sediments ranged from undetected to 93 ppm. This contamination probably resulted from rainfall runoff during the time of historical operations or oil spills along the railroad tracks.

In addition, sediment samples in one isolated area near the railroad track on the east side of the site showed contamination from polychlorinated biphenyls (PCBs). PCBs are not used in wood preserving operations. The cause of this contamination appears to be a spill resulting from railroad activity. USEPA has recently gathered data to better define the area, and will address remediation of the PCBs later.

The analyses of air and drainage ditch water showed no measurable contamination.

2.4 POTENTIAL IMPACTS ON HUMAN HEALTH AND ENVIRONMENT

Based on the information gathered from the site, USEPA has found no current exposure to local residents or onsite workers. The principal exposure pathways through which humans might potentially become exposed to contaminants in the future are:

- o inadvertent ingestion and direct contact with surficial soils, and inhalation of dust and volatile chemicals by utility workers in trenches or construction workers in excavations;

- o inadvertent ingestion and direct contact with surficial soils by children if the site is ever developed for residential purposes;

- o direct contact with drainage ditch sediments by utility workers; and

- o ingestion of shallow groundwater if water supply wells are ever installed onsite.

The exposure to site contaminants is of concern because many of the chemicals are carcinogens (ie. benzene and benzo(a)pyrene) or are otherwise toxic to humans (xylenes and toluene). For groundwater, arsenic, benzene, and carcinogenic PAHs concentrations exceed Federal regulations and criteria for drinking water (see Table 2). USEPA assessed the above pathways and contaminant concentrations with relation to risks to human health if no remedial action is taken. These risks are shown below as the aggregate risk to each receptor group from all site contaminants. The first three receptor groups are exposed to direct contact with soils; the last group with groundwater. These risks are upper bound estimates of effects on human health; the true risks are most likely lower and may be zero.

	Noncarcinogenic Hazard Index (Target = 1)		Additional Risk of Cancer	
Receptor Group	Average	Maximum	Average	Maximum
Utility Workers	0.04	18	$3x10^{-6}$	$7x10^{-4}$
Construction Workers	0.01	8	$2x10^{-6}$	$3x10^{-4}$
Future Residents	<0.001	<0.001	$2x10^{-5}$	$1x10^{-4}$
Groundwater Users	----	0.06	---	$9x10^{-5}$

USEPA concluded from the risk assessment that adverse public health or environmental hazards could result if no action was taken to prevent exposure to contaminants found at the site. The principal exposure pathways leading to these risks are those involving surficial soils and groundwater; sediments posed an additional risk of cancer of only $1x10^{-9}$. USEPA determined that to protect the public from adverse effects to health, surficial soil and groundwater will be cleaned as follows:

Contaminant	Surficial Soils	Ground Water
Carcinogenic PAHs	1 ppm	not detected
Benzene	0.04 ppm	5 ug/l

The remedial level for soils was selected to prevent against an additional risk of cancer from exposure to soils of greater than 1 in 100,000 (10^{-5}) and also ensure against any non-carcinogenic hazards. The 10^{-5} cancer risk level was selected as appropriate for a commercial site where only a few people may ever become exposed. The remedial level will also assure that creosote based compounds will not continue to leach into the groundwater.

The remedial level for volatiles in groundwater was selected to comply with the Federal drinking water standard for benzene which is a relevant and appropriate requirement (see Appendix B for the list of ARARs). The remedial level for carcinogenic PAHs was selected to assure that, in conjunction with the level for volatiles, the overall risk to potential consumers of groundwater will be less than 10^{-5}. A remedial level for arsenic was not developed because arsenic was only found with the free phase creosote in one well. Collection and treatment of groundwater to attain the benzene level would collect the free phase and remove the arsenic.

From the Remedial Investigation results, approximately 22,300 cubic yards of soil above 10 feet in depth and 5.6 million gallons of groundwater in the upper aquifer exceed these levels. Figures 4 and 5 show the areas of surficial soil and groundwater where remedial levels are exceeded.

3. ENFORCEMENT

USEPA identified four potentially responsible parties (PRPs) in the initial stages of the Remedial Investigation. USEPA will continue its enforcement activities and send a Special Notice letter to the PRPs before the initiation of the remedial design. Should the PRPs decline to conduct future remedial activities, USEPA will provide funding for these activities, but will retain its right to seek cost recovery for all USEPA-funded response actions from the PRPs. USEPA will also investigate the liability of other parties who may have contributed to the contamination during the time when the Houston Creosoting Company was operating.

4. COMMUNITY RELATIONS HISTORY

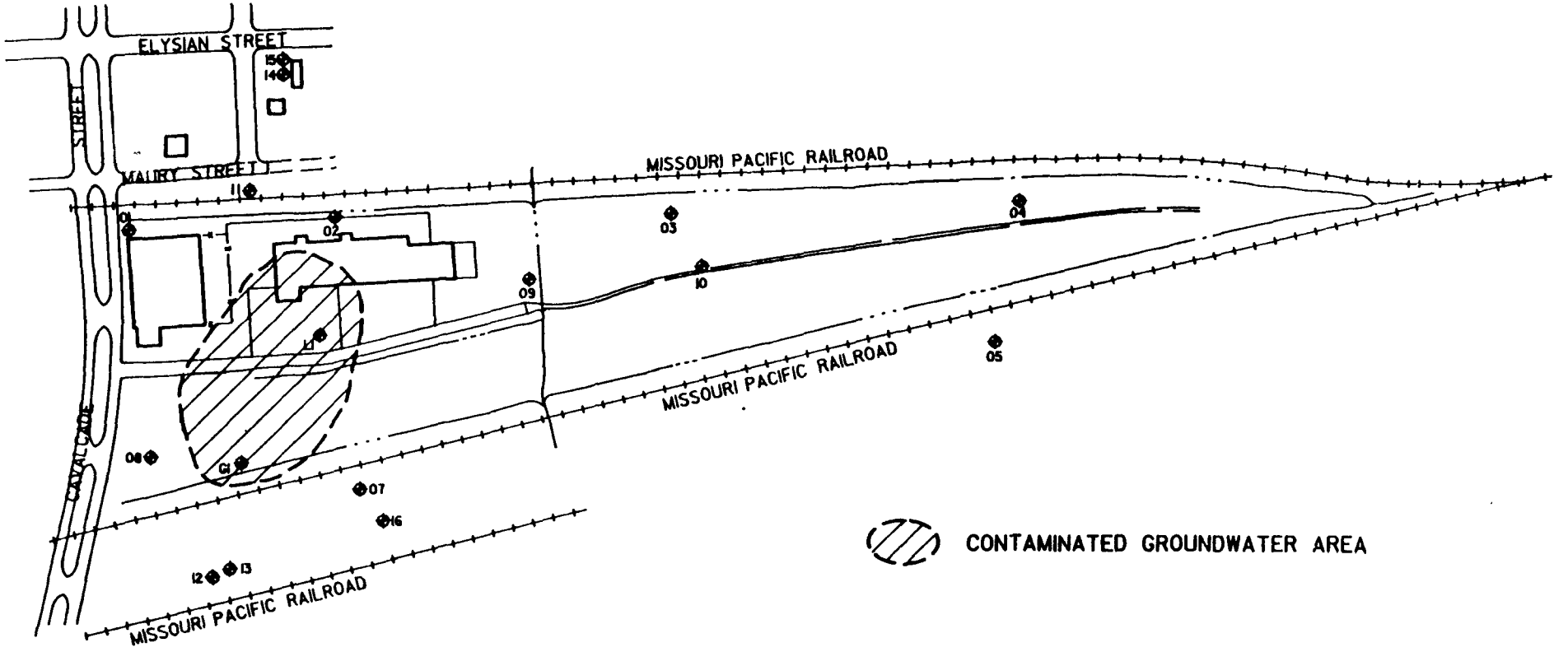
In October 1984, USEPA proposed to add the North Cavalcade Street site to the National Priorities List. USEPA approved funds in the spring of 1985 to conduct a Remedial Investigation and Feasibility Study at the site.

