Site: Leo Eisenberg
ID#: MOD985768175
Break: 1.5
Other:
3-7-95

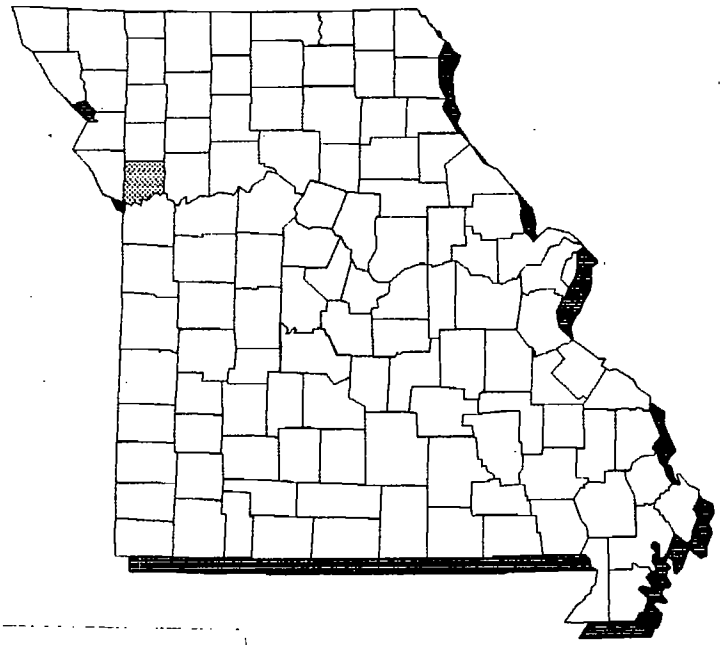
SECOND SITE INSPECTION REPORT (SI2)

EISENBERG FILL SITE
ALIAS: LEO EISENBERG'S PROPERTY

CLAY COUNTY, MISSOURI

August 7, 1995

Missouri Department of Natural Resources
Hazardous Waste Program



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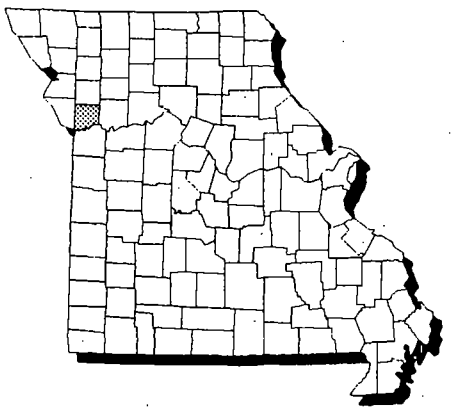

Prepared By	Reviewed By	Approved By
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DATE: August 7, 1995

PREPARED BY: Julie A. Bloss
Missouri Department of Natural Resources

SITE: Eisenberg Fill site (alias: Leo Eisenbergs Property)

EPA ID NO: MOD985768175

CA. NO: V007587-03-0

1. INTRODUCTION

Under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), the Superfund Amendments and Reauthorization Act of 1986 (SARA), and the Missouri Hazardous Waste Management Law (1986), the Missouri Department of Natural Resources (MDNR), Hazardous Waste Program (HWP) conducted a second site inspection (SI2) at Leo Eisenbergs Property, which is also known as the Eisenberg Fill site. This report was prepared by MDNR under a cooperative agreement with EPA for fiscal year 1995.

The purpose of this investigation was to collect sufficient information concerning conditions at the site to assess the threat posed to human health and the environment and to determine the need for additional investigation under CERCLA/SARA or other authority. The scope of the investigation included review of previous file information, sampling of waste and environmental media to test previous preliminary assessment and site inspection (PA/SI) hypotheses and document HRS (Hazard Ranking System) factors, and to collect additional non-sampling information.

The Eisenberg Fill site is listed under the CERCLA Information System (CERCLIS), as Leo Eisenberg's Property. The site is listed as having been discovered on February 8, 1989 by EPA with a PA conducted in 1989, although initial EPA sampling was conducted in 1988. MDNR conducted SI sampling in 1989 and completed the SI report in 1990. The SI is listed on CERCLIS with a completion date of 1991. Due to an inaccuracy in the SI sampling map, there was some confusion as to the exact location of the site. A second site inspection was performed to document the exact location of the site as well as to update the site's status. Site visits were conducted by MDNR staff on June 3, 1993 and June 2, 1994. An SI2 site reconnaissance and sampling event were conducted by MDNR on April 27, 1995.

2. SITE DESCRIPTION, OPERATIONAL HISTORY, AND WASTE CHARACTERISTICS

2.1 Location

The Eisenberg Fill site is located on the eastern side of Interstate-35 and north of 16th street in North Kansas City, Missouri. This location is in the center of the Southwest Quarter (SW ¼) of the Southwest Quarter (SW ¼) of Section 13, Township 50 North (T50N), Range 33 West (R33W), in Clay County, Missouri (Reference 4). The geographical coordinates are 39° 8' 19.30" north latitude and 94° 33' 42.93" west longitude (Reference 3). To reach the site from Kansas City, take I-35 north to the exit at 16th Street. Follow 16th Street east until it dead-ends at Railroad Avenue. The site is located to the north along Railroad Avenue (Reference 4).

Climatically, the Kansas City area is characterized by warm, humid summers and cold winters. Within a season, temperatures and precipitation may fluctuate widely. Summer weather is moderately warm and humid. July and August temperatures occasionally exceed 100° Fahrenheit (F). The average annual temperature is about 55° (Reference 11, p.4-5). The average annual rainfall for Clay County is about 36 inches. Rainfall is highest in June (Reference 11, p.4-5).

2.2 Site Description

The Eisenberg property is an undeveloped 30-acre tract located in an industrialized portion of North Kansas City, Missouri. The property is diamond-shaped. It is bound to the north and west by I-35, and to the east and south by railroad tracks and the Burlington Northern railyard (Figure 1). ConAgra and another flour milling company are located northeast of the property, facing Armour Road (References 4; 10; 13; photo #46-15A). The southwestern 10 acres of the property, currently leased to Mo-Kan Container Service, is the portion of the property which was the focus of previous site investigations. For purposes of this report, the Eisenberg Fill site consists of the entire 30-acre tract.

Mo-Kan Container Service is a company that rents containers for use by truck or rail (Reference 6; photo #46-18A). This company was not operating on-site prior to June 1993, when MDNR conducted a site visit (Reference 18). When MDNR returned to the site in 1994, truck/rail containers were present on-site. There were areas of new gravel and recent grading between the containers (Reference 5, p.2).

The Mo-Kan rental area was completely covered with truck/rail containers at the time of the MDNR SI2 site visit. A check-in trailer is located at the entrance to Mo-Kan (Reference 13). The northeastern 20 acres of the property is vacant, primarily covered with sparse vegetation. Heavier vegetation occurs along the intermittent drainages running along the northern and western boundaries. A strip of heavier vegetation also separates Mo-Kan from the vacant portion of the property (Reference 13, photo #46-16A).

The City of North Kansas City 19th Avenue pumping station is located slightly east/southeast of the property (photo #46-7A). This pump station serves to lift sewage so that it can flow down hill to the sewage disposal area, located slightly less than one mile to the northeast of the site (References 4; 27). The pump station building formerly housed an animal shelter. An intermittent drainage runs behind the southeastern corner of this building (Reference 13).

2.3 Site History

On April 6, 1988, the Emergency Planning and Response Branch of EPA Region VII received a call from the North Kansas City Fire Department reporting several pools of an unknown liquid oozing from a fill area near the intersection of 16th Street and Interstate 35. A subsequent investigation by EPA revealed three pools of dark stained water, each approximately 50 square feet in size, at the northeastern corner of what is now Mo-Kan rental property. A sample of the pooled water was collected by EPA on April 6, 1988 and analyzed for metals and organic pollutants (Reference 5, p.1; Reference 9, p.1). This information was used by EPA to complete a PA form (Reference 9).

MDNR continued investigations of the Eisenberg Fill site and conducted sampling in support of the first SI on July 25, 1989. Two small shallow pools, approximately six feet in diameter and five or six inches deep were observed at that time. Both pools contained a chocolate-brown colored water. The presence of the pools seemed unusual considering that there had not been any recent rainfall and the area largely consisted of rock and gravel fill (Reference 7). A sample of pooled water was collected, along with a sample of the fill material underlying the pool. A sample of fill was collected from a location 50 feet south, as a background (Reference 7).

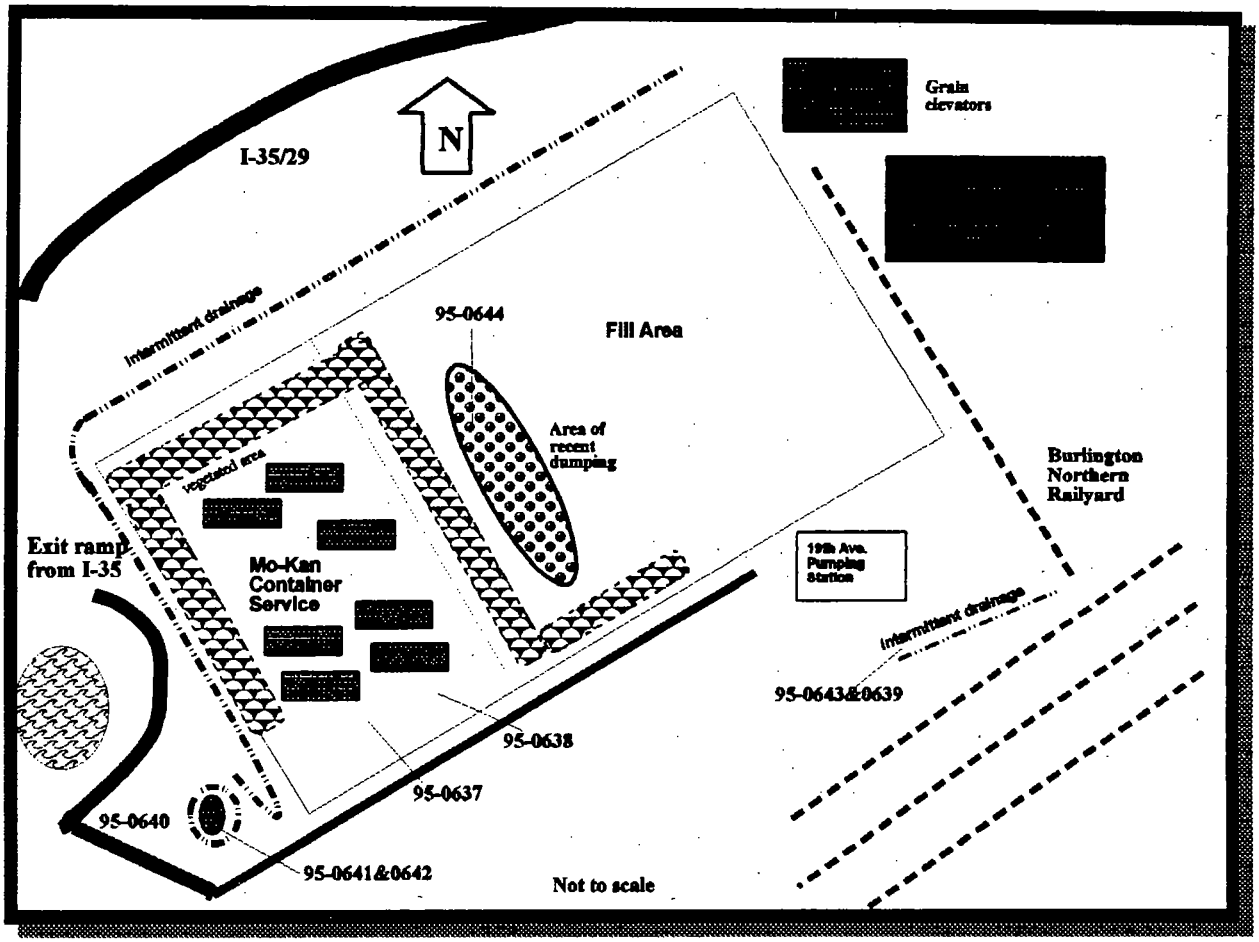

Figure 1 - Eisenberg Fill Site Map With SI2 Sampling Locations

The site appears to have been used as a fill area for at least seven years, based upon the time the original complaint was filed (1988) and subsequent observations of dumping. In 1993, an employee of the animal shelter said that there had been a lot of hauling to the site in the last couple of years (Reference 18). A city employee who inspects the 19th Avenue pumping station has observed people hauling fill dirt and chunks of concrete to the site, but had not observed any unusual loads that would indicate something hazardous has been placed there (Reference 27).

An area of recent dumping was observed during the MDNR on-site sampling on April 27, 1995 (Reference 13; location is marked in Figure 1). The material appeared to be a type of sludge (photo #46-17A). A sample of this material was collected from a pile similar to the one depicted in #46-17A, for analysis. Piles of this grayish, sludge-like material were observed to be scattered across the northern 20 acres of the Eisenberg property. (Reference 44).

The Eisenberg property is owned by Northtown Devco, a Missouri General Partnership of the County of Jackson, State of Missouri. Their mailing address is in care of Leo Eisenberg & Co., Inc. in Kansas City, Missouri (Reference 18).

2.4 Waste Characteristics

The following hazardous wastes are known to be associated with the Eisenberg Fill site:

- *Arsenic* (Reference 20, p.1-4)

Arsenic is a naturally occurring metal used in copper and lead smelting, wood treating and pesticide application. Inorganic arsenic is recognized as a human poison, with doses of 300 ppb in food or water resulting in death. EPA has classified arsenic as a known human carcinogen.

- *Cadmium* (Reference 46, p.1-5, 89-90)

Cadmium is a naturally occurring metal commonly found as a mineral combined with other elements such as oxygen and sulfur. Most cadmium used in this country is extracted during the production of other metals such as zinc, lead, or copper. Cadmium has many uses in industry and consumer products, mainly batteries, pigments, metal coatings, and plastics. Food and cigarette smoke are the largest potential sources of cadmium exposure for most people.

Most of the cadmium that enters the environment binds to soil, but it can leach into groundwater under acidic conditions. Cadmium is more mobile in aquatic environments than most other heavy metals, such as lead. Aquatic and terrestrial organisms bioaccumulate cadmium.

Cadmium has no known health benefits. Excessive levels of acute cadmium exposure can irritate the stomach and digestive tract, and may lead to death. In the human body, cadmium is stored in the liver and kidneys. Long-term exposure to cadmium can cause

fragile bones and kidney damage. EPA has determined that cadmium is a probable human carcinogen via inhalation.

- *Lead* (Reference 45, p. 1-6).

Lead is a naturally-occurring, bluish-gray element. Although its abundance in the earth's crust is small, human activities have dispersed lead throughout the environment. Lead has been used to produce batteries, ammunition, piping, paints and ceramic glazes. Tetraethyl and tetramethyl lead were formerly used as gasoline additives.