HORIZONTAL DATUM IS TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NORTH AMERICAN DATUM 1927.

N

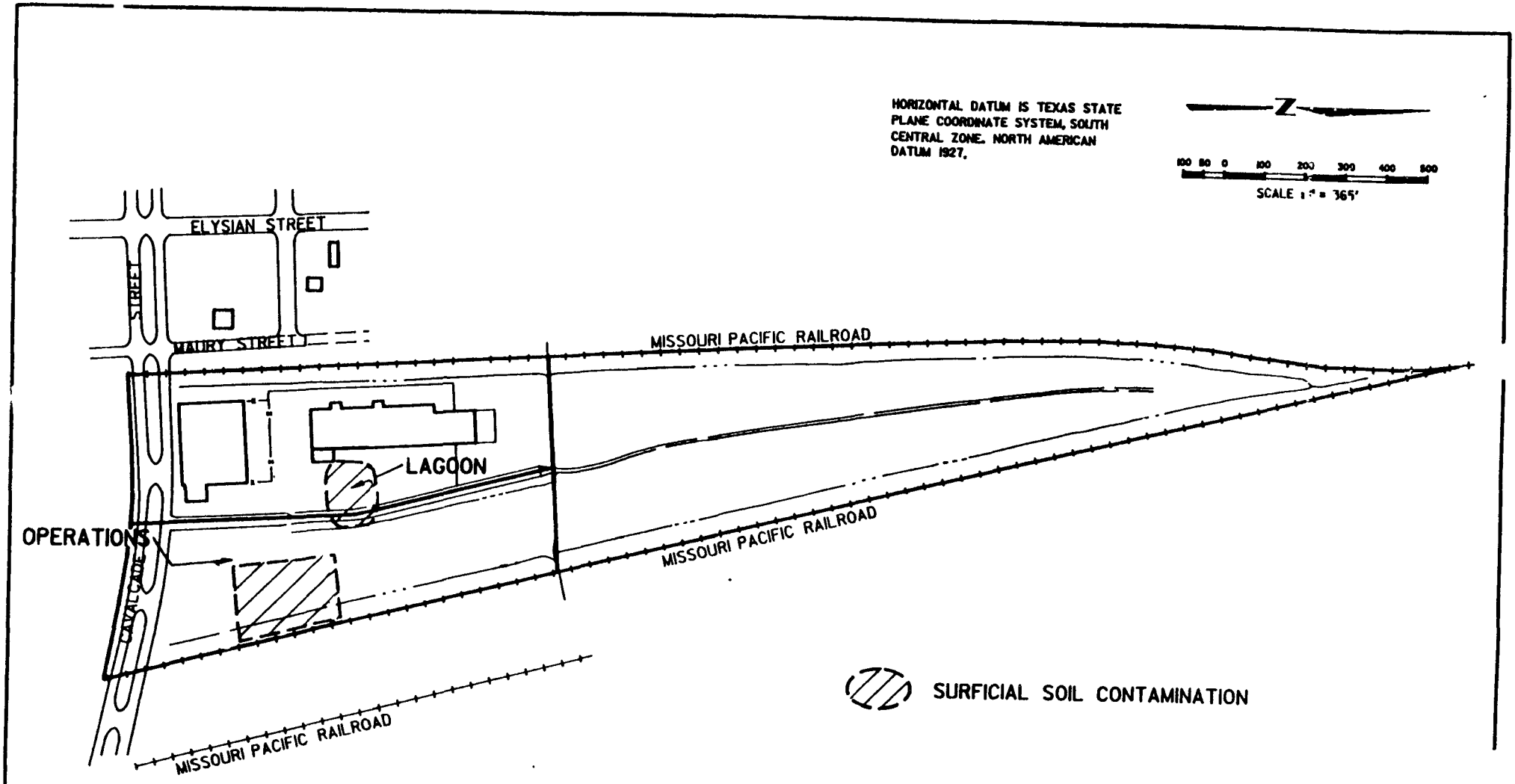
200 100 0 100 200 300 400 800

SCALE 1" = 365'



CONTAMINATED GROUNDWATER AREA

GROUND WATER
REQUIRING REMEDIATION



SURFICIAL SOILS REQUIRING REMEDIATION

USEPA held the first community meeting on September 11, 1985, to discuss the reasons for listing the site on the NPL and to present the schedule for the site investigation. Fact sheets were periodically mailed to local residents and interested parties to describe the field activities.

On April 18, 1988, USEPA announced, through a press release, the completion of the site investigation studies on the North Cavalcade site. The announcement also advised the public that USEPA would accept comments on the proposed remedy for the site from May 1 through May 31, 1988, and that the Agency would hold a public meeting on May 11, 1988. USEPA prepared a fact sheet describing various alternatives evaluated and the proposed remedial plan; this was mailed to interested citizens on April 15, 1988. USEPA also met informally on May 5, 1988, with the local city councilman's staff and representatives of onsite businesses.

The public meeting was held on May 11, 1988, at the Lindale Park Civic Club in Houston, Texas. Approximately 15 people attended. The Responsiveness Summary in Appendix A lists the public response to the alternatives proposed by USEPA at this meeting.

5. ALTERNATIVE EVALUATION

5.1 EVALUATION CRITERIA

OSWER Directive 9355.0-21 prescribes nine factors which USEPA must consider in selecting a remedy for a Superfund site. These factors address the specific requirements of Section 121(b)(1) of SARA. These nine factors are listed below:

1. Consistency with Other Environmental Laws

   In determining appropriate remedial actions at Superfund sites, USEPA must consider the requirements of other Federal and State environmental laws, as well as CERCLA as amended by SARA. Primary consideration is given to attaining applicable or relevant and appropriate Federal and State public health and environmental laws, regulations and standards (ARARs). Not all Federal and State environmental laws and regulations are applicable to each Superfund remedial action.

2. Reduction of Toxicity, Mobility or Volume

   USEPA must assess the degree to which remedial alternatives employ treatment that reduces toxicity, mobility or volume. The relevant factors include:

   - The treatment processes the proposed solutions use and the materials they treat;
   - the amount of contaminated materials destroyed or treated;

- o the degree of expected reduction in toxicity, mobility or volume;

- o the degree to which the treatment is irreversible; and

- o the residuals that will remain following treatment after considering the persistence, toxicity, mobility, and propensity for bioaccumulation of such hazardous substances and their constituents.

3. Short-term Effectiveness

USEPA must assess the short-term effectiveness of an alternative by considering the following:

- o Magnitude of reduction of existing risks; and

- o probable short-term risks to the community, workers, or the environment during the implementation of an alternative, including potential threats associated with excavation, transportation, and redisposal or containment.

4. Long-term Effectiveness and Permanence

USEPA must assess for each alternative the long-term effectiveness and permanence it affords along with the degree of certainty that the remedy will prove successful. The relevant factors include:

- o Magnitude of residual risks in terms of amounts and concentrations of wastes remaining following implementation of a remedial action, considering the persistence, toxicity, mobility and propensity for bioaccumulation of such hazardous substances and their constituents;

- o type and degree of long-term management required, including monitoring and operation and maintenance;

- o potential for exposure of human and environmental receptors to remaining waste considering the potential threat to human health and the environment associated with excavation, transportation, redisposal or containment;

- o long-term reliability of the engineering and institutional controls, including uncertainties associated with the land disposal of untreated wastes and residuals; and

- o potential need for replacement of the remedy.

5. Implementability

USEPA must assess the ease or difficulty of implementing the alternatives by considering the following factors:

- o Degree of difficulty associated with constructing the solution;
- o expected operational reliability of the treatment technology;
- o need to coordinate with, and obtain, necessary approvals and permits (or meet the intent of a permit for Superfund actions);
- o availability of necessary equipment and specialists; and
- o available capacity and location of needed treatment, storage and disposal services.

6. Costs

USEPA must assess the following types of costs:

- o Capital costs;
- o operation and maintenance costs;
- o net present value of capital and operation and maintenance costs; and
- o potential future remedial action costs.

7. Community Acceptance

USEPA must assess the concerns of the community including:

- o Components of remedial alternatives that the community supports;
- o features of the alternatives about which the community has reservations; and
- o elements of the alternatives which the community strongly opposes.

8. State Acceptance

USEPA must assess the concerns of the State government which, for this site, is represented by the Texas Water Commission. This assessment includes:

- o Components of remedial alternatives that the State supports;
- o features of the alternatives about which the State has reservations; and
- o elements of the alternatives which the State strongly opposes.

9. Overall Protection of Human Health and the Environment

Following the analysis of the remedial options against individual evaluation criteria, USEPA must also assess whether the remedial alternatives provide adequate protection of human health and the environment. USEPA is also directed by the Superfund law (SARA) to prefer solutions that use treatment to permanently remove contaminants from the environment. Offsite transport and disposal without treatment is the least-preferred option when practicable treatment technologies are available.

5.2 DESCRIPTION OF ALTERNATIVES

In conformance with the National Contingency Plan (NCP), USEPA screened initial remedial approaches to determine which might be appropriate for this site. The Feasibility Study describes the details of this evaluation. From these possible remedies, four were chosen for detailed evaluation under the remedy selection criteria outlined above. One other alternative, No Action, was also evaluated to comply with the requirements of the NCP.

Except for the No Action alternative, all alternatives require collection and treatment of contaminants in groundwater. Groundwater will be collected and treated. A maximum of 38 collection wells and 44 recharge wells will be installed in the surface aquifer to the depth where the non-aqueous phase liquids (NAPLs) reside. The extracted groundwater will be treated by an oil-water separator to remove the non-aqueous phase liquids followed by a carbon adsorption system to remove trace organics. Part of the treated groundwater will then be re-injected into the formation to aid groundwater recovery; the remaining treated groundwater will be disposed of directly into Hunting Bayou to the east of the site. The recovered NAPLs will be sent offsite to be burned; the spent activated carbon will be regenerated offsite.

Alternative 1 - No Action: This alternative consists of long-term groundwater monitoring and deed restrictions. Five site monitoring wells will be monitored. In addition, the deeds for the property will be amended to restrict any future land use from those activities which would disturb the soil. The approximate cost of this action is $307,000.

Alternative 2 - Onsite Landfill: This remedy represents containment of contaminated surficial soil in an onsite landfill. A landfill will be designed in accordance with Federal requirements and constructed in the south end of the site. Clean soil removed during the construction will be stockpiled for later use as fill. After the landfill has been constructed, the surficial soil will be excavated, mixed with fly ash if wet, and placed into the landfill. The stockpiled clean soil will be used to fill in the excavation. After all contaminated soil has been removed, the landfill will be capped according to Federal requirements, and the disturbed site areas will be revegetated.

A fence will be erected to prevent access to the landfill area. In addition, the deeds for the property will be amended to restrict any future land use to those activities which do not disturb the soil. Finally, four monitoring wells will be installed and monitored to ensure that the landfill remains intact. The estimated cost of this alternative is $4.0 million; it will require about 2 years to complete.

Alternative 3 - Onsite Incineration: This remedy represents complete treatment of contaminated surficial soil by incineration. The soils will be thermally treated in a mobile incinerator equipped with appropriate air pollution control devices. The components of the incinerator will be shipped to the site and erected adjacent to the contaminated soil area. The incinerator will then be tested with small volumes of soil to ensure that the incineration will comply with Federal and State requirements. When the incinerator is ready for full operation, the soil will be excavated and fed into the incinerator. After incineration, the treated soil will be stockpiled temporarily and returned to the excavation if it can be delisted. Otherwise, the treated soil will be disposed of in a hazardous waste landfill. Finally, disturbed areas will be revegetated. The estimated cost of this is $10.5 million; it will require about 2 years to complete.