Human exposure to lead can have adverse effects on such tissues as the heart, kidneys, lungs, and brain. These effects are more striking in children. Nearly all of the lead entering the bloodstream of an adult will move into bones and teeth within a few weeks. In children, however, over 25% of the lead remains in their soft tissues.

Lead exposure can cause poor growth and decreased mental ability in an unborn child. Similar effects can occur in young children. At high levels of exposure, lead can severely damage the brain and kidneys of both adults and children. Lower levels of lead exposure contribute to slower reaction time, poor memory, and weakness in the extremities. Some lead compounds may be carcinogenic, but have not been classified as such at this time.

- *Selenium* (Reference 47, p.1-9)

Selenium is a naturally occurring element commonly found combined with sulfide minerals or with copper, silver, lead, and nickel minerals. The burning of coal, especially the fly ash that comes from burning coal, is the major source of selenium in the environment. Elemental selenium is also commercially processed, primarily as a by-product of copper refining.

Some evidence indicates that selenium can bioaccumulate and possibly biomagnify in aquatic organisms. Exposure to high levels of inorganic selenium has been shown to cause birth defects in birds, but not in mammals.

Most of the selenium that enters the human body is excreted within 24 hours. A small amount of selenium is recommended in the human diet. Ingestion of slightly higher levels of selenium can cause adverse effects such as brittle hair, deformed nails, and loss of feeling in the extremities. Dizziness, fatigue, and irritation of mucous membranes have been reported in occupational exposures to selenium dust. EPA has classified one form of selenium, selenium sulfide, as a probable human carcinogen.

- *Vanadium* (Reference 19, p.1-2,50)

Vanadium occurs naturally in fuel oils and coal, and can be released to the environment when fuel oil is burned. Vanadium is used in the processes of making steel, rubber, plastics, and ceramics. Approximately 83% of the vanadium used in the United States is utilized as an alloying agent in the steel industry; 14% in the production of ferrovanadium alloys, which are used in the manufacture of jet aircraft engines. Vanadium dusts are known to cause irritation to the eyes, throat, and lungs. Vanadium is not known to be a human carcinogen.

- *Polycyclic Aromatic Hydrocarbons (PAHs)* (Reference 21, p.1-4)

PAHs are a group of chemicals that are formed during the incomplete burning of coal and other organic substances. A few PAHs are used to prepare medicines, dyes, plastics and pesticides; others are contained in asphalt used in road construction. EPA has determined that seven PAHs (benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene) are probable human carcinogens. Negative immunologic effects have been reported in animals.

3. WASTE/SOURCE SAMPLING

3.1 Sampling Locations

Previous Site Sampling

A sample of pooled water was collected by EPA on April 6, 1988 from the area now occupied by Mo-Kan. This sample was analyzed for metals and organic pollutants (Reference 5, p.1; 9, p.1).

Two samples, a water grab and a grab of underlying fill, were collected by MDNR from the pooled water area on July 25, 1989 during SI1 sampling. Another grab of fill was collected for use as a background sample from a location 50 feet south. These samples were analyzed for volatile organics, base neutrals, and metals (References 5; 7).

SI2 Sampling

MDNR conducted SI2 sampling on April 27, 1995. The pooled waste was not observed during this visit (Reference 13). The former location of the pools has been buried by greater than three feet of fill and is occupied by Mo-Kan Container Service and their fleet of truck/rail containers. Soil samples, 95-0637 and 95-0638, were collected from the

former pooled waste area. These results are discussed under Section 6, Soil Exposure and Air Pathways. Sample 95-0644 was collected from a grayish pile of sludge like material, similar in composition to the material depicted in photo #46-17A (Reference 18, p.3). A background sample was collected from an area near the off ramp from I-35.

SI2 sampling rationale is presented as Appendix A. SI2 sampling locations are shown in Figure 1.

3.2 Analytical Results

- *EPA Sampling - April 6, 1988*

Analytical results for the surface water source sample collected by EPA are presented in Table 1a. Several metals were detected in excess of the environmental benchmarks listed for surface water in the Superfund Chemical Data Matrix (SCDM): arsenic (4.4 parts per million or ppm), chromium (0.5 ppm), copper (5.5 ppm), iron (43,000 ppm), nickel (5 ppm), lead (0.2 ppm), and zinc (0.6 ppm). Vanadium (100 ppm) was also detected. Results for semi-volatile compounds were inconclusive (References 2; 9).

- *MDNR SI1 Sampling - July 25, 1989*

The sample of underlying fill from the pooled water area detected vanadium and the following base neutral compounds in excess of three times the background sample: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)perylene, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, phenanthrene, and pyrene. The levels of benzo(a)pyrene in both the background sample (0.8 ppm) and the pooled area sample (3.8 ppm) are in excess of the SCDM benchmark for benzo(a)pyrene in soil (0.08 ppm). Five additional base neutral compounds were detected in the fill sample collected 50 feet south, indicating that the extent of contamination on-site may not be limited to the observed contamination in the pooled water area (References 5, 7; Table 1B).

The following metals were detected in the pooled water sample in excess of SCDM environmental benchmarks for surface water: silver (0.07 ppm), cadmium (0.6 ppm), mercury (0.7 ppm), and lead (0.2 ppm). Vanadium was also detected (1.9 ppm) (References 2; 5; 7).

- *MDNR SI2 Sampling - April 27, 1995*

The following base/neutral/acid extractable compounds were detected in the sludge-like material at levels elevated above background: naphthalene (0.035 ppm), 2-methylnaphthalene (0.082 ppm), dibenzofuran (0.024 ppm), and phenanthrene (0.086 ppm). Selenium (total) was also detected in this sample at 2.79 ppm; this metal was not detected in any soil samples collected from this site. Arsenic (total) was detected at 6.18 ppm, which is above the SCDM benchmark for arsenic (0.33 ppm), but this metal was detected at similar levels (10.5 ppm) in the background sample (Reference 44; Table 1C).

3.3 Conclusions

Previous on-site sampling found hazardous substances in the soils and pooled water of the Eisenberg Fill site in the vicinity of the current Mo-Kan operation. Levels of benzo(a)pyrene were detected in on-site soils in 1989 in excess of site screening standards; other polycyclic aromatic hydrocarbons were present. Levels of vanadium (100 ppm) and arsenic (4.4 ppm) in pooled water on-site exceeded expected concentrations for surface water (up to 0.2 ppm vanadium; about 0.002 ppm arsenic) (Reference 19, p.63; 20, p.2).

SI2 sampling conducted in April 1995 indicates that the contamination of this property extends beyond the 10 acres of Mo-Kan rental property and includes portions of the 20 acre vacant lot. Levels of selenium and several semi-volatile compounds in the sample of sludge-like material were found to exceed the background sample, which was non-detect for these parameters. Arsenic was detected at a level which exceeds the SCDM benchmark for arsenic but this metal was also found in the background sample (References 2;44). Arsenic is commonly found in soils in Missouri at levels ranging up to 70 ppm; the average amount of arsenic in Missouri soils is 8.7 ppm (Reference 26, p.H13).

The background sample is likely to be influenced by its proximity to the highway, which may account for some of the PAH contamination detected (such as pyrene and fluoranthene), as these compounds are commonly associated with incomplete burning of fuel (Reference 21, p.2). An elevated level of vanadium was found in the suspected source sample (209 ppm), although this value is not greater than three times background. The expected level of naturally-occurring vanadium in soils in this area is up to 125 ppm (up to 150 ppm nationally); the background sample detected 142 ppm, which is higher than anticipated (Reference 19, p.2; 26, p.H50; 44).

Table 1A
PREVIOUS SAMPLING CONDUCTED AT EISENBERG FILL SITE - PA STAGE
U.S. ENVIRONMENTAL PROTECTION AGENCY - APRIL 6, 1988
Shaded values exceed a SCDM benchmark; All results in parts per billion (ppb)

PARAMETER	Pooled Water PK825001	SCDM Environmental Benchmark - Surface Water
Aluminum	28,000	---
Arsenic	4,400	190
Barium	740	---
Cobalt	150	---
Chromium	500	210
Copper	5,500	12
Iron	43,000	1,000
Manganese	1,800	---
Molybdenum	1,700	---
Nickel	5,000	160
Lead	190	3.2
Titanium	870	---
Vanadium	100,000	---
Zinc	610	110
Calcium	150	---
Sodium	10,000	---

--- indicates substance was either not present or present below detection levels.

Table 1B

PREVIOUS SAMPLING CONDUCTED AT EISENBERG FILL SITE - SI1 SAMPLING
MISSOURI DEPARTMENT OF NATURAL RESOURCES - JULY 25, 1989
Shaded values exceed applicable SCDM benchmark; All results in parts per billion (ppb)

PARAMETER	89-1736 POOLED WATER AREA - soil	89-1737 UPGRADIENT of 89-1736 -soil	89-1738 POOLED WATER	SCDM soil value	SCDM surface water value
Silver	170	72	7.1	2,900,000	0.12
Barium	140000	200000	600	41,000,000	---
Cadmium	3600	2300	57	290,000	1.1
Chromium	10000	12000	170	2,900,000	210
Mercury	1500	850	690	170,000	0.012
Lead	84000	38000	180	---	0.08
Selenium	200	120	15	2,900,000	36
Vanadium	85000	17000	1900	4,100,000	---
Benzo(a)anthracene	3800	---	---	---	---
Benzo(a)pyrene	3800	800	---	80	---
Benzo(b)fluoranthene	7400	700	---	---	---
Benzo(ghi)perylene	3500	---	---	---	---
Bis(2-ethylhexyl)phthalate	600	600	37	42,000	---
Chrysene	5100	600	---	---	---
Fluoranthene	7600	800	---	23,000,000	---
Indeno(1,2,3-cd)pyrene	3000	---	---	---	---
Phenanthrene	3900	---	---	---	---
Pyrene	9500	700	---	17,000,000	---

--- indicates substance not present or present below detection levels. No VOAs were detected.

Table 1C

MISSOURI DEPARTMENT OF NATURAL RESOURCES SECOND SITE INSPECTION (SI2) SAMPLING EISENBERG FILL SITE - SOURCE MATERIAL RESULTS (0-2 foot depth) Samples collected April 27, 1995; All samples in parts per million (ppm) Values in bold show actual contamination*; shaded values exceed an applicable SCDM benchmark			
PARAMETER	**Sample Number and Type**		
Samples analyzed for total metals and BNAs	SCDM Reference Value	95-0640 - Soil grab, near exit ramp; **Soil Background**	95-0644 - "Soil" grab, north side of Mo-Kan fill; suspected source
Arsenic, total	0.33	**10.5**	**6.18**
Barium, total	41,000	241	25.9
Cadmium, total	290	1.03	ND
Chromium, total	2,900	19.8	33.5
Lead, total	---	32.5	14.3
Selenium, total	2,900	ND	**2.79**
Vanadium, total	4,100	142	209
Naphthalene	---	ND	**0.035**
2-Methylnaphthalene	---	ND	**0.082**
Dibenzofuran	---	ND	**0.024**
Phenanthrene	---	ND	**0.086**
Fluoranthene	23,000	0.1	ND
Pyrene	17,000	0.073	ND
* - Values exceed background if background is non-detect (ND) or are 3X background			

4. GROUNDWATER PATHWAY

4.1 Hydrogeologic Setting

The Eisenberg Fill site is located in an industrialized section of North Kansas City, Missouri, in the Missouri River floodplain. The topographic surface of the floodplain in this area is nearly level (References 4; 8, p.1).

The Missouri River alluvium covers approximately 150 square miles through the Kansas City area and is the major aquifer in northwestern Missouri (Reference 8, p.2; 10, p.1). Large quantities of water (1,000 to 2,000 gallons per minute) are obtainable from the saturated sand and gravel of the alluvium. Groundwater in the alluvial aquifer occurs under both unconfined and artesian conditions (Reference 8, p.2; 12, p.24).

Depth to the alluvial aquifer is estimated at 15 to 30 feet below ground surface. It is expected that the thickness of the alluvial material above bedrock is in the range of 70 to 140 feet, averaging 85 to 90 feet. The composition of the alluvium varies from highly permeable coarse sand and gravel to finer sand. Variations in the thickness of the alluvium is controlled by irregularities in the bedrock surface (Reference 8, p.1-2).

The dominant regional groundwater flow direction is toward the south, but the direction in the alluvial aquifer may vary, depending upon the magnitude of flow in the Missouri River (Reference 8, p.1). During flooding or exceptionally high river stages, the river can recharge the aquifer and redirect the flow eastward (Reference 17, p.1).

Bedrock in this area is a slightly permeable shale, likely of the Pennsylvanian aged Pleasanton group. The Pleasanton is estimated to be 30 to 80 feet thick in this area. This shale unit would be expected to act as an aquitard (Reference 8, p.1; 17, p.1). Deep bedrock groundwater in Pennsylvanian-aged rock is highly mineralized and is non-potable (Reference 8, p.2). In addition to poor water quality, yields from the bedrock aquifer would likely be too low for most uses (Reference 12, p.24).

The Kansas City area is under evaluation for a wellhead protection program (WHPP), but this program has not yet been implemented (Reference 10).

4.2 Groundwater Targets

Four municipal wells serving North Kansas City are located 0.9 miles west of the site. Eleven municipal wells serving Kansas City, Missouri are located 1.5 miles northwest of the site. Five wells serving Gladstone are located between 2 and 3 miles northwest of the site (Reference 15). An apportioned population of approximately 236,435 people are served by drinking water supplies which draw water from within four miles of the site (References 16, 22, 29, 30-32; 41; Table 2). The Kansas City Missouri municipal water company alone supplies water to more than 30 communities. Twenty-five percent of Kansas City municipal water can be attributed to groundwater wells (References 22; 30).

4.3 Groundwater Conclusions

No groundwater sampling was conducted for this site. Records were reviewed for the nearest drinking water wells known to be in use near the site. There are five North Kansas City municipal wells located approximately 0.9 miles northwest. Routine analytical testing of the North Kansas City wells in 1993 did not indicate the presence of pesticides, volatile organics (with the exception of chloroform) or commonly used industrial metals such as arsenic, cadmium, chromium, lead, and zinc (Reference 28). No analytical data for base/neutral/acid extractable compounds were located.

The main discharge for the alluvial aquifer is seepage from the aquifer to the Missouri River. Shallow groundwater migration at the site would be limited by the shale unit separating the alluvial aquifer from deeper groundwater (Reference 8, p.1). There is a pump station on-site which serves to prevent sewage from migrating deeper into the subsurface. It is possible that contaminant migration into the subsurface may infiltrate the sewer lines of the municipal sewage system (Reference 27).