Alternative 4 - In-situ Soil Flushing: This remedy represents complete treatment of contaminated surficial soil by remobilizing the organic contaminants and treating them in the groundwater. Surfactants will be added to the treated groundwater and reinjected into the formation to desorb the contaminants from soil and allow them to migrate into the groundwater. The groundwater treatment system would then remove the contaminants from the groundwater. The surfactants will continue to be added until test borings show no residual contamination in the soil and the groundwater is completely remediated. The estimated cost for this alternative is $4.8 million; it will require approximately 3 to 5 years to complete.

Alternative 5 - Biological Treatment: This remedy represents complete treatment of contaminated surficial soil by accelerating the natural biological degradation of the organic contaminants. Nutrients and oxygen will be added to treated groundwater and mixed with the contaminated soils. Mixing will be accomplished either through percolating the water through perforated pipes, injecting the water into the soil, or by mechanically mixing the water with the soil. This approach enhances growth of indigenous microorganisms in the soil and increases the rate of bacterial degradation. The nutrients and oxygen will continue to be added until soil samples show no residual contamination and the groundwater is completely remediated. The estimated cost for this alternative is $4.2 million; it will require about 3 years to complete.

5.3 EVALUATION OF ALTERNATIVES

USEPA has assessed the degree to which each remedial alternative meets the nine selection criteria; Table 3 summarizes this assessment. The following values were used to compare the remedy selection criteria:

- ++ Alternative would greatly exceed a selection criterion compared to other alternatives.
- + Alternative would exceed a criterion compared to other alternatives.
- 0 Alternative can meet the selection criterion.
- - Special efforts will be necessary in the design of the remedy to meet the selection criterion.
- -- Great difficulty would result in achieving a selection criterion as compared to other alternatives.

The rationale for the ratings assigned in this table follows:

1. Consistency With Other Environmental Laws (i.e. meets or exceeds applicable, or relevant and appropriate Federal and State requirements). Appendix B discusses the compliance of each remedial alternative with all applicable or relevant and appropriate environmental laws.

   No Action is rated as "--" because it violates the intent of SARA Section 121 regarding the selection of a remedy and does not comply with the National Contingency Plan provisions to respond to a threat of release.

   Onsite Landfill is rated as "-" because it cannot comply with the proposed requirements for PAHs in creosote sludge under the Land Disposal Restrictions (40 CFR Part 268). The contaminated soil originated from creosote sludge. These proposed regulations require treatment of individual PAHs to 3 ppm. Existing PAH concentrations exceed this level; therefore, treatment of the contaminated soil is required before disposal. The regulations are not yet promulgated, but should be by November 1988.

   Onsite Incineration, Soil FLushing, and Biological Treatment are rated as "0" since they can be designed to meet any ARARs. Specifically, for the Land Disposal Restrictions, these three alternatives include treatment methods which provide sufficient performance to meet the proposed requirements for PAHs in creosote sludge.

TABLE 3

COMPARISON OF REMEDIAL ALTERNATIVES
NORTH CAVALCADE STREET SITE

	NO ACTION	ONSITE LANDFILL	ONSITE INCIN-ERATOR	IN-SITU SOIL FLUSHING	ONSITE BIOLOGICAL TREATMENT
COMPLY WITH OTHER ENVIRONMENTAL LAWS	--	--	0	0	0
REDUCES TOXICITY	-	-	+	0	0
REDUCES MOBILITY	-	0	+	0	0
REDUCES VOLUME	-	-	+	0	0
SHORT-TERM EFFECTIVENESS	-	-	-	+	0
LONG-TERM EFFECTIVENESS	--	-	+	0	0
IMPLEMENTABILITY	+	+	-	-	-
COST[1]	0.3	4.0	10.5	4.8	4.2
PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT	--	-	0	0	0

Symbols:
- ++ = Compared to others, alternative greatly exceeds criterion.
- + = Compared to others, alternative exceeds criterion.
- 0 = Alternative can be designed to meet the criterion.
- - = Compared to others, alternative will need special efforts to meet the criterion.
- -- = Compared to others, alternative would have the most difficulty in meeting the criterion.

Notes: (1) Present worth in units of million dollars, includes anticipated replacement costs, see Table 4 for cost breakdown.

2. Reduction of Toxicity, Mobility and Volume

No Action is rated as "-" because it does not reduce toxicity, mobility or volume. However, natural biodegradation will eventually reduce some contamination.

Onsite Landfill is rated as "-" for toxicity and volume for the same reasons as for No Action, and as "0" for mobility since the leachate from the contaminated surficial soils would be contained.

Soil Flushing and Biological Treatment are rated as "0" because the organic contaminants would be removed from the soil down to the remedial action level, but probably not any further.

Onsite Incineration is rated as "+" since it would completely destroy the organic compounds.

3. Short-Term Effectiveness

All action alternatives would complete the remediation within 3 years. Therefore, there is no difference between the alternatives on the basis of completion time.

No Action is rated as "-" because the health threat would not be abated.

Onsite Landfill and Onsite Incineration are rated as "-" because excavation and materials handling could pose additional risks to the health of workers at onsite businesses through inhalation of volatilized contaminants.

Biological Treatment is rated as "0" because workers at onsite businesses would not be exposed to volatil d contaminants during installation if in-situ treatment .s shown to be possible during the design. In the event that the pilot tests show that mechanical mixing by augering or partial excavation is needed, the open soil area could be covered with an inflatable dome.

Soil Flushing is rated as "+" because the in-situ design would prevent workers at onsite businesses from being exposed to volatilized contaminants during installation of the remedy.

4. Long-Term Effectiveness and Permanence

No Action is rated as "--" because the potential human health and environmental risks, as previously stated, would not be abated.

Onsite Landfill is rated as "-" because it would involve long-term monitoring, maintenance, and possible replacement of monitoring wells, fence, or liner.

Soil Flushing and Biological Treatment are rated as "0" since these remedies would destroy health-threatening contamination at the site.

Onsite Incineration is rated as "+" because it would remove all contamination at the site.

5. Implementability

Onsite Incineration, Soil Flushing, and Biological Treatment are rated as "-" because they require a significant amount of testing and coordination with State agencies before startup. Pilot studies of all three alternatives would be required to optimize the performance. In addition, the Texas Air Control Board would need to be consulted in the design and operation of an incerator.

No Action and Onsite Landfill are rated as "+" because they can be easily implemented.

6. Cost

Table 4 lists the estimated costs for each remedial action alternative. This table includes capital, operation and maintenance, present worth, and replacement costs. The No Action alternative has the lowest present worth cost of all alternatives followed by Onsite Landfill, Biological Treatment, Soil Flushing, and Onsite Incineration in increasing order of cost. The three treatment alternatives (Biological Treatment, Soil Flushing, and Onsite Incineration) have no long-term operation and maintenance costs beyond 5 years.