Table 2 - Population Served By Groundwater Wells Within Four Miles of the Site

Well Distance from site (miles)	*Apportioned Population*	*Name Municipal Well Owner*	*Supplies which purchase water from municipalities*	*Supplies which purchase water[1]*
0 - 1/4				
1/4 - 1/2				
1/2 - 1	5,000	N. Kansas City		
1 - 2	175,000*	Kansas City		
	4,500*		Belton	
	653*			Cass Co. PWD#2
	52*		Vill.of Birmingham	
	2,288#		Blue Springs	
	515*##		Lathrop	
	4,703**		Lees Summit	
	74**			Cass Co. PWD#3

Table 2 - Population Served By Groundwater Wells Within Four Miles of the Site

Well Distance from site (miles)	*Apportioned Population*	*Name Municipal Well Owner*	*Supplies which purchase water from municipalities*	*Supplies which purchase water*[1]
1 - 2	165**			Cass Co. PWD#6
	174**			Jackson Co. PWSD #12&14
	287**			Pleasant Hill
	140*		Northmoor	
	737*		Platte City	
	1,392*		Raymore	
	6,250*		Raytown Water Co.	
	375*		Weatherby Lake	
	763*		Clay Co. PWSD #2	
	600*		Clay Co. PWSD #6	
	300*		Clay Co. PWSD #9	
	1,875&*		Jackson Co.PWD#2	
	5,592*		Jackson Co.PWD#1	
2 - 3	25,000	Gladstone		
3 - 4				
0 - 4	236,435			

* - Kansas City PWSD wells supply 25% of total water supply
\# - Blue Springs gets 55% of their water from Kansas City PWSD

- For Lathrop, 775 connections x 2.66 people per household in Clinton County = 2,062 people; **- Lee's Summit gets 33% of their water from Kansas City; & - Jackson County PWSD #2 gets 60% of its water from Kansas City wells.

[1] - These supplies purchase water from supplies that purchase water from municipalities

5. SURFACE WATER PATHWAY

5.1 Hydrologic Setting

The Eisenberg Fill site lies within the Dissected Till Plains of the Central Lowland physiographic province in the Missouri River drainage system (References 14, p.7; 25). The Dissected Till Plains are distinctive in stream development, with broad flood plains and underfit stream channels. The level floodplains are interrupted only by terraces and drainage ditches (Reference 25, p. 21). The Missouri River provides recharge for the alluvial aquifer, most notably during prolonged high river stages (Reference 8, p.1).

Soil erosion is high in the Missouri River basin near Kansas City (Reference 11). Average annual runoff in the Kansas City area is around eight inches (Reference 12, p.22). Streams in the basin generally carry heavy sediment loads and provide poor aquatic habitat. Fishing in the Missouri River in and downstream of the Kansas City area was previously restricted by the Missouri Department of Health due to chlordane contamination in fish (Reference 11).

Water tends to pool on-site during times of heavy rainfall. There are intermittent drainages which run along the northern and western sides of the property; another drainage runs parallel with the railroad tracks, to the southeast, near the pump station. Flow in these drainages was very minimal during the SI2 reconnaissance conducted by MDNR on April 27, 1995 (Reference 13).

Run-off from the site would likely be diverted into these drainage ditches that run along the northern, southern, and eastern perimeters of the site. Although drainage is thought to flow south or southeast, there have been complaints from the grain silo operators north of the site (Figure 1) about water displacement entering the silos when it rains (Reference 18, p.2).

Site drainage is thought to flow southeast, to enter either a stormwater sewer or follow an overland channel, to empty into the Missouri River. The shortest distance from the site to the Missouri River is about 1.5 miles. The probable point of entry (PPE) for the surface water pathway starts between Missouri River miles 362 and 363. The 15-mile target distance limit ends at the SE ¼ of the SE ¼ of Section 25, T51N, R31W/R30W near Atherton, Missouri (Reference 4).

According to a flood hazard boundary map, this location is considered to be an area of minimal flood hazards, as it is protected by a levee (References 4; 24). No karst areas were noted near the site (Reference 14, p.34).

5.2 Surface Water Targets

The Missouri River is state-designated for irrigation, livestock and wildlife watering, protection of warm water aquatic-life and human health - fish consumption, boating, drinking water supply, and industrial use (Reference 33). In 1993, the commercial fish harvest from the segment of the Missouri River bordering Clay and Jackson counties was 2,138 pounds of fish (Reference 42, fig.1).

There are no known drinking water intakes within 15 downstream miles of the site (References 14; 15). Kansas City, Kansas obtains drinking water from an intake on the Missouri River upstream of the site (Reference 31).

Sensitive environments are present in the Missouri River. The federally-endangered bald eagle (*Haliaeetus leucocephalus*) is found roosting in tall trees and cliffs along the Missouri River during the winter months. The federally-endangered pallid sturgeon (*Scaphirhynchus albus*) is known to inhabit the Missouri River. The pallid sturgeon favors shallow areas around islands and sand bars (Reference 36, p. 1).

Wetland areas are present on both banks of the Missouri River along the 15-mile surface water pathway. The nearest northern riverbank wetland, downstream from the PPE, accounts for 2 miles of wetland frontage. The nearest southern riverbank wetland, which includes Riverfront Park, accounts for 11.75 miles of contiguous wetland frontage (Reference 43).

The sicklefin chub (*Macrhybopsis meeki*) and floating foxtail grass (*Alopecurus aequalis*) are known historically from the area. Floating foxtail grass, state-listed Rare, was identified 10 miles downstream of the site in 1985. The sicklefin chub, a candidate for federal listing and state-listed Rare, was found 12 miles downstream of the probable point of entry in 1945 (References 39 and 40). Due to the age of these sightings, these species may not meet the definition of sensitive environments as per the HRS (Reference 1).

5.3 Surface Water Sampling Locations

Surface water samples were collected from two intermittent drainages. The sample collected from the pooled water area near the highway exit ramp (95-0641), off-site to the southwest, was collected as background. Sample 95-0639 was collected off-site to the southeast, from the intermittent drainage near the pumphouse. This location is thought to be downgradient (Reference 44; Appendix A).

5.4 Surface Water Analytical Results

Surface water analytical results are presented as Table 3A. Both samples collected from intermittent drainages near the site were found to contain barium, chromium, and bis-2-ethylhexylphthalate. The upgradient sediment sample, considered to be background, also contained di-n-butylphthalate (Reference 44).

Values were higher for all parameters in the sample considered to be background, or upgradient. As stated earlier, this location may be adversely affected by its proximity to the highway. However, it reflects the off-site conditions found in this industrial location.

5.5 Sediment Sampling Results

Sediment samples were collected at the same locations as the surface water samples, from the intermittent drainages located southwest and southeast of the site. The sediment samples showed a marked contrast to the surface water samples. Eight semi-volatile compounds (0.15 - 6.1 ppm) and arsenic (12 ppm), parameters that were non-detect in the upgradient sample, were detected in the sediment sample from the pumphouse. The downgradient sample also detected elevated levels of cadmium (11.9 ppm), lead (743 ppm), and selenium (2.94 ppm) (Reference 44).

The following base-neutral compounds, not detected in the sample near the pumphouse, were found in the background sample: bis(2-ethylhexyl)phthalate (570 ppm) and di-n-octylphthalate (180 ppm) (Reference 44).

Table 3A

MISSOURI DEPARTMENT OF NATURAL RESOURCES SITE INSPECTION SAMPLING - EISENBERG FILL SITE - INTERMITTENT SURFACE WATER RESULTS
All values in parts per billion (ppb); samples collected April 27, 1995
Shaded values show actual contamination**; values in bold exceed an applicable SCDM benchmark

PARAMETER	Sample Number and Type			
Samples analyzed for total metals and BNAs ** trip blank analyzed for BNAs only*	95-0639 off-site to southeast water grab	95-0641 off-site to southwest water grab *background*	95-0645 trip blank water	SCDM Environmental Benchmark - Surface Water
Barium, total	24.4	56.9	NA*	---
Chromium, total	7.32	20.2	NA*	210
Di-n-butylphthalate	ND	0.86	ND	---
Bis(2-ethyl-hexyl)phthalate	2.5	30.0	ND	---

** - Values are 3X background or exceed background where background is non-detect (ND)

5.6 Surface Water Conclusions

As samples were collected from an intermittent portion of the surface water pathway, the elevated levels of contamination detected in the sediment samples does not constitute an observed release to this pathway. One form of contamination (primarily phthalates, barium, and chromium) is reflected at the southwestern intermittent drainage, thought to be upgradient of the site; while another type of contamination (base-neutrals, arsenic, lead, selenium, and cadmium) is reflected in the other off-site drainage, thought to be downgradient.

It is interesting to note that the original sample of pooled water EPA collected from the site in 1988, while recorded as inconclusive for semi-volatiles, did detect a series of phthalate esters at concentrations of 50-200 ppb. It was assumed that this was due to the sampling vial (which was plastic) not being Teflon lined (Reference 9). It is possible that the

Table 3B

MISSOURI DEPARTMENT OF NATURAL RESOURCES SITE INSPECTION SAMPLING FOR EISENBERG FILL SITE- SEDIMENT RESULTS (0-2 foot depth)

Samples collected April 27, 1995; All samples in parts per million (ppm)
Shaded values show actual contamination*; There are no SCDM benchmarks for sediment

PARAMETER	SAMPLE NUMBER AND TYPE	
Samples analyzed for total metals and BNAs	95-0642 Sediment grab, ditch near exit ramp southwest of site; **Background**	95-0643 Sediment grab, ditch at pumphouse - southeast of site
Arsenic, total	ND	12
Barium, total	204	311
Cadmium, total	3.56	11.9
Chromium, total	48.2	108
Lead, total	167	743
Selenium, total	0.531	2.94
Vanadium, total	163	123
Acenaphthene	ND	0.15
Phenanthrene	ND	4.8
Anthracene	ND	1.2
Fluoranthene	ND	6.1
Pyrene	ND	4.7
Bis(2-ethylhexyl)phthalate	570	ND
Butylbenzylphthalate	ND	1.1
Benzo(a)anthracene	ND	2.1
Chrysene	ND	2.8
Di-n-Octylphthalate	180	ND

* Values exceed background(if background is non-detect {ND}) or are 3X background

contamination found to the southwest of the site (SI2 background) actually reflects the historical dumping which has occurred in this area, while the sample collected to the southeast of the site (SI2 downgradient) reflects more recent dumping events.

As surface water drainage from the site is normally intermittent, it is difficult to tell how pooled water drains from the site. It is possible that surface water entering the shallow subsurface is channeled by the sewer lines of the 19th Avenue pumping station into the municipal sewage system (Reference 27).

6. SOIL EXPOSURE AND AIR PATHWAYS

6.1 Physical Conditions

The Eisenberg property is a 30-acre parcel located in a low-lying portion of North Kansas City, approximately 1.5 miles north of the Missouri River. The surrounding area is predominantly industrial. Grain silos are located both northeast and southeast of the site; the Burlington Northern railyard is directly southeast, past the 19th Avenue Pumping Station. The site is bounded on the northwest by Interstate-35, the southwest by 16th Street (Reference 4; Figure 1).

The Missouri River floodplain in this area, including the Eisenberg Fill site, has a flat to gently undulating topography, sloping 0-2% to the south (Reference 17, p.1). The 10-acre portion of the Eisenberg property leased by Mo-Kan Container Service is covered with truck/rail containers. The 20 acres of Eisenberg property to the northeast of Mo-Kan is an open lot, partially covered by sparse vegetation. During the MDNR SI2 site reconnaissance on June 27, 1995, thick grasses and trees were noted along the northwestern perimeter of the property, adjacent to an intermittent surface water drainage (Reference 13).

Piles of grayish fill are evident across the vacant 20 acres of the site, in contrast to the tan soils observed over most of the site surface. A fire extinguisher, caution tape and what appeared to be a gas mask were found near the center of the vacant lot during the site visit (Reference 13, photo #46-12A).

During an MDNR SI1 site visit in 1989, it was estimated that at least 10 feet of fill material had been introduced to the Eisenberg property. The fill material was composed of concrete, brick, iron, rebar, and fine-grained soil. At least three feet of fill has been added since that time (Reference 13).

About three feet of colluvial or glacial silty clay and clay underlie the fill material (Reference 8, p.1). Topsoil is a dark brown silty clay loam, approximately two feet thick with moderate to low permeability (Reference 17; p.2). Leta silty clay and Levasy silty clay are prevalent in this area. Both soil types are considered to be unsuitable for building development or on-site waste disposal due to wetness, occasional flooding, and ponding (Reference 23, p.48-49).

6.2 Soil and Air Targets

There are no residential areas within 200 feet of Eisenberg property. The nearest residence is a condominium development to the northwest of the intersection of I-35 and Armour Road, 0.1 miles northwest of the site. A trailer is set up as a check-in area near the entrance to the property. Site access is expected to be limited to the four permanent employees of Mo-Kan Container Service and their customers. As many as 100 trucking companies may visit the site in a day to rent containers (References 4; 13).

Approximately 76,169 people live within four miles of the site. About 71,459 people were attributable to Missouri; 4710 people to Kansas. The Kansas population was calculated as follows. Approximately 3.39 square miles of the four mile distance ring fell in Kansas City, Kansas. The average population per square mile in Kansas City Kansas in 1990 was 1,389.3 people. This equates to approximately 1570 people apportioned to the 2-3 mile distance ring and 3140 people to the 3-4 mile distance ring. The Missouri population was estimated using 1990 census tract block information (Reference 34).

Table 4

Residential Population Within Four Mile Radius of Site

Distance	*Population*	*References*
on-site	0	4,13
0 - 1/2	1,368	4,34
1/2 - 1	2,737	34
1 - 2	5,365	34
2 - 3	23,074	34,35
3 - 4	43,625	34,35
0 - 4	76,169	

Within a four-mile radius, there are a significant number of wetland areas located along the Missouri River. The most notable areas are as follows:

- Riverfront Park, on the southern bank of the Missouri River, is located approximately 1 mile from the site. Roughly 250 acres of wetland frontage are associated with this park (Reference 43).

- There is a wetland of roughly 150 acres located from 1.5 to 3 miles southwest of the site (Reference 43). This wetland is also listed as a notable natural area (Reference 39).

The state-designated Rare species Goldie's Fern (*Dryopteris Goldiana*) is located within the 3-4 mile distance ring in the Hidden Valley city park and associated natural area (Reference 37). The Hidden Valley Natural Area is an 82-acre upland mesic forest (Reference 38). There is also a four-acre mesic forest located 1-2 miles from the site (Reference 39).

6.3 Soil Sampling Locations

Two grab samples of fill were collected from the Mo-Kan portion of the property, toward the southeast border, which was the location of the pooled waste noted in the initial EPA sampling of 1988. A soil grab sample was collected from a location just east of the I-35 exit ramp at 16th Street, for background. A sample of the waste piles observed on-site was collected from a representative pile located near the southern boundary of the vacant portion of the Eisenberg property (Reference 44). This sample was previously discussed in detail in Section 3, Waste/Source Sampling.

6.4 Soil Analytical Results

The westernmost sample of fill collected from the Mo-Kan property, 95-0637, was similar in composition to the background sample, 95-0640. No metals were detected in sample 95-0637 at levels greater than the background sample. Fluoranthene (0.58 ppm) and pyrene (0.53 ppm) were detected at levels greater than three times background (0.1 ppm fluoranthene, 0.073 ppm pyrene) (Reference 44).

The sample collected further east, 95-0638, had the following substances at levels greater than three times background: cadmium (4.06 ppm), total lead (132 ppm), fluoranthene (21 ppm), and pyrene (9.8 ppm). The following parameters were also present at levels ranging from 0.12 ppm to 13 ppm: acenaphthene, phenol, dibenzofuran, fluorene, phenanthrene, anthracene, benzo(a)anthracene. These compounds were not present in the background sample (Reference 44; Table 5).

Arsenic was detected across most of the site at levels (3.29 ppm - 10.5 ppm) which exceed the SCDM reference value of 0.33 ppm for arsenic. The highest level was detected from the background sample (Reference 44).

6.5 Soil Exposure and Air Pathway Conclusions

An observed release of contamination to the soil pathway was not documented by analytical sampling, as samples collected on-site were not native soil. However, actual contamination of fill material on-site has been documented by analytical sampling (Reference 44).

Elevated levels of semi-volatile compounds were detected across the site. The highest levels of metal contamination were found in the easternmost fill sample collected from the Mo-Kan rental property (elevated levels of lead and cadmium) and a pile of gray sludge-like material (elevated selenium) found near the southern boundary of the vacant portion of the site (Reference 44).

Potential exposure to on-site contaminants may be a concern for the worker population of the Mo-Kan Container Service and their customers. The nearest residential population is over 200 feet to the northwest of the site, across the I-35 exchange with Armour Road (Reference 13). The population within 0.5 miles of the site is approximately 1,368 people; within four miles, 76,169 (Reference 37). The affected population may be greater, as the area of contamination has been documented to extend beyond the boundaries of the 10 acres of Eisenberg property rented by Mo-Kan Container Service and may include the entire 30 acres.

Eisenberg Fill
Site Inspection
August 7, 1995

Table 5

MISSOURI DEPARTMENT OF NATURAL RESOURCES SITE INSPECTION SAMPLING
EISENBERG FILL SITE - SURFICIAL SOIL RESULTS (0-2 foot depth)
Samples collected April 27, 1995; All samples in parts per million (ppm)
Values in bold show actual contamination*; shaded values exceed an applicable SCDM benchmark

PARAMETER	**Sample Number and Type**				
Samples analyzed for total metals and BNAs	SCDM Reference Value	95-0637 Soil grab, hole #1, Mo-Kan fill	95-0638 Soil grab, hole #2, Mo-Kan fill	95-0640 Soil grab, Exit ramp **BKGD**	95-0644 "Soil" grab, north side of Mo-Kan fill; suspected source
Arsenic, total	0.33	**3.29**	ND	**10.5**	**6.18**
Barium, total	41,000	98.8	224	241	25.9
Cadmium, total	290	ND	**4.06**	1.03	ND
Chromium, total	2,900	10.2	30.9	19.8	33.5
Lead, total	—	18.3	**132**	32.5	14.3
Selenium, total	2,900	ND	ND	ND	**2.79**
Vanadium, total	4,100	61.5	125	142	209
Acenaphthene	35,000	ND	**0.620**	ND	ND
Naphthalene	—	ND	ND	ND	**0.035**
Phenol	350,000	ND	**0.120**	ND	ND
2-Methylnaphthalene	—	ND	ND	ND	**0.082**
Dibenzofuran	—	ND	**0.930**	ND	**0.024**
Fluorene	23,000	ND	**1.0**	ND	ND
Phenanthrene	—	ND	**13**	ND	**0.086**
Anthracene	170,000	ND	**5.1**	ND	ND
Fluoranthene	23,000	**0.58**	**21**	0.1	ND
Pyrene	17,000	**0.53**	**9.8**	0.073	ND
Benzo(a)anthracene	—	ND	**6.9**	ND	ND

* - exceed background(if background is non-detect (ND) or are 3X background

7. SUMMARY AND CONCLUSIONS

Summary

The Eisenberg property is an undeveloped 30-acre tract of land located on the northeastern quadrant of the intersection of Interstate-35 and 16th street in industrialized North Kansas City, Missouri. The southwestern 10 acres of the property, currently leased to Mo-Kan Container Service, was the focus of previous Eisenberg Fill Superfund site investigations. The findings of this SI2 report indicate that the entire Eisenberg property has been used for unauthorized dumping.

EPA received a complaint regarding the Eisenberg Fill site in 1988. Several pools of a black liquid were reportedly oozing from a fill area near the intersection of 16th Street and Interstate 35. A subsequent investigation by EPA revealed three pools of dark stained water, each approximately 50 square feet in size, at the northeastern corner of what is now Mo-Kan rental property. A sample of the pooled water was collected by EPA on April 6, 1988 and was found to contain elevated levels of vanadium and arsenic. Subsequent investigation by MDNR, in 1989, confirmed previous results. Levels of benzo(a)pyrene were also detected in on-site soils in excess of Superfund site screening standards.

SI2 sampling conducted in April 1995 indicates that the contamination of this property extends beyond the 10 acres of Mo-Kan rental property and includes portions of the 20 acre vacant lot. On-site samples were found to contain elevated levels of semi-volatile compounds and several metals, demonstrating actual contamination. However, no values were found to exceed SCDM values, with the exception of arsenic, which was detected in the background sample. There is difficulty in obtaining a true background sample near the site, due to the industrial nature of the area.

The Missouri River alluvium is the major aquifer in northwestern Missouri (Reference 8, p.2; 10, p.1). Twenty municipal wells are located within three miles of the site, representing over 230,000 people relying upon groundwater for their drinking water within a four-mile radius. The dominant regional groundwater flow direction is toward the south, but the direction in the alluvial aquifer may vary, depending upon the magnitude of flow in the Missouri River (Reference 8, p.1). During flooding or exceptionally high river stages, the river can recharge the aquifer and redirect the flow eastward (Reference 17, p.1).

Sampling of groundwater was not conducted as a part of the SI2 (Reference 44). The nearest wells to the site, the municipal wells for North Kansas City, are located 0.9 miles

to the northwest (Reference 15). Routine analytical testing of these wells in 1993 did not indicate a release of hazardous substances to the shallow aquifer (Reference 28).

Water tends to pool on-site, as the property is located in a low-lying portion of the Missouri River floodplain. Intermittent drainages run along the northern and western sides of the property (Reference 13). Samples collected from the sediment and surface water contained in these drainages indicates that hazardous substances may be migrating into the surface water pathway. However, since the samples were not collected from permanently flowing surface water, an observed release to the surface water pathway has not been documented.

Run-off from the site would likely be diverted into the sewer system or overland drainage ditches. Drainage from the site ultimately empties into the permanently-flowing Missouri River, approximately 1.5 miles south of the site. The Missouri River is utilized as a fishery and may support two federally-endangered species in this area. Over twenty miles of wetland frontage is represented along the 15 miles of Missouri River downstream of the site. The nearest southern riverbank wetland accounts for 11.75 miles of contiguous wetland frontage and is over 250 acres in size (Reference 43).

There are no residential areas within 200 feet of Eisenberg property. The nearest residence is a condominium development 0.1 miles northwest of the site. A trailer is set up as a check-in area near the entrance to the property. Site access is expected to be limited to the four permanent employees of Mo-Kan Container Service and their customers (References 4; 13). The contaminated fill at the site may pose a threat of exposure to hazardous substances for the employees of Mo-Kan Container Service and their customers (References 44).

Conclusions
The Eisenberg Fill site appears to have been used as an unregulated fill area for at least seven years, with dumping continuing on-site today. Several of the metals associated with the site - arsenic, cadmium, and selenium - are associated with copper refining or smelting. Due to the continued use of the property as an unregulated fill area, additional action is recommended for this site.

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Appendix A

SITE INSPECTION SAMPLING RATIONALE EISENBERG FILL SITE April 27, 1995		
Sample Number	**Sample Type (grab)**	**Location and Objectives** All soil samples collected from a depth of 0-2 feet
95-0637	Soil	Fill at Mo-Kan rental property, hole #1; sample to determine on-site conditions
95-0638	Soil	Fill at Mo-Kan rental property, hole #2; sample to determine on-site conditions
95-0639	Surface water	Drainage ditch at pumphouse; sample to show condition of surface water leaving southeastern side of site
95-0640	Soil	Soil near highway exit ramp, *background*
95-0641	Surface water	Drainage ditch near highway exit ramp; sample to show condition of surface water upgradient (southwest) of site, *background*
95-0642	Sediment	Drainage ditch near highway exit ramp; sample to show condition of sediment upgradient (southwest) of site, *background*
95-0643	Sediment	Drainage ditch at pumphouse; sample to show condition of sediment on southeastern side of site
95-0644	Soil grab	Fill material on north side of Mo-Kan area; soil sample to determine contents of suspected source
95-0645	Water grab	Trip blank

EPA	POTENTIAL HAZARDOUS WASTE SITE **TENTATIVE DISPOSITION**	REGION VII	SITE NUMBER MOD985768175

File this form in the regional Hazardous Waste Log File and submit a copy to: U.S. Environmental Protection Agency, Site Tracking System; Hazardous Waste Enforcement Task Force (EN-335); 401 M St., SW; Washington, D.C. 20460.

I. SITE IDENTIFICATION

A. SITE NAME	eB. STREET	
Leo Eisenberg's Property alias: Eisenberg Fill Site	Intersection of I-35 and 16th Street at Armour Rd	
C. CITY North Kansas City	D. STATE MO	E. ZIP CODE 64116

II. TENTATIVE DISPOSITION

Indicate the recommended action(s) and agency(ies) that should be involved by marking 'X' in the appropriate boxes.

RECOMMENDATION		Action Agency			
	Mark 'X'	EPA	STATE	LOCAL	PRIVATE
A. NO ACTION NEEDED - NO HAZARD					
B. INVESTIGATIVE ACTION(S) NEEDED (If yes, complete Section III.)	X	X			
C. REMEDIAL ACTION NEEDED (If yes, complete Section IV.)					
D. ENFORCEMENT ACTION NEEDED (If yes, specify in Part E whether the case will be primarily managed by the EPA or the State and what type of enforcement action is anticipated.)					

E. RATIONALE FOR DISPOSITION

The Eisenberg Fill Site is an unpermitted fill area with contaminated soil and piles of sludge-like waste. A draft score of greater than 28.5 was generated for this site, due to the proximity of the North Kansas City municipal well field (0.9 miles). Dumping appears to have occurred for at least seven years and continues today.

F. INDICATE THE ESTIMATED DATE OF FINAL DISPOSTION (mo,day,yr)	G. IF A CASE DEVELOPMENT PLAN IS NECESSARY, INDICATE THE ESTIMATED DATE ON WHICH THE PLAN WILL DEVELOPED (mo,day,yr)
FY'96	

H. PREPARER INFORMATION

A. Oberding EPA-SAM 9-12-95

1. NAME	2. TELEPHONE NUMBER	3. DATE (mo., day, & yr.)
Julie A. Bloss Julie A Bloss	(314) 751-3176	August 3, 1995

III. INVESTIGATIVE ACTIVITY NEEDED

A. IDENTIFY ADDITIONAL INFORMATION NEEDED TO ACHIEVE A FINAL DISPOSITION.

Identification of waste haulers and origin of wastes is needed to determine if RCRA or DOT authority is applicable. The wastes at site should be evaluated for a removal action due to the proximity of municipal wells.

B. PROPOSED INVESTIGATIVE ACTIVITY (Detailed Information)

1. METHOD FOR OBTAINING NEEDED ADDITIONAL INFO.	2. SCHEDULED DATE OF ACTION (mo,day,& yr)	3. TO BE PERFORMED BY (EPA, Contractor, State, Etc.)	4. ESTIMATED MANHOURS	5. REMARKS
A. TYPE OF SITE INSPECTION				
(1)				
(2)				
(3)				
B. TYPE OF MONITORING				
(1)				
(2)				
C. TYPE OF SAMPLING				
(1)				
(2)				

Continued From Front

1. METHOD FOR OBTAINING NEEDED ADDITIONAL INFO.	2. SCHEDULED DATE OF ACTION (mo, day, & yr)	3. TO BE PERFORMED BY (EPA, Contractor, State, Etc.)	4. ESTIMATED MANHOURS	5. REMARKS
a. TYPE OF LAB ANALYSIS (1)				
(2)				
b. OTHER (specify) (1) 104E Letter	FY'96	EPA		Haulers of waste are potentially violating federal RCRA and DOT regulations. Inquiry letter to owner may provide information about source and type of waste deposited on-site
(2) Removal assessment	FY'96	EPA		Removal assessment will provide additional information about type of waste and further delineate amount of waste deposited; measures such as restricting access to the site may also be appropriate

C. ELABORATE ON ANY OF THE INFORMATION PROVIDED IN PART B(on front and above)AS NEEDED TO IDENTIFY ADDITIONAL INVESTIGATIVE WORK.

D. ESTIMATE MANHOURS BY ACTION AGENCY

1. ACTION AGENCY	2. TOTAL ESTIMATED MANHOURS FOR INVESTIGATIVE ACTIVITIES	1. ACTION AGENCY	2. TOTAL ESTIMATED MANHOURS FOR INVESTIGATIVE ACTIVITIES
a. EPA		b. STATE	
c. EPA CONTRACTOR		d. OTHER (specify)	

IV. REMEDIAL ACTIONS

A. SHORT TERM/EMERGENCY ACTIONS (On Site and Off Site): List all emergency actions needed to bring site under immediate control, e.g., restrict access, provide alternate water supply, etc. See instructions for a list of the Key Words for each of the actions to be used in the space below.

1. ACTION	2. EST. START DATE mo, day, yr	3. EST. END DATE mo, day, yr	4. ACTION AGENCY EPA, State, Private Party	5. ESTIMATED COST	6. SPECIFY 311 OR OTHER ACTION; INDICATE THE MAGNITUDE OF THE WORK REQUIRED.
				$	
				$	
				$	
				$	

B. LONG TERM STRATEGY (On Site and Off Site): List all long term solutions, e.g., excavation, removal, ground water monitoring wells, etc. See instructions for a list of Key Words for each of the actions to be used in the spaces below.