Replacement costs are those for replacing elements needed for long-term operation. This cost is greatest for the Onsite Landfill because the integrity of the landfill liner cannot be guaranteed beyond 30 years. The three treatment alternatives require no replacement costs because there is no long-term operation.

7. Community Acceptance

The public at the public meeting demonstrated a preference for remediation of the site. The people attending the meeting had no preference for any alternative other than to note some concern about risks to health of local residents during remediation. USEPA explained that the proposed remedy, Biological Treatment, would be designed to minimize any air emission which could adversely affect human health.

TABLE 4

SUMMARY OF REMEDIAL ALTERNATIVE COSTS[1]
NORTH CAVALCADE STREET SITE

LINE ITEM	NO ACTION	ONSITE LANDFILL	ONSITE INCIN-ERATOR	IN-SITU SOIL FLUSHING	ONSITE BIOLOGICAL TREATMENT
CAPITAL					
Soil Treatment	0	1,024	6,090	1,915	1,475
Groundwater Treat.	25	971	971	971	971
Site Overhead	.0	1,342	3,479	1,924	1,764
Total Capital Cost	25	3,337	10,540	4,810	4,210
OPERATION/MAINTENANCE					
Annual	25	53	0	0	0
Present Worth[2]	279	584	0	0	0
REPLACEMENT					
Total	25[3]	1,000[4]	0	0	0
Present Worth[2]	3	99	0	0	0
TOTAL PRESENT WORTH[5]	307	4,020	10,540	4,810	4,210

(1) Units of thousand dollars; uncertainty of -30% to +50%

(2) 30 years at 8% interest

(3) Based on 5 wells, 30 year life

(4) Based on 4 wells and a landfill liner, 30 year life

(5) Sum of capital, present worth O/M, and present worth replacement.

8. State Acceptance

The Texas Water Commission (TWC), the State regulatory agency for CERCLA sites, was briefed on the remedial alternatives on May 4, 1988. The TWC notified USEPA by letter that the TWC had no objections to the selected remedy (see Appendix C).

9. Overall Protection of Human Health and the Environment

No Action is rated as "--" because it does not provide adequate protection from the potential risks involved with leaving untreated wastes onsite.

Onsite Landfill is rated as "-" because it only protects health by containing the soils. There is some potential for exposure to soil or release to groundwater in the future if the landfill fails and, most importantly, it is the least-preferred alternative where practicable treatment technologies are available. However, the ground collection and treatment part of the alternative will provide full protection in this, and all action alternatives, by removing and treating the groundwater contaminants.

Onsite Incineration, Soil Flushing, and Biological Treatment are rated as "0" because they destroy the organics, and they provide protection of human health and the environment.

6. SELECTED REMEDY

6.1 DESCRIPTION OF THE REMEDY

USEPA believes that carbon adsorption of groundwater with biological treatment of contaminated surficial soil (Alternative 5) best fulfills the statuatory and selection criteria as compared to other solutions. The optimum method for implementing this alternative will be determined after pilot testing during the Remedial Design phase. USEPA prefers that in-situ application of nutrients and oxygen to contaminated soils be used if found to be practicable.

Soils contaminated with carcinogenic PAHs in excess of 1 ppm will be treated to this level using biological treatment. The 1 ppm level was selected to prevent an additional risk of cancer of 10^{-5} from direct contact with soils and also to prevent continued leaching of creosote compounds into the groundwater. There are approximately 22,300 cubic yards of surficial soils above 10 feet of depth needing remediation. The remediation should be complete approximately 3 years after construction. After treatment, the soils will remain onsite.

Groundwater contaminated with benzene in excess of 5 ug/l and detectable carcinogenic PAHs will be treated to these levels using oil/water separation and activated carbon filtration. The benzene level is the Federal drinking water standard (MCL); both levels together prevent an additional risk of cancer of 10^{-5} from ingestion of groundwater. There are approximately 5.6 million gallons of groundwater in the upper aquifer needing remediation. The remediation should be complete approximately 2 years after construction due to the number of wells to be installed. After treatment, the groundwater will be re-injected into the aquifer, or, if necessary to maintain the water balance, some may be discharged into an onsite drainage ditch which, in turn, discharges into Hunting Bayou.

6.2 STATUATORY DETERMINATIONS

Section 121 of SARA requires the selected remedy to be protective of human health and the environment, be cost effective, use permanent solutions and alternative treatment or resource recovery technologies to the maximum extent possible, be consistent with other environmental laws, and have a preference for treatment which significantly reduces the toxicity or mobility of the hazardous substances as a principle element. USEPA believes that the selected remedy best fulfills the statuatory and selection criteria as compared to the other solutions evaluated herein.

1. Protective of Human Health and Environment

   The selected remedy will reduce soil and groundwater contaminations to prevent an additional risk of cancer of 10^{-5}, prevent any non-carcinogenic hazards, and prevent continued leaching of creosote compounds from soils into groundwater. It does this by treatment; therefore, the risks will not increase in the future due to a failure of the remedy.

2. Cost Effective

   The selected remedy offers the lowest cost of all the treatment alternatives. Compared to other treatment alternatives, it is equally effective in removing contaminants and is also equally implementable. It can offer little short-term risk to onsite workers during remediation by minimizing excavation and thereby the potential for volatile emissions.

3. Permanent Solutions to Maximum Extent Possible

   The selected remedy permanently removes contaminants from soil by biological degradation and from groundwater by activated carbon adsorption. As a result, no long term monitoring or maintenance will be necessary.

4. Consistent with Other Environmental Laws

The selected remedy can be designed to attain other environmental laws. The laws applicable or relevant and appropriate to CERCLA activities are called ARARs. Appendix B lists all the ARARs which were initially identified for this site in the Feasibility Study. The specific ARARs for the selected remedy are described below:

National Primary Drinking Water Standards: Groundwater treatment performance will attain all final Maximum Contaminant Levels (MCL). Table 2 listed the MCLs for contaminants found on the site.

National Secondary Drinking Water Standards: Groundwater treatment performance will attain all final secondary drinking water standards. Table 2 listed these for contaminants found on the site.

Maximum Contaminant Level Goals (MCLGs): This is not an ARAR, but is another factor to be considered. Groundwater treatment performance will attain the MCLGs for those contaminants where the MCLs have yet to be promulgated.

Underground Injection Control Regulations: The wells through which treated groundwater will be re-injected into the aquifer will be designed to comply with the Class V well regulations.