1. ACTION	2. EST. START DATE mo, day, yr	3. EST. END DATE mo, day, yr	4. ACTION AGENCY EPA, State, Private Party	5. ESTIMATED COST	6. SPECIFY 311 OR OTHER ACTION; INDICATE THE MAGNITUDE OF THE WORK REQUIRED.
				$	
				$	
				$	
				$	
				$	

C. ESTIMATED MANHOURS AND COST BY ACTION AGENCY

1. ACTION AGENCY	2. TOTAL EST. MAN-HOURS FOR REMEDIAL ACTIVITIES	3. TOTAL EST. COST FOR REMEDIAL ACTIVITES	1. ACTION AGENCY	2. TOTAL EST. MANHOURS FOR REMEDIAL ACTIVITIES	3. TOTAL EST. COST FOR REMEDIAL ACTIVITIES
a. EPA			b. STATE		
c. PRIVATE PARTIES			d. OTHER (specify)		

RESPONSE CHECKLIST

Site Name: Eisenberg Fill site **alias: Leo Eisenberg's Property**	**Phone: N/A**	**Status:**	X *Active* ☐ *Inactive*
Address: northeastern quadrant of I-35 and 16th Street, North Kansas City, Missouri 64116			
Property Owner: Northtown Devco, c/o Leo Eisenberg & Co., Inc.	**Phone: (816) 221-2300 (NT Realty)**		
Owner Address: 1101 Walnut, Suite 800, Kansas City, Missouri 64106			
Operator Name: Mo-Kan Container Service (rents southern 10 acres)	**Phone: (816) 421-3100; (816) 421-5008**		
Operator Address: 1620 Railroad Avenue, North Kansas City, Missouri 64116			
Site Latitude & Longitude: 39°8'19.30" N latitude; 94°33'42.93" W longitude	**Site Setting:**	X *Urban*	☐ *Rural*
Township Range & Section: T50N, R33W, Section 13	**Site Access Restricted:**	☐ *Yes*	X *No* - **partially**
CERCLIS ID No.: MOD985768175			

1. Is the site in close proximity to any of the following?

- ☐ Residential Area
- ☐ School/Daycare Facility
- ☐ Surface Water Bodies
- ☐ Endangered Species
- ☐ Gas Station
- ☐ Manufacturing Plant
- X Grain Elevator
- ☐ Other
- X Major Thoroughfares
- X Drinking Water Supply Wells
- ☐ Surface Water Drinking Supplies
- ☐ Sensitive Environments (e.g., wetlands)
- ☐ State/National Parks/Forests/Monuments, etc.
- ☐ Above or Below-Ground Tanks
- ☐ Dump
- ☐ Landfill

Comments: (If possible, include specific names and indicate proximity to site.)
The Eisenberg Fill site has been used as an unpermitted landfill of construction and possibly industrial wastes. The site is bordered to the northwest by I-35. Grain elevators are located both northeast and southeast of the site on adjacent properties. The North Kansas City drinking water supply wells are within 1 mile of the site.

2. Potential types of contamination identified during site reconnaissance:

- X Surface Soil (estimate volume)
- X Subsurface Soil (estimate volume)
- X Groundwater
- ☐ Air
- ☐ Surface Water
- ☐ Unknown

Comments:
Polycyclic aromatic hydrocarbons and some metals, including vanadium, were identified during on-site sampling at levels exceeding background.

3. Were any areas of obvious contamination observed during the site reconnaissance? X *Yes* ☐ *No*

4. Do you suspect buried wastes? X *Yes* ☐ *No*

Comments:
The site is covered with at least 10 to 20 feet of fill. Unpermitted dumping has occurred on-site for over seven years.

5. Are any wastes potentially in contact with groundwater? X *Yes* ☐ *No*

6. What is the depth to groundwater? 15 - 30 feet below ground surface

Comments:

Response Checklist (Continued)

7. Current onsite operations: (include specific name and worker population)
The Mo-Kan Container Service, with four permanent employees, leases the southern 10 acres of the property.

8. Past onsite operations: (if possible, include specific name and worker population)
None identified.

9. Are there any drinking water supply wells onsite? ☐ *Yes* X *No*
Are these wells contaminated? ☐ *Yes* ☐ *No* ☐ *Unknown*

10. Potential onsite sources identified during site reconnaissance:

Sources	*Estimated Volume/Area*	*Suspected Waste*
☐ Drums		
☐ Tanks		
☐ Surface Impoundments		
☐ Landfill		
X Pile	Roughly 6 acres	Sludge
☐ Contaminated Soil		
☐ Spill		
☐ Burned Waste		
☐ Waste Stream		
☐ Other		

11. Is a release or contaminants from onsite sources suspected? X *Yes* ☐ *No*

Media suspected to be contaminated:

Media	*Suspected Contaminant*
X Soil	Vanadium, cadmium, and other metals, PAHs
X Groundwater	
X Surface Water	
☐ Air	

12. Any analytical data available? X *Yes* ☐ *No*
Attach all data to this questionnaire.

Data contained within Eisenberg Fill SI2 narrative report.

HEALTH THREATS

13. What types of exposure are potentially occurring? X *Inhalation* ☐ *Ingestion* X *Skin Contact*

14. Are there any reports of the following from potential receptors? ☐ *Illness* ☐ *Injury* ☐ *Skin Rashes* ☐ *Death*

Explain:

Response Checklist (Continued)

15. Are people living or working in areas of suspected contamination? X *Yes* ☐ *No*

Comments: The four permanent workers of Mo-Kan Container Service may be exposed to contaminated soils at the site.

16. What potential exposure pathways are associated with the site?

X Drinking Water ☐ Contaminated Agricultural Crops ☐ Contaminated Soils
☐ Surface Water X Skin Contact

Comments:

ENVIRONMENTAL THREATS

17. Are there any reports or injuries to natural resources flora or fauna on/in the vicinity of the site? ☐ *Yes* X *No*

18. Are there any preferential offsite flow pathways? Intermittent drainages are found off-site X *Yes* ☐ *No*
The Missouri River is 1.5 miles south of the site

19. Is the site located within a floodplain? X *Yes* ☐ *No* ☐ *Unknown* 10 yr. 100 yr. 500 yr.

20. Does any offsite drainage pathway flow into a surface water body? X *Yes* ☐ *No*

21. Is the previously identified surface water body used for recreational uses? X *Fishing* X *Recreational* ☐ *Unknown*
The Missouri River is a commercial fishery.

22. Were any of the following seen on or in the vicinity of the site during the reconnaissance?

☐ Endangered/Threatened Species ☐ Discolored Surface Water Bodies
X Stressed Vegetation X Discolored Soil
☐ Wetlands

Comments:
Most of the site is covered with sparse vegetation. Birds and rabbits were observed on-site in areas of thick brush found near the intermittent waterways.

23. Were wildlife absent from the site or surrounding area? ☐ *Yes* X *No*

24. Is there additional information available which documents a threat to the environment? ☐ *Yes* X *No*

If so, explain.

25. What are the potential short- and long-term effects?
Workers at the Mo-Kan Container Service may be exposed to contaminated soil in both the short and long-term. Potential long-term effects include the following: pooled water from the site may flow north toward the grain silos and contaminate grain, contaminants may enter groundwater and pollute North Kansas City drinking water supply.

REMOVAL SITE EVALUATION SECTION

1. **Is there evidence of a release as defined by Section 300.5 of the NCP?** X *Yes* ☐ *No*

2. **Is the source of the release either a vessel or a facility as defined by Section 300.5 of the NCP?**
   ☐ *Vessel* X *Facility* ☐ *Neither*

3. **Does the release involve either a hazardous substance, a pollutant, or contaminant that may present an imminent and substantial danger to public health or welfare?** ☐ *Yes* X *No*

4. **Is the type of release subject to the regulations on response exclusions specified in Section 300.400 (b) of the NCP (i.e., naturally-occurring substance, part of a structural building products, or due to deterioration of a drinking water distribution system?**

   Explain: ☐ *Yes* X *No*

5. **Is there a responsible part or other person providing appropriate response such that response and/or on-scene monitoring by the government is not necessary?**

   Explain: ☐ *Yes* X *No*

6. **Are any of the following conditions or factors present, or are likely to be present, at the site which would indicate that a removal action under Section 300.415 of the NCP may be necessary?**

   X Actual or potential exposure to nearby human populations, animals, or food chain from hazardous substances or pollutants or contaminants;

   X Actual or potential contamination of drinking water supplies or sensitive ecosystems;

   ☐ Hazardous substances or pollutants or contaminants in drums, barrels, tanks, or other bulk storage containers, that may pose a threat of release;

   ☐ High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate;

   X Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released;

   ☐ Threat of fire or explosion;

   ☐ The availability or other appropriate Federal or State response mechanisms to respond to the release;

   X Other situations or factors that may pose threats to public health or welfare or the environment.
   -Dumping continues on-site today. Haulers are possibly violating federal RCRA or DOT regulations.

Removal Site Evaluation Section (Continued)

Attention Site Assessment Personnel: The following questions should only be completed by EPA personnel.

7. Which of the following removal-type actions are considered appropriate to address the threats presently posed by the site?

- ☐ Fences, warning signs, or other security or site control precautions.
- ☐ Drainage controls, such as run-on or run-off diversion structures.
- ☐ Stabilization of berms, dikes, or impoundments or drainage or closing of lagoons.
- ☐ Capping of contaminated soils or sludge.
- ☐ Using chemicals or other materials to retard the spread or release or to mitigate its effects.
- ☐ Excavation, consolidation, or removal of contaminated soils from drainage or other areas.
- ☐ Removal of drums, barrels, tanks, and other bulk containers that contain or may contain hazardous substances or pollutants or contaminants.
- ☐ Containment, treatment, disposal, or incineration of hazardous materials.
- ☐ Provision of alternative water supply.

8. In light of the magnitude of the threat or potential threat to health, welfare, or the environment, the removal action should be undertaken as a:

- ☐ Emergency Removal Action
- ☐ Time-Critical Removal Action
- ☐ Non-Time-Critical Removal Action

N/WP
6-2-94
KD

Eisenberg Fill

Ponded water,
western edge of
site

28-15

NWP
6-3-94
KD

Eisenberg Fill

Storm sewer, shows
depth of fill

#28-14

NWP
6-2-94
KD

Eisenberg Fill
Ponded area along
southwest corner

2820

NWP
6-2-94
KD

Eisenberg Fill
Ponding along western
edge of fill

28-21

K/WP
6-2-94
Kd

Eisenberg Fell

To north along
access road

#28-18

GEM

K/WP
6-2-94
KJ

Eisenberg Fell

7/0 south along

access road

#28-17

AWP
6-2-94
1(c)

Eisenberg Fill

View to southeast

from highway

28-22

MO-KAN

H/WP
6-2-94
KD

Eisenberg File
Check-in for MO-Kan

#28-19

HYUNDAI

HWP
KO
6-2-94

Eisenberg Fill

70 west.
Ponded water on fill

#28-16

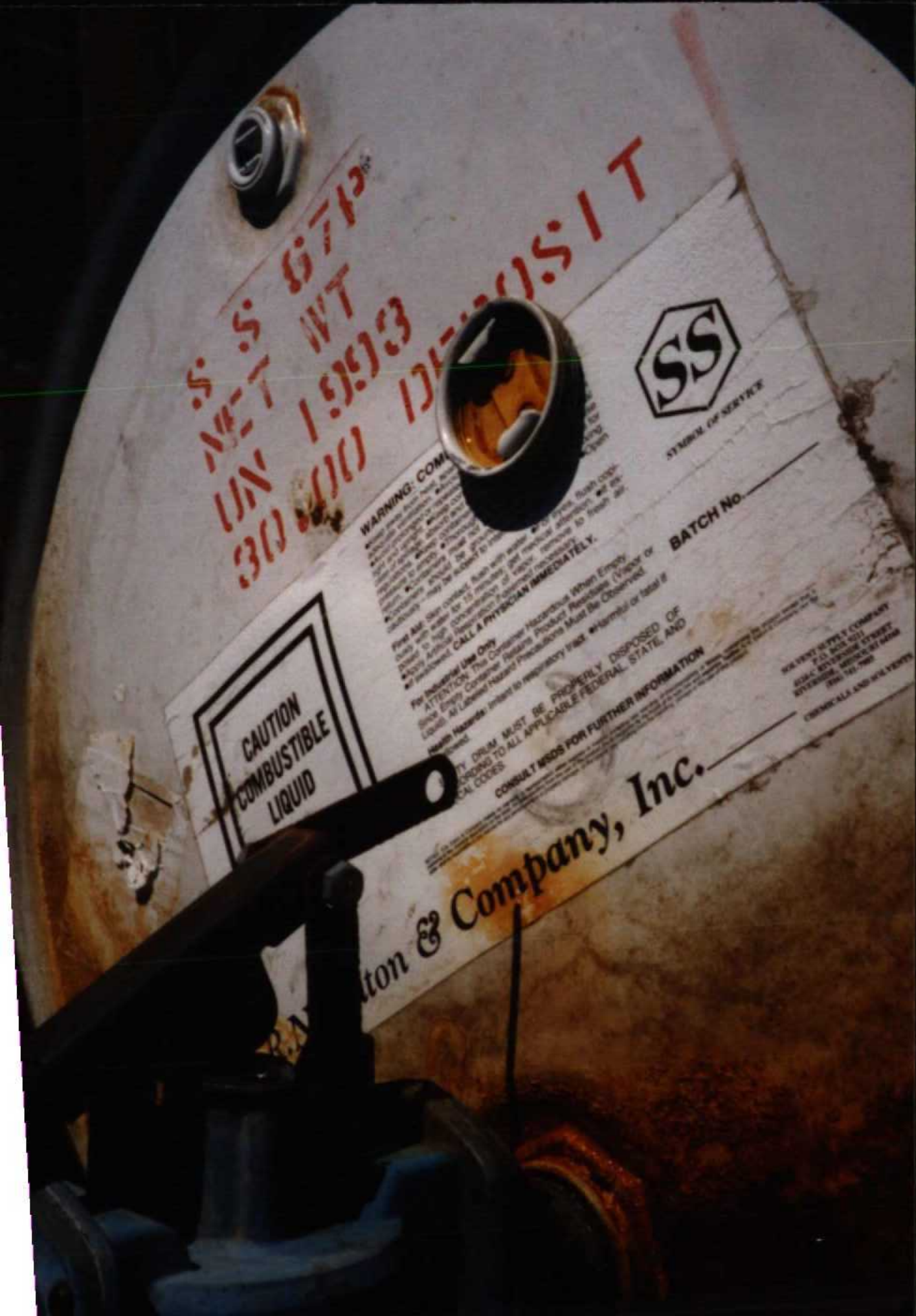
Eisenberg Fill site. North Kansas City, Missouri. Photo taken on 4/27/95 by Julie Bloss, Superfund, MDNR. Interior of pump station, with flow entering from the north - strong sewery smell. #46-8A

JB

Eisenberg Fill site. North Kansas City, Missouri. Photo taken on 4/27/95 by Julie Bloss, Superfund, MDNR. Photo taken from northeast corner of Mo-Kan rental property, looking north/northwest across site. #46-10A

Eisenberg Fill site. North Kansas City, Missouri. Photo taken on 4/27/95 by Julie Bloss, Superfund, MDNR. Pump station, photo taken looking east/northeast. Larry Alderson, ESP, MDNR, in photo. #46-7A

JB



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BATCH No.
CAUTION
COMBUSTIBLE
LIQUID
CONSULT MSDS FOR FURTHER INFORMATION
Company, Inc.