Ambient Water Quality Criteria: Groundwater treatment performance will comply with these criteria if, to maintain a proper water balance, treated water needs to be discharged to the drainage ditch leading into Hunting Bayou.

National Pollutant Discharge Elimination System: Groundwater treatment performance will comply with Best Available Technology and water quality standards if treated water needs to be discharged to the drainage ditch leading into Hunting Bayou. A permit will not be required because the point of discharge will be onsite.

Occupational Safety and Health Act: Remedial action will be conducted consistent with the OSHA regulations for personnel protection and safety.

Hazardous Materials Transportation Act: Transport of recovered creosote offsite will require handling in a manner consistent with this act.

RCRA Standards Applicable to Generators of Hazardous Waste: Transport of recovered creosote offsite for incineration will require manifesting.

RCRA Standards Applicable to Transporters of Hazardous Waste: Transport of recovered creosote offsite for incineration will require manifesting and handling consistent with this regulation.

Releases from Solid Waste Management Units (40 CFR 264(F)): Groundwater not recovered will comply with the levels required by this regulation.

Tanks (40 CFR 264(J)): Tanks temporarily storing recovered creosote will be designed to comply with this regulation.

Land Disposal Restrictions: Treatment performance for soils will comply with the proposed regulations for creosote sludge (K001 waste). Recovered creosote will need to be sent to an off-site incinerator which can achieve the required performance.

Texas Allowable Limits of Metals in Drinking Water: Groundwater treatment performance will attain these levels.

Texas Water Quality Standards for Surface Waters: Groundwater treatment performance will comply with water quality standards if water needs to be discharged to the drainage ditch leading into Hunting Bayou.

Texas Prohibition of Air Contaminants which Adversely Affect Human Health: Soil disturbance will be minimized during remediation to assure compliance with these regulations. If necessary, an inflatable dome can be constructed over the soil areas to contain any release. Air will be monitored during remediation to observe compliance.

Texas Storage of Volatile Organic Compounds: Tanks temporarily storing recovered creosote will be designed to comply with this regulation.

Texas Oil/Water Separators: The oil/water separator in the groundwater treatment system will be designed to control volatile emissions in accordance with this regulation.

Texas Vacuum Producing Systems: The groundwater recovery system uses a vacuum. This system will be designed to prevent emissions requiring incineration under this regulation.

5. Preference for Treatment as a Principle Element

The selected remedy uses treatment for the complete remediation of each contaminated medium (soils and groundwater). Biological treatment will detoxicify benzene and carcinogenic PAHs in soils by bacterial degradation. Oil/water separation and activated carbon adsorption will remove contaminants from groundwater.

Other alternatives were not selected for the following reasons:

No Action: This alternative does not protect human health or the environment.

Onsite Landfill: This alternative does not permanently reduce the toxicity or volume of the waste. The long-term effectiveness of this alternative is not as reliable as the selected remedy. Furthermore, this alternative may require replacement of wells, fences, or liners in the future.

Onsite Incineration: This alternative is protective of human health and the environment, but the costs are more than double those of the selected remedy. Furthermore, this alternative could result in short-term air emissions during construction which could pose a threat to the health of workers at onsite businesses. This was one concern voiced by the public during the public meeting.

In-Situ Soil Flushing: This alternative is also protective of human health and the environment, but at a slightly higher cost than the selected remedy.

6.3 FUTURE ACTIONS

The selected remedy offers a high degree of permanence; therefore, future remedial actions should not be necessary after completion of the remedy. The proposed schedule for remediation is as follows:

Action	Date
Approve Remedial Action by Signing the Record of Decision	June 1988
Complete Enforcement Negotiations	August 1988
Obligate Funds to Begin Remedial Design	September 1988
Complete Remedial Design	May 1990
Obligate Funds to Begin Remedial Action	June 1990
Complete Remedial Action	December 1994

APPENDIX A

RESPONSIVENESS SUMMARY

North Cavalcade
Community Relations Responsiveness Summary

This Community Relations Responsiveness Summary has been prepared to provide written responses to comments submitted regarding the proposed plan of action at the North Cavalcade Superfund site. The summary is divided into two sections:

Section I: Background of Community Involvement and Concerns. This section provides a brief history of community interest and concerns raised during the remedial planning activities at the North Cavalcade site.

Section II: Summary of Major Comments Received. The comments are summarized and USEPA's responses are provided.

I. Background of Community Involvement and Concerns

Reported citizen concern regarding this site has been minimal. No known public interest groups have been formed, and concern about the site is very limited. Media coverage of the site has been scarce.

In August 1985, USEPA held a meeting to announce the start of the remedial investigation. Thirty-one citizens attended; however, few attendees lived in the immediate area. Progress reports were issued in April and July of 1987. These two updates did not generate any comments, questions or concerns.

II. Summary of Major Comments Received

The press release and Proposed Plan fact sheet announcing the public comment period and public meeting were released on April 18, 1988. The comment period began on May 1 and ended on May 31, 1988. The public meeting was held with area residents and local officials on May 11, 1988, at the Lindale Park Civic Club. The purpose of this meeting was to explain the results of the Remedial Investigation and to outline the various alternatives presented in the Feasibility Study. Fifteen citizens attended the meeting, and four people made oral statements or asked questions. No additional written comments or questions were received from citizens.

Overall, the residents and local officials do not oppose the proposed plan. During the public comment period, there were comments and questions regarding the following:

Comment #1: Will the health assessment describe the danger of exposure to the residents?

USEPA Response: Yes, the health assessment will examine the various pathways of exposure and the types of contaminants involved.

Comment #2: It is difficult to comment on the Proposed Plan when the health assessment has not been completed.

USEPA Response: The Feasibility Study does address some of the health impacts related to the proposed remedy. The principle concern during remedial action would be air emissions from disturbing the soil. Potential exposure during the construction of the remedy would be virtually limited to the workers. Specific measures to eliminate the exposure will be included in the actual design of the remedy. In addition, the air will be monitored during all activity on the site so that USEPA will know if any emission occurs and can take appropriate action.

Comment #3: When will you make the decision on the remedy?

USEPA Response: The decision will be made before June 30, 1988.

Comment #4: What other alternatives could be considered for the groundwater? Why is there just the one remedy?

USEPA Response: There are other ways to address a groundwater problem, but they are not feasible for this site. USEPA considered a number of technologies in the initial analysis of alternatives in the Feasibility Study. They were eliminated based on construction problems (need to cross railroad tracks), or would be ten times more expensive and would not provide any additional benefit to, or protection of, public health.

Comment #5: What is the opinion of the Texas Water Commission?