Eisenberg Fill site. North Kansas City, Missouri. Photo taken on 4/27/95 by Julie Bloss, Superfund, MDNR. Drum in use at pump station; can be seen in perspective on #46-7A, right side of photo. #46-9A

JB

Eisenberg Fill site. North Kansas City, Missouri. Photo taken on 4/27/95 by Julie Bloss, Superfund, MDNR. Operational grain silos to the north/northeast of site. #46-13A

Eisenberg Fill site. North Kansas City, Missouri. Photo taken on 4/27/95 by Julie Bloss, Superfund, MDNR. Taken from western side of property, looking southeast. #46-16A

Eisenberg Fill site. North Kansas City, Missouri. Photo taken on 4/27/95 by Julie Bloss, Superfund, MDNR. Photo taken on vacant portion of Eisenberg Fill property. Note caution tape, fire extinguisher (far right), and what appears to be a gas mask (center of photo). #46-12A

Eisenberg Fill site. North Kansas City, Missouri.
Photo taken on 4/27/95 by Julie Bloss, Superfund,
MDNR. Taken from Mo-Kan property, looking south.
#46-18A

JB

Eisenberg Fill site
N KC, MO
Taken 4/27/95 by Julie Bloss, Superfund, MDNR. Taken from northern, vacant portion of site, looking south toward Mo-Kan

#46-14A

Eisenberg Fill site. North Kansas City, Missouri. Photo taken on 4/27/95 by Julie Bloss, Superfund, MDNR. Intermittent surface water drainage along northern edge of property. #46-15A

JB

Eisenberg Fill site. North Kansas City, Missouri. Photo taken on 4/27/95 by Julie Bloss, Superfund, MDNR. Shot typical of vegetated areas of site.
#46-11A

JB

Eisenberg Fill site. North Kansas City, Missouri. Photo taken on 4/27/95 by Julie Bloss, Superfund, MDNR. Mound of gray fill on-site, just north of Mo-Kan rental property boundary. #46-17A

JB

Eisenberg Fill site. North Kansas City, Missouri.
Photo taken on 4/27/95 by Julie Bloss, Superfund,
MDNR. Same rock as #46-19A, close-up. #46-20A

Eisenberg Fill site. North Kansas City, Missouri. Photo taken on 4/27/95 by Julie Bloss, Superfund, MDNR. Unusual gold-colored rock found on vacant lot, just north of Mo-Kan property line. #46-19A

Eisenberg Fill site. North Kansas City, Missouri.
Photo taken on 4/27/95 by Julie Bloss, Superfund,
MDNR. Same as #46-19A and #46-20A.
#46-21A

Eisenberg Fill site. North Kansas City, Missouri. Photo taken on 4/27/95 by Julie Bloss, Superfund, MDNR. Fill area, southern portion of vacant area. Shot looking due west. #46-22A

Eisenberg Fill site. North Kansas City, Missouri. Photo taken on 4/27/95 by Julie Bloss, Superfund, MDNR. Shot from southern portion of vacant area, looking northwest. Photo continued in #46-24A.
#46-23A

Eisenberg Fill site. North Kansas City, Missouri. Photo taken on 4/27/95 by Julie Bloss, Superfund, MDNR. Shot from southern portion of vacant area, looking northwest. Continuation of #46-23A.
#46-24A

Eisenberg Fill Site
(alias: Leo Eisenberg's Property)
MOD985768175
PA/SI Reference 3

LATITUDE AND LONGITUDE CALCULATION WORKSHEET #2
LI USING ENGINEER'S SCALE (1/60)

SITE NAME: Eisenberg Fill Site CERCLIS #: MOD985768175

AKA: Leo Eisenberg's Property SSID:

ADDRESS: I-35 & 16th Street at Armour Road

CITY: North Kansas City STATE: MO ZIP CODE: 64116

SITE REFERENCE POINT: Pond at 16th Street exit from I-35 - Just left

USGS QUAD MAP NAME: North Kansas City MO-Kans. TOWNSHIP: 50 (N)/S RANGE: 33 E(W)

SCALE: 1:24,000 MAP DATE: 1964 SECTION: center of ~~1/4~~ SW 1/4 SW 1/4 of 13

MAP DATUM: (1927) 1983 (CIRCLE ONE) MERIDIAN: 5th Principle

COORDINATES FROM LOWER RIGHT (SOUTHEAST) CORNER OF 7.5' MAP (attach photocopy):

LONGITUDE: 94 ° 30 ' 0 " LATITUDE: 39 ° 07 ' 30 "

COORDINATES FROM LOWER RIGHT (SOUTHEAST) CORNER OF 2.5' GRID CELL:

LONGITUDE: 94 ° 32 ' 30 " LATITUDE: 39 ° 07 ' 30 "

CALCULATIONS: LATITUDE (7.5' QUADRANGLE MAP)

A) NUMBER OF RULER GRADUATIONS FROM LATITUDE GRID LINE TO SITE REF POINT: 148

B) MULTIPLY (A) BY 0.3304 TO CONVERT TO SECONDS:

A x 0.3304 = 48.90 "

C) EXPRESS IN MINUTES AND SECONDS (1'= 60"): 0 ' 49.30 "

D) ADD TO STARTING LATITUDE: 39 ° 07 ' 30 . 0 " + 0 ' 49 . 30 =

SITE LATITUDE: 39 ° 8 ' 19 . 30 "

CALCULATIONS: LONGITUDE (7.5' QUADRANGLE MAP)

A) NUMBER OF RULER GRADUATIONS FROM RIGHT LONGITUDE LINE TO SITE REF POINT: 251

B) MULTIPLY (A) BY 0.3304 TO CONVERT TO SECONDS:

A x 0.3304 = 82.93 "

C) EXPRESS IN MINUTES AND SECONDS (1'= 60"): 1 ' 12 . 93 "

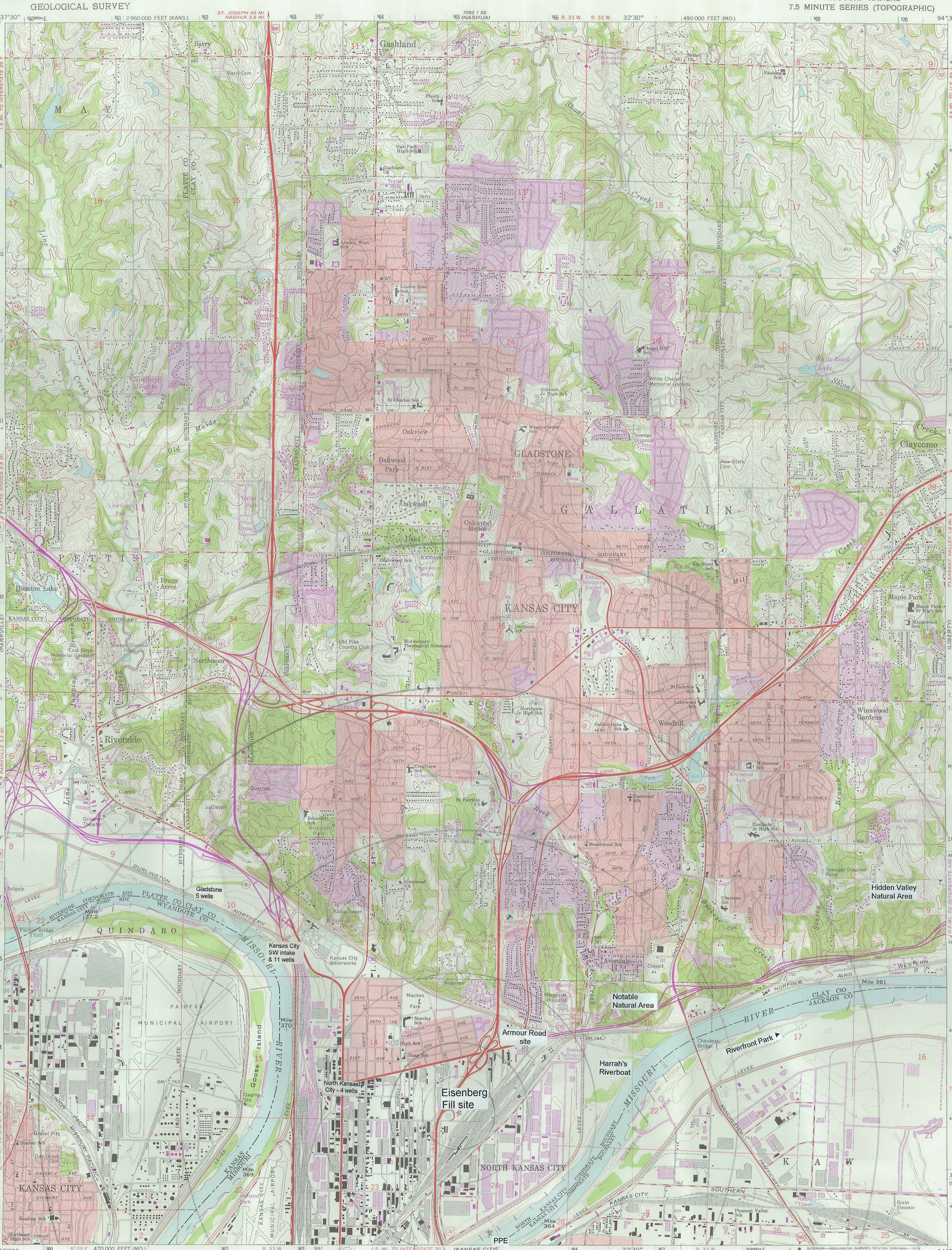
D) ADD TO STARTING LONGITUDE: 94 ° 32 ' 30 . 0 " + 1 ' 12 . 93 =

SITE LONGITUDE: 94 ° 33 ' 42 . 93 "

INVESTIGATOR: John A. Bloss DATE: 8/3/95

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

NORTH KANSAS CITY QUADRANGLE
MISSOURI—KANSAS
7.5 MINUTE SERIES (TOPOGRAPHIC)



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Planimetry by photogrammetric methods from aerial photographs taken 1947. Topography by planetable surveys 1934–35. Revised from aerial photographs taken 1963. Field checked 1964

Polyconic projection. 1927 North American datum
10,000-foot grids based on Missouri coordinate system, west zone and Kansas coordinate system, north zone
1000-metre Universal Transverse Mercator grid ticks, zone 15, shown in blue

Red tint indicates areas in which only landmark buildings are shown

Fine red dashed lines indicate selected fence and field lines where generally visible on aerial photographs. This information is unchecked

UTM GRID AND 1975 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET
DOTTED LINES REPRESENT 5-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092,
AND THE DIVISION OF RESEARCH AND TECHNICAL INFORMATION
MISSOURI DEPARTMENT OF NATURAL RESOURCES, ROLLA, MISSOURI 65401
AND STATE GEOLOGICAL SURVEY, LAWRENCE, KANSAS 66044
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

QUADRANGLE LOCATION

Revisions shown in purple compiled from aerial photographs taken 1970 and 1975. This information not field checked

Purple tint indicates extension of urban areas

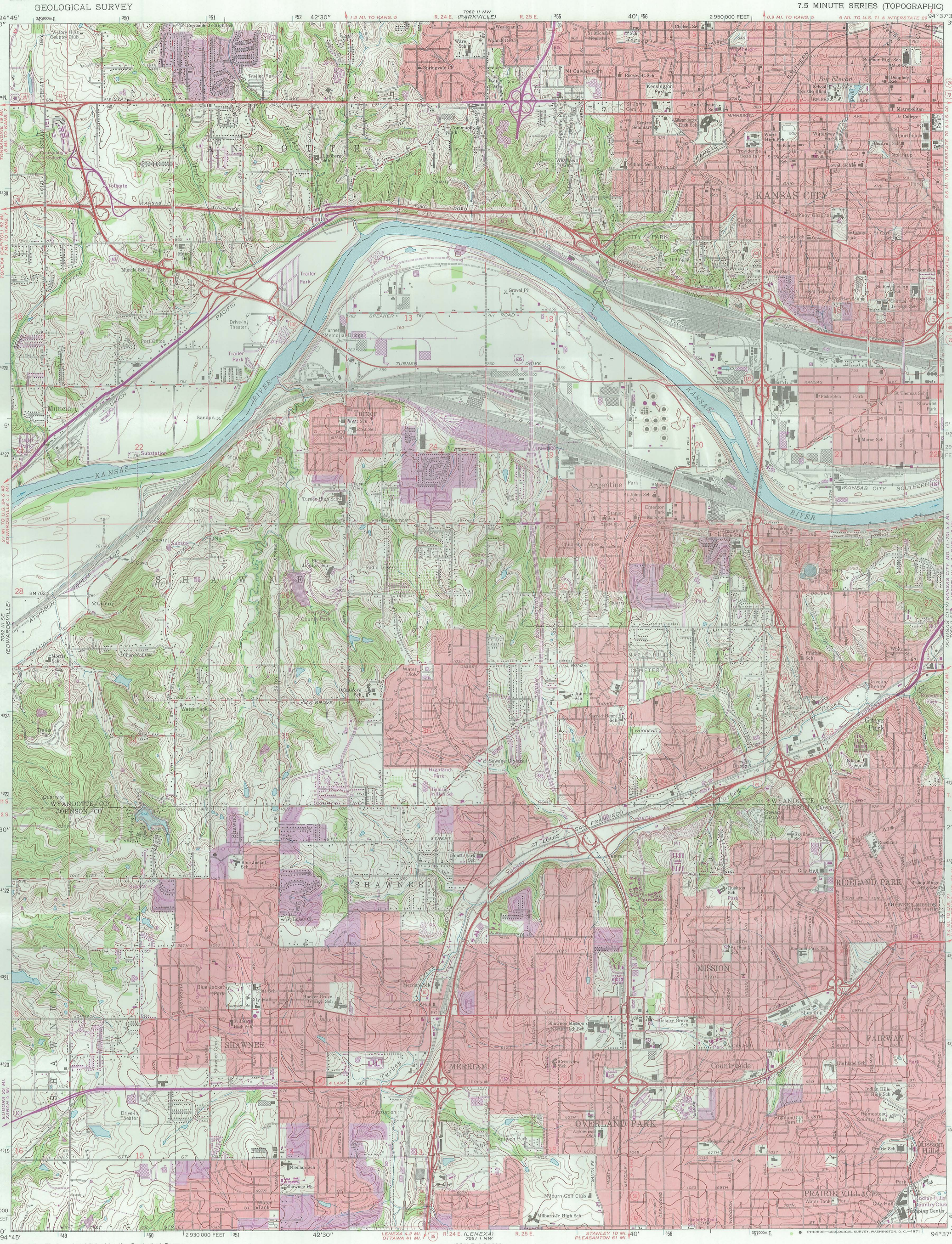
ROAD CLASSIFICATION
Heavy-duty / Light-duty
Medium-duty / Unimproved dirt
Interstate Route / U. S. Route / State Route

NORTH KANSAS CITY, MO.—KANS.
N3907.5—W9430/7.5
1964
PHOTOREVISED 1970 AND 1975
AMS 7062 II NE—SERIES V879

Eisenberg Fill Site
(alias: Leo Eisenberg's Property)
MOD985768175
PA/SI Reference 4
North Central Map

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SHAWNEE QUADRANGLE
KANSAS
7.5 MINUTE SERIES (TOPOGRAPHIC)



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Planimetry by photogrammetric methods from aerial photographs taken 1955. Topography by planetable surveys 1933–34. Revised 1964

Polyconic projection. 1927 North American datum
10,000-foot grid based on Kansas coordinate system, north zone
1000-meter Universal Transverse Mercator grid ticks, zone 15, shown in blue

Red tint indicates areas in which only landmark buildings are shown

Revisions shown in purple compiled from aerial photographs taken 1970. This information not field checked

Purple tint indicates extension of urban areas

UTM GRID AND 1970 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL

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AND BY THE STATE GEOLOGICAL SURVEY, LAWRENCE, KANSAS 66044
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

ROAD CLASSIFICATION
Heavy-duty — Light-duty
Medium-duty — Unimproved dirt
Interstate Route — U. S. Route — State Route

KANSAS
QUADRANGLE LOCATION

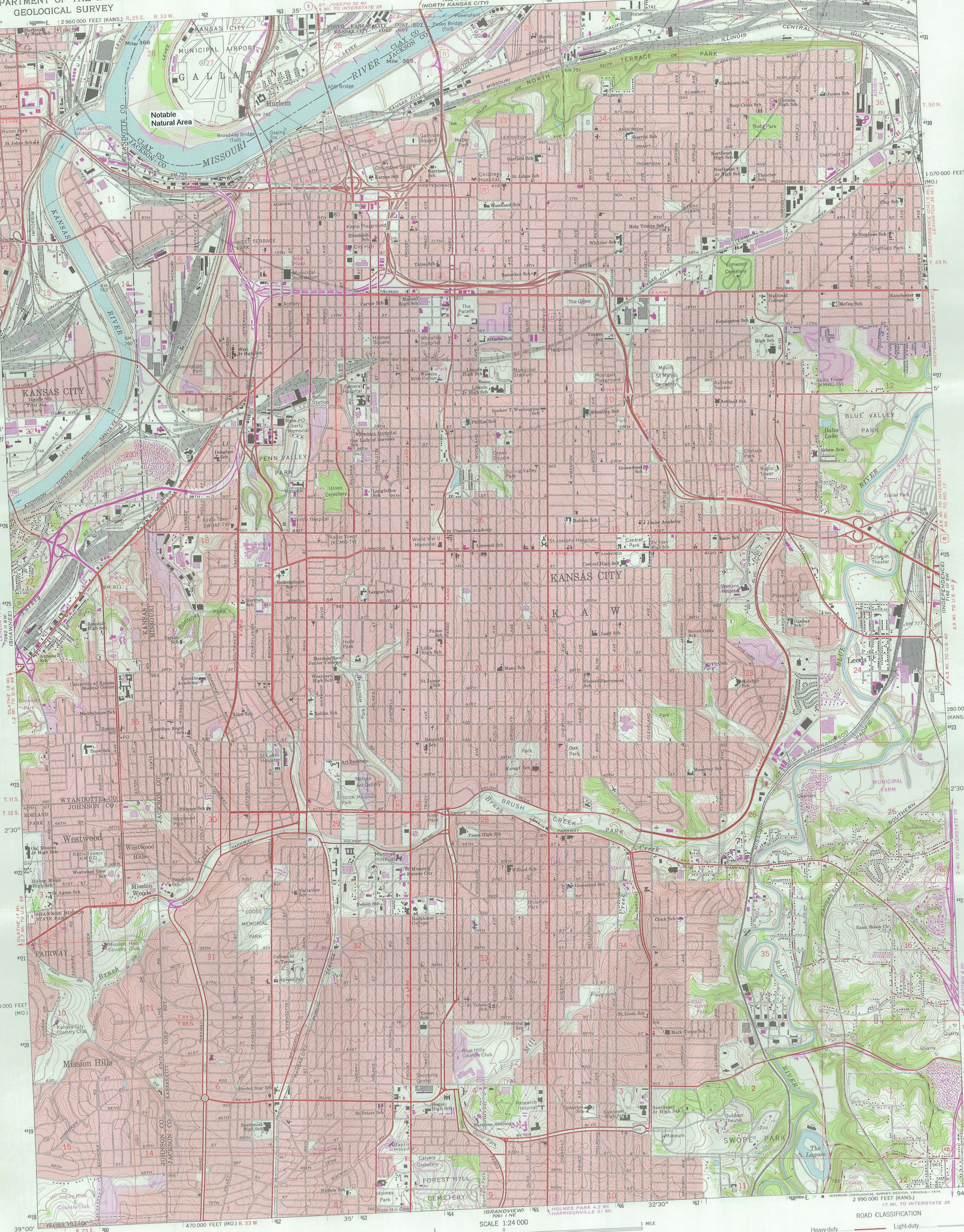
Eisenberg Fill Site
(alias: Leo Eisenberg's Property)
MOD985768175
PA/SI Reference 4
Southwest Map

SHAWNEE, KANS.
N3900—W9437.5/7.5

1964
PHOTOREVISED 1970
AMS 7062 II SW—SERIES V878

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

KANSAS CITY QUADRANGLE
MISSOURI–KANSAS
7.5 MINUTE SERIES (TOPOGRAPHIC)



SCALE 1:24 000

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

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Control by USGS, USC&GS, and USCE

Planimetry by photogrammetric methods from aerial photographs taken 1955. Topography by planetable surveys 1934–35
Revised 1964

Polyconic projection. 1927 North American datum
10,000-foot grids based on Missouri coordinate system, west zone and Kansas coordinate system, north zone
1000-metre Universal Transverse Mercator grid ticks, zone 15, shown in blue

Red tint indicates areas in which only landmark buildings are shown

Revisions shown in purple compiled from aerial photographs taken 1970 and 1975. This information not field checked

Purple tint indicates extension of urban areas

UTM GRID AND 1975 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
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AND THE DIVISION OF RESEARCH AND TECHNICAL INFORMATION
MISSOURI DEPARTMENT OF NATURAL RESOURCES ROLLA, MISSOURI 65401
AND STATE GEOLOGICAL SURVEY, LAWRENCE, KANSAS 66044
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

ROAD CLASSIFICATION
Heavy-duty — Light-duty
Medium-duty — Unimproved dirt
Interstate Route — U. S. Route — State Route

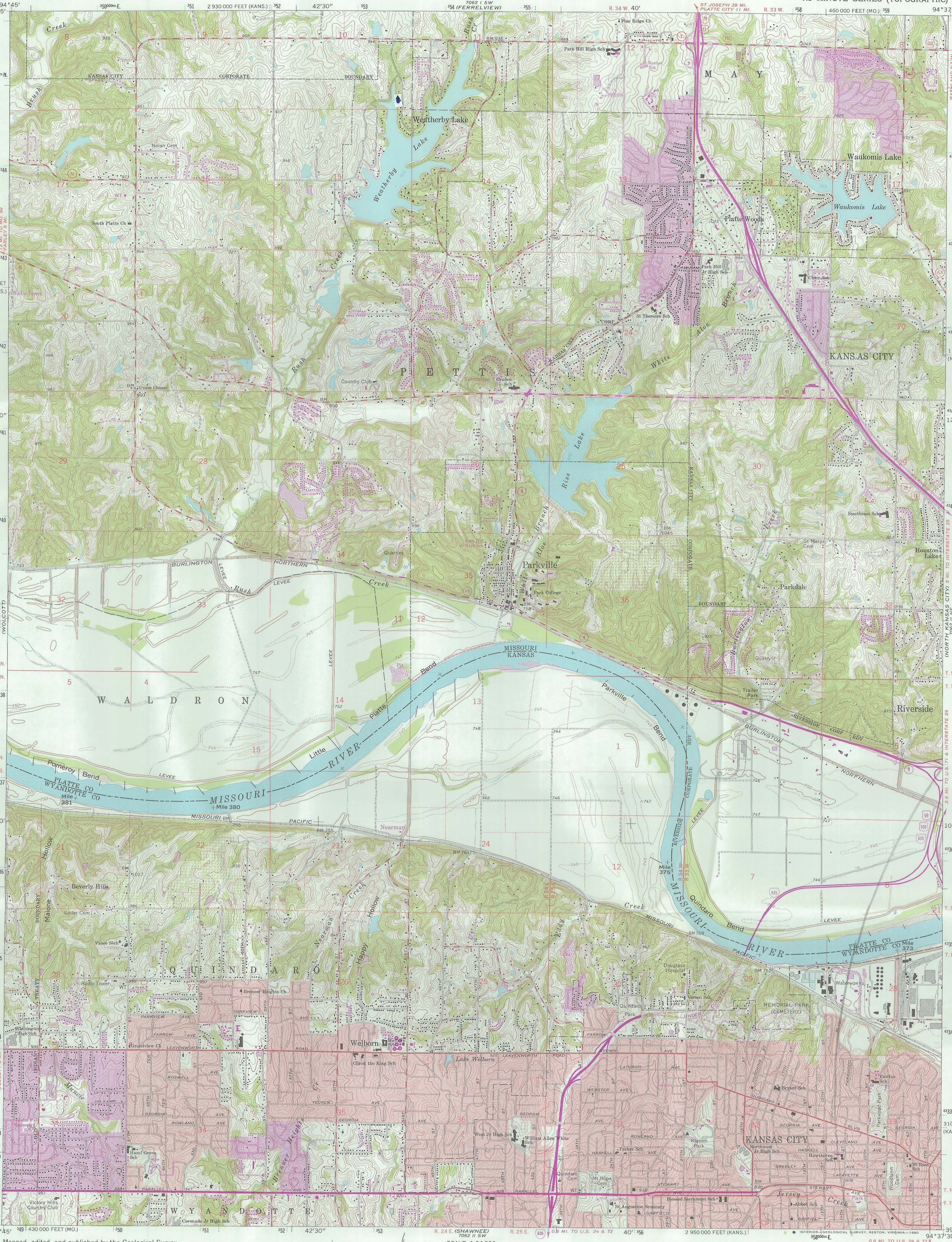
Eisenberg Fill Site
(alias: Leo Eisenberg's Property)
MOD985768175
PA/SI Reference 4
South Central Map

KANSAS CITY, MO.–KANS.
N3900—W9430/7.5

1964
PHOTOREVISED 1970 AND 1975
AMS 7062 II SE—SERIES V879

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

PARKVILLE QUADRANGLE
MISSOURI–KANSAS
7.5 MINUTE SERIES (TOPOGRAPHIC)



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Control by USGS and USC&GS

Topography in Missouri by photogrammetric methods from aerial photographs taken 1947. Field checked 1948. Revised 1964

Topography in Kansas by photogrammetric methods from aerial photographs taken 1963 and planetable surveys 1964

Polyconic projection. 1927 North American datum
10,000-foot grids based on Missouri coordinate system, west zone and Kansas coordinate system, north zone
1000-metre Universal Transverse Mercator grid ticks, zone 15, shown in blue

Red tint indicates area in which only landmark buildings are shown

To place on the predicted North American Datum 1983 move the projection lines 3 meters north and 20 meters east as shown by dashed corner ticks

GN MN
1°04′ 19 MILS
6½° 116 MILS
UTM GRID AND 1975 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

1 MILE: 1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 KILOMETRE: 1 .5 0

CONTOUR INTERVAL 10 FEET
DOTTED LINES REPRESENT 5-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092,
AND THE DIVISION OF GEOLOGY AND LAND SURVEY
MISSOURI DEPARTMENT OF NATURAL RESOURCES, ROLLA, MISSOURI 65401
AND STATE GEOLOGICAL SURVEY, LAWRENCE, KANSAS 66044
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

Eisenberg Fill Site
(alias: Leo Eisenberg's Property)
MOD985768175
PA/SI Reference 4
Northwest Map

MISSOURI
QUADRANGLE LOCATION

Revisions shown in purple compiled from aerial photographs taken 1970 and 1975. This information not field checked

Purple tint indicates extension of urban areas

ROAD CLASSIFICATION

Heavy-duty — Light-duty
Medium-duty — Unimproved dirt
Interstate Route — U. S. Route — State Route