USEPA Response: The Texas Water Commission has indicated that it supports bioremediation. However, a treatability study would be needed to prove that the bioremediation process would be an effective remedy.

Comment #6: When would the treatability studies begin?

USEPA Response: The treatability studies will be conducted as part of the Remedial Design. The Remedial Design is scheduled to begin after August 1988 and to be completed by May 1990. The public will be notified, in advance, of the start of the treatability study.

Comment #7: The meeting room location is not very close to the site and the Proposed Plan was not sent to the community.

USEPA Response: The meeting room was selected because it was near the site, available on the appropriate date, and provided the needed space at a reasonable cost. The room had been used for an earlier meeting on this site, and no opposition was expressed. Any future meetings will be held at the Ryan Civic Center.

Information on the site, and announcement of the meeting, was mailed to all individuals who expressed an interest in the site. Both major Houston newspapers ran articles on the proposed remedy and meeting. Specific information on the Proposed Plan was also mailed to the Ryan Civic Center.

Comment #7: Why are you cleaning up this site where there are other sites on Collingsworth, Cavalcade, and Crosstimbers which are much worse?

USEPA Response: The creosote site on Collingsworth is the South Cavalcade Superfund site. We are working on a possible remedy for that site. We expect to have a proposed plan ready in August and will hold a public meeting and comment period at that time. The information on the North Cavalcade site was available a few months earlier than the South Cavalcade site.

The lead battery facility on Jensen and Cavalcade is being investigated by the Texas Water Commission.

The Crosstimbers site is being investigated by USEPA to determine if it could be a future Superfund site.

Comment #9: Is creosote the only problem at this site?

USEPA Response: Yes, for the site. We did, however, find polychlorinated biphenyls (PCB) on the border of the site. This appears to have been caused by a spill from the railroad. We will be looking into this in the near future.

Comment 10: Will the proposed remedy be as safe in the future as the other remedies?

USEPA Response: Yes, it will.

APPENDIX B

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

APPENDIX B: APPLICABLE OR RELEVANT AND APPROPRIATE REQUIRMENTS

Section 121(d)(2) of CERCLA as amended in 1986 by SARA requires that the selected remedy attain requirements adopted under Federal and state environmental laws. These requirements are called "ARARs" which means "applicable or relevant and appropriate requirements".

The Feasibility Study for the North Cavalcade site included a review of these laws, and identified those which could be ARARs based on the types of wastes at the site, the types of remedial actions contemplated, and the site location. This appendix lists all the laws which the Feasibility Study identified as potential ARARs for this site, and indicates whether each of the final remedial alternatives can comply with the laws.

SAFE DRINKING WATER ACT

National Primary Drinking Water Standards: Establishes health based standards for public water systems (maximum contaminant levels); an ARAR for all alternatives because the groundwater contamination can reach an aquifer used as a drinking water supply.

National Secondary Drinking Water Standards: Establishes aesthetic based standards for public water systems (secondary maximum contaminant levels); an ARAR for all alternatives because the groundwater contamination can reach an aquifer used as a drinking water supply.

Maximum Contaminant Level Goals: Establishes drinking water quality goals set at levels of no known or anticipated adverse health effects, with an adequate margin of safety; not an ARAR but a factor to be considered for those contaminants where the Maximum Contaminant Levels have yet to be promulgated.

Underground Injection Control Regulations: Provides for protection of underground sources of drinking water; an ARAR for all alternatives because the treated groundwater will be re-injected.

CLEAN WATER ACT

Water Quality Criteria: Sets criteria for water quality based on toxicity to aquatic organisms and human health; an ARAR for disposal of water into Hunting Bayou from the groundwater treatment system.

National Pollutant Discharge Elimination System: Requires treatment performance for the discharge of pollutants for any point source into waters of the United States; an ARAR for disposal of water into Hunting Bayou from the groundwater treatment system.

National Pretreatment Standards: Sets standards to control pollutants which pass through or interfere with treatment processes in public treatment works or which may contaminate sewage sludge; not an ARAR because disposal from the groundwater treatment system will not be to the Houston sewage treatment plant.

OCCUPATIONAL SAFETY AND HEALTH ACT: Regulates worker health and safety; an ARAR for all site activities.

HAZARDOUS MATERIALS TRANSPORTATION ACT: Regulates transportation of hazardous materials; an ARAR for the offsite transport of recovered oil and creosote for burning; applies to the groundwater treatment system.

EXECUTIVE ORDER ON FLOODPLAIN MANAGEMENT: Requires Federal agencies to avoid to the extent possible, the adverse impacts associated with the destruction, or loss of wetlands and to avoid support of new construction in wetlands if a practical alternative exists; not an ARAR because there will be no site activity within the floodplain.

SOLID WASTE DISPOSAL ACT

Standards Applicable to Generators of Hazardous Waste: Establishes standards for generators of hazardous wastes; an ARAR for all alternatives except No Action.

Standards Applicable to Transporters of Hazardous Waste: Establishes standards which apply to transporters of hazardous waste within the U.S. if the transportation requires a manifest under 40 C.F.R. Part 262; an ARAR for the offsite transport of recovered oil and creosote generated from the groundwater treatment system.

Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities: Establishes minimum national standards which define the acceptable management of hazardous wastes for owners and operators of facilities which treat, store or dispose of hazardous wastes. Each subpart follows:

General Facility Standards (Subpart B): Sets siting requirements for floodplains; not an ARAR because no treatment or disposal unit will be located in a floodplain.

Releases from Solid Waste Management Units (Subpart F): Sets groundwater remediation levels; an ARAR for all alternatives.

Closure and Post-Closure (Subpart G): Sets standards for maintenance of disposal sites; an ARAR only for the landfill alternative.

Financial Requirements (Subpart H): Sets financial requirements for responsible parties maintaining a disposal site; not an ARAR because only an administrative requirment.

Use and Management of Containers (Subpart I): Sets requirements for storage of wastes in containers; not an ARAR because containers will not be used in any alternative.

Tanks (Subpart J): Sets requirements for storage of wastes in tanks; an ARAR for the groundwater treatment system.

Surface Impoundments (Subpart K): Sets requirements for disposal or treatment of wastes in surface impoundments; not an ARAR because no alternative uses surface impoundments.

Waste Piles (Subpart L): Sets requirements for storing and treating wastes in piles; an ARAR for Landfill and Incineration which requires storing wastes in piles prior to disposal or treatment.

Land Treatment (Subpart M): Sets requirements for treatment of wastes by placing them in land; not an ARAR because no alternative uses this method.

Landfills (Subpart N): Sets requirements for disposal of wastes in landfills; an ARAR only for the Landfill alternative.

Incinerators (Subpart O): Sets requirements for incineration of wastes; an ARAR only for the Incineration alternative.

Land Disposal Restrictions: Establishes allowable concentration levels for burial of hazardous wastes; an ARAR only if waste is disposed or placed away from the present area of disposal, an ARAR for soils for Landfill and Incineration, will be -- ARAR for soils for Biological Treatment only if the wastes not be treated in-place, an ARAR for all alternatives with respect to incineration of the creosote collected from the groundwater.

TEXAS DEPARTMENT OF HEALTH

Allowable Limits of Metals in Drinking Water: Sets health-based standards for public water systems; these set groundwater remedial levels for all alternatives.

Location of Wells used for Drinking Water Supplies: Restricts placement of drinking water wells; restricts location of solid waste disposal sites; only an ARAR for those alternatives which leave wastes in the ground.

TEXAS WATER COMMISSION

Water Quality Standards for Surface Waters: Prohibits point source discharges which cause toxicity in natural streams; these are an ARAR for all groundwater treatment alternatives.

TEXAS AIR CONTROL BOARD

Prohibition of Air Contaminants which Adversely Effect Human Health: Health-based standards for air; only an ARAR for those alternatives which disturb the soil and may cause a release.

Control of Air Pollution from Visible Emissions and Particulate Matter: Maximum allowable levels of particulates in air; an ARAR for incinerators.

Storage of Volatile Organic Compounds: Regulates handling of tanks containing volatiles; an ARAR for the groundwater treatment system if recovered creosote is stored in a tank.

Oil/Water Separators: Controls volatile emissions from separators; an ARAR for the groundwater treatment system.

Vacuum Producing Systems: Requires incineration of emmissions from vacuum producing systems; an ARAR for the groundwater treatment system

FEDERAL ARARS

Standard, Requirement, Criteria, or Limitation	Remedial Alternative				
	No Action	Land-fill	Incin-erator	Soil Flushing	Biological Treatment
SAFE DRINKING WATER ACT					
National Primary Drinking Water Standards (40 CFR Part 141)	NO	YES	YES	YES	YES
National Secondary Drinking Water Standards (40 CFR Part 143)	NO	YES	YES	YES	YES
Maximum Contaminant Level Goals*	---	---	---	---	---
Underground Injection Control Regulations (40 CFR Part 144-147)	---	YES	YES	YES	YES
CLEAN WATER ACT					
Water Quality Criteria (40 CFR Part 131)	---	YES	YES	YES	YES
National Pollutant Discharge Elimination System (40 CFR Part 125)	---	YES	YES	YES	YES
National Pretreatment Standards (40 CFR Part 403)	---	---	---	---	---
OCCUPATIONAL SAFETY AND HEALTH ACT (29 USC 651-678)	---	YES	YES	YES	YES
HAZARDOUS MATERIALS TRANSPORTATION ACT (49 CFR Part 107, 171-177)	---	YES	YES	YES	YES
EXECUTIVE ORDER ON FLOODPLAIN MANAGEMENT (Order No. 11,988)	---	---	---	---	---

NO = does not comply; YES = complies; --- = not an ARAR for this alternative

* Although not an ARAR, the MCLGs are other factors to be considered.

FEDERAL ARARS continued

Standard, Requirement, Criteria, or Limitation	Remedial Alternative				
	No Action	Land-fill	Incin-erator	Soil Flushing	Biological Treatment
SOLID WASTE DISPOSAL ACT					
Standards for Generators of Hazardous Waste (40 CFR Part 262)	---	YES	YES	YES	YES
Standards for Transporters of Hazardous Waste (40 CFR Part 263)	---	YES	YES	YES	YES
Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities					
General Facility Standards (40 CFR Part 264 B)	---	---	---	---	---
Releases from Solid Waste Management Units (40 CFR Part 264 F)	NO	YES	YES	YES	YES
Closure and Post-Closure (40 CFR Part 264 G)	---	YES	---	---	---
Financial Requirements (40 CFR Part 264 H)	---	---	---	---	---
Use of Containers (40 CFR Part 264 I)	---	---	---	---	---
Tanks (40 CFR Part 264 J)	---	YES	YES	YES	YES
Surface Impoundments (40 CFR Part 264 K)	---	---	---	---	---
Waste Piles (40 CFR Part 264 L)	---	YES	YES	---	---
Land Treatment (40 CFR Part 264 M)	---	---	---	---	---
Landfills (40 CFR Part 264 N)	---	YES	---	---	---
Incinerators (40 CFR Part 264 O)	---	---	YES	---	---
Land Disposal (40 CFR Part 268)	---	YES	YES	YES	YES

NO = does not comply; YES = complies; --- = not an ARAR for this alternative

STATE OF TEXAS ARARS

Promulgated Standard, Requirement, Criteria, or Limitation	Remedial Alternative				
	No Action	Land-fill	Incin-erator	Soil Flushing	Biological Treatment
DEPARTMENT OF HEALTH					
Allowable Limits of Metals in Drinking Water	NO	YES	YES	YES	YES
Location of Wells used for Drinking Water Supplies	YES	YES	---	---	---
WATER COMMISSION					
Water Quality Standards for Surface Waters	---	YES	YES	YES	YES
AIR CONTROL BOARD					
Prohibition of Air Contaminants that Adversely Affect Human Health	---	YES	YES	---	YES
Control of Air Pollution from Visible Emissions and Particulate Matter	---	---	YES	---	---
Storage of Volatile Organic Compounds	---	YES	YES	YES	YES
Oil/Water Separators	---	YES	YES	YES	YES
Vacuum Producing Systems	---	YES	YES	YES	YES

NO = does not comply; YES = complies; --- = not an ARAR for this alternative

APPENDIX C

STATE OF TEXAS CONCURRENCE

June 27, 1988

Allyn M. Davis, PhD., Director
Hazardous Waste Management Division
U.S. Environmental Protection Agency
Region VI
1445 Ross Avenue
Dallas, Texas 75202-2733

Re: North Cavalcade Street Superfund Site
Draft Record of Decision

Dear Dr. Davis:

We have reviewed the proposed Record of Decision (ROD) for the North Cavalcade Street Site. We have no objection to the selected remedy as described in the draft ROD of June 16, 1988. The selected remedy requires biological treatment of contaminated surficial soils with oil/water separation and carbon adsorption treatment of contaminated groundwater.

Sincerely,

Allen P. Beinke
Executive Director

P. O. Box 13087 Capitol Station • 1700 North Congress Ave. • Austin, Texas 78711-3087 • Area Code 512/463-7830

APPENDIX D

INDEX TO THE ADMINISTRATIVE RECORD

administrative Record Index
not included.