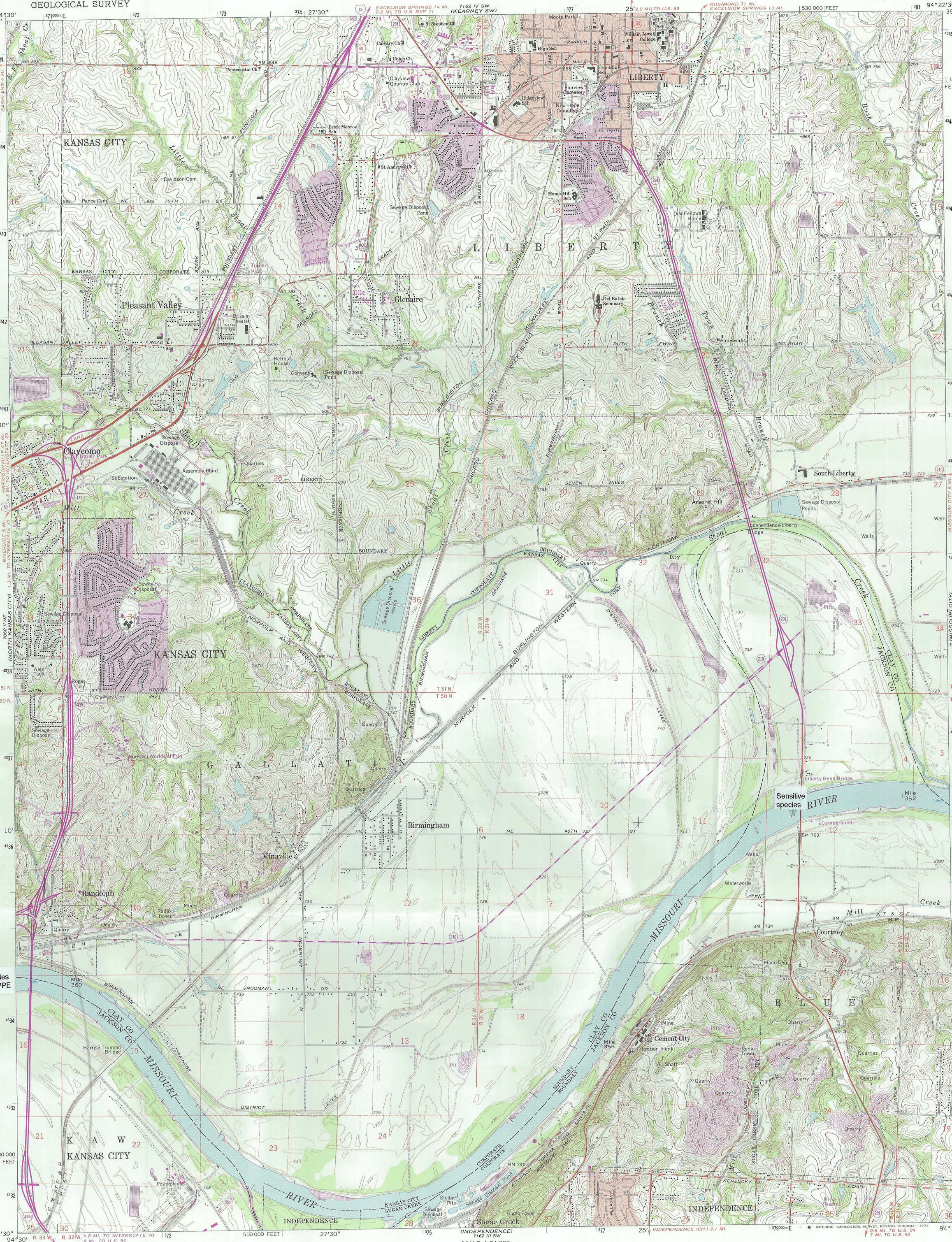
PARKVILLE, MO.–KANS.
N3907.5—W9437.5/7.5

1964
PHOTOREVISED 1970 AND 1975
AMS 7062 II NW—SERIES V879

INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1980

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

LIBERTY QUADRANGLE
MISSOURI
7.5 MINUTE SERIES (TOPOGRAPHIC)



Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography by photogrammetric methods from aerial photographs taken 1963 and planetable surveys 1965
Supersedes map dated 1935

Polyconic projection. 1927 North American datum
10,000-foot grid based on Missouri coordinate system, west zone
1000-metre Universal Transverse Mercator grid ticks, zone 15, shown in blue

Red tint indicates areas in which only landmark buildings are shown

Fine red dashed lines indicate selected fence and field lines where generally visible on aerial photographs. This information is unchecked

Revisions shown in purple compiled from aerial photographs taken 1970 and 1975. This information not field checked

Purple tint indicates extension of urban areas

UTM GRID AND 1975 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
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MISSOURI DEPARTMENT OF NATURAL RESOURCES, ROLLA, MISSOURI 65401
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

ROAD CLASSIFICATION
Heavy-duty — Light-duty
Medium-duty — Unimproved dirt
Interstate Route — U. S. Route — State Route

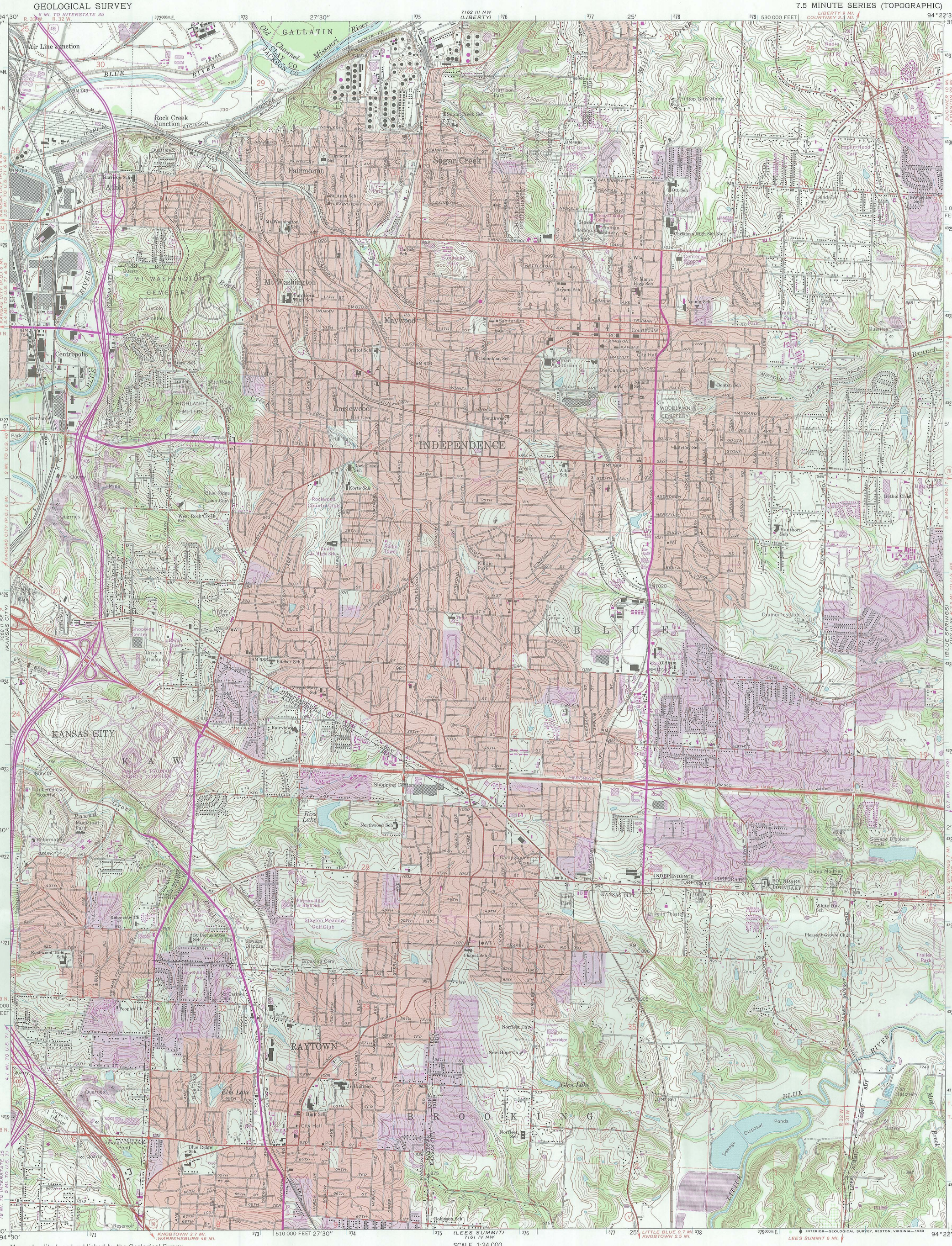
Eisenberg Fill Site
(alias: Leo Eisenberg's Property)
MOD985768175
PA/SI Reference 4
Northeast Map

LIBERTY, MO.
N3907.5—W9422.5/7.5

1965
PHOTOREVISED 1970 AND 1975
AMS 7162 III NW—SERIES V879

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

INDEPENDENCE QUADRANGLE
MISSOURI
7.5 MINUTE SERIES (TOPOGRAPHIC)



Mapped, edited, and published by the Geological Survey
in cooperation with State of Missouri
Geological Survey and Water Resources

Control by USGS, USC&GS, and USCE

Planimetry by photogrammetric methods from aerial photographs taken 1955. Topography by planetable surveys 1934
Revised 1964

Polyconic projection. 1927 North American datum
10,000-foot grid based on Missouri coordinate system, west zone
1000-metre Universal Transverse Mercator grid ticks, zone 15, shown in blue
To place on the predicted North American Datum 1983 move the projection lines 3 meters north and 19 meters east as shown by dashed corner ticks

Red tint indicates areas in which only landmark buildings are shown

MN
GN
0°54′
16 MILS
6½°
116 MILS

UTM GRID AND 1975 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

1 ½ 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETRE

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
AND DIVISION OF GEOLOGY AND LAND SURVEY
MISSOURI DEPARTMENT OF NATURAL RESOURCES, ROLLA, MISSOURI 65401
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

Revisions shown in pu
taken 1970 and 1975

Purple tint indicates e

MISSOURI

Eisenberg Fill Site
(alias: Leo Eisenberg's Property)
MOD985768175
PA/SI Reference 4
Southeast Map

ROAD CLASSIFICATION

Heavy-duty
Medium-duty
Light-duty
Unimproved dirt
Interstate Route
U. S. Route
State Route

INDEPENDENCE, MO.
N3900—W9422.5/7.5

1964
PHOTOREVISED 1970 AND 1975
AMS 7162 III SW—SERIES V879

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MISSOURI CITY QUADRANGLE
MISSOURI
7.5 MINUTE SERIES (TOPOGRAPHIC)

Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography by photogrammetric methods from aerial photographs taken 1963 and planetable surveys 1965
Supersedes map dated 1935–45

Polyconic projection. 1927 North American datum
10,000-foot grid based on Missouri coordinate system, west zone
1000-metre Universal Transverse Mercator grid ticks, zone 15, shown in blue

Fine red dashed lines indicate selected fence and field lines where generally visible on aerial photographs. This information is unchecked

Revisions shown in purple compiled from aerial photographs taken 1970 and 1975. This information not field checked

Purple tint indicates extension of urban areas

UTM GRID AND 1975 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET
DOTTED LINES REPRESENT 5-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
AND BY THE DIVISION OF RESEARCH AND TECHNICAL INFORMATION
MISSOURI DEPARTMENT OF NATURAL RESOURCES, ROLLA, MISSOURI 65401
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

ROAD CLASSIFICATION
Heavy-duty — Light-duty
Medium-duty — Unimproved dirt
U. S. Route — State Route

Eisenberg Fill Site
(alias: Leo Eisenberg's Property)
MOD985768175
PA/SI Reference 4
End of 15-mile target distance

MISSOURI CITY, MO.
N3907.5—W9415/7.5

1965
PHOTOREVISED 1970 AND 1975
AMS 7162 III NE—SERIES V879

File: Eisenberg Fill Site
Superfund Technical

Eisenberg Fill Site
(alias: Leo Eisenberg's Property)
MOD985768175
PA/SI Reference 5

MISSOURI DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
ENVIRONMENTAL SERVICES PROGRAM

RECEIVED
APR 10 1995
HAZARDOUS WASTE PROGRAM
MISSOURI DEPARTMENT OF
NATURAL RESOURCES

Expanded Site Inspection Sampling Plan
Eisenberg Fill Site
Kansas City, MO

INTRODUCTION

At the request of the Missouri Department of Natural Resources (MDNR), Hazardous Waste Program (HWP), Site Evaluation Unit, the MDNR, Environmental Services Program (ESP) will conduct sampling as part of an expanded site inspection of the Eisenberg Fill Site in Kansas City, Missouri. Information learned from field observations and sampling will be used to assist the HWP in scoring the site's potential as a hazardous waste site under the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Hazard Ranking System.

The Eisenberg Fill Site is located along the Missouri River flood plain in Kansas City, Missouri. The general area under investigation is in the NW 1/4, SW 1/4, Sec. 13, T50N, R33W, Clay County.

SITE DESCRIPTION AND HISTORY

On April 6, 1988, the Emergency Planning and Response Branch of the Environmental Protection Agency (EPA), Region VII, received a call from Mr. Terry Williams, North Kansas City Fire Department, reporting several pools of an unknown liquid in a fill near the intersection of 16th Street and Interstate 35. A subsequent investigation by EPA revealed three puddles of dark stained water at the northeast corner of the property along the west side of a drive that leads to a city animal shelter.

As a result of the EPA investigations, a preliminary assessment and site inspection was conducted to determine if the site may score under the Hazard Ranking System. Samples collected during the site inspection revealed the presence of base/neutral compounds as well as confirming the presence of vanadium and barium.

Subsequent investigations were made by Peter Fulweiler of the Kansas City Regional Office on September 28, 1990, and by Al Wallen of the HWP on June 3, 1993. Both subsequent investigators indicated that they were unclear as to the location of the original samples, the source of the materials found, or the extent of the contamination.

SITE RECONNAISSANCE

Due to the number of questions concerning the current condition of the site, a reconnaissance was conducted. ESP Environmental Specialist Larry Alderson and HWP Environmental Specialist Kristine Davidson visited the site on June 3, 1994. The following observations were made during the reconnaissance:

1) The site is located on the east side of Interstate 35 and north of 16th Street just west of a large rail yard in North Kansas City, Clay County, Missouri, and consists of a large level lot (approximately five acres) that has been built up to its existing elevation by the use of construction debris as fill (see map attached as Appendix A).

2) The fill area was being used by a container company and many large ship/rail type containers were staged in rows. Areas of new gravel and recent grading were noted between the rows.

3) Recent rains and bare unvegetated soil caused the site to be muddy. Standing water was observed in the drainage along the west border of the fill and water covered much of the fenced area used as an animal shelter by the city. The sound of water falling into a deep hole, as if into a storm sewer, could be heard near a large wooden box located just inside the fenced area, although no opening could be seen. A drainage east of the animal shelter also contained water that appeared to flow to the north. There were no pools, however, in the area initially reported to EPA.

4) A sewer manhole is located along the road just south of the area where the dark pools were originally discovered. A line runs northeast from the manhole under the area of concern. It is not known whether the sewer line existed at the time of the initial report of the pools.

SAMPLING STRATEGIES

A judgmental sampling approach will be utilized at the Eisenberg site to collect surface water, sediment, surface soil, and sub-surface soil samples.

Surface water and sediment samples should be collected from the drainages along the west and east sides of the site, and any pools that may be present at or near the site where the original pools existed.

Soil samples should be collected in the area of the original pools and at least one additional area within the fill. A backhoe should be utilized to allow for easy access to soils at various depths within the fill area. Soil samples will be collected from the top two feet of the fill and at the interface between the fill and the native soil, if it can be determined. If water is encountered during the excavations, groundwater samples should also be collected.

Background samples will be collected of all medias. The background samples will be taken from an area that is known or expected to be contaminant free and that is similar in formation and depth to that of the original samples.

Exact locations of the samples will be determined in the field based on observations and site conditions.

Based on previous sampling conducted and the history of the site, all samples will be submitted for base neutrals/acid extractables (BNAs) and total metals (Ag, As, Ba, Cd, Cr, Hg, Pb, Se, V) analyses. If total metals or BNA results are twenty times 80% of the Toxicity Characteristic Leaching Procedure (TCLP) regulatory limit, TCLP analysis will be performed on that sample.

Sampling Technique

Water Grabs:

Water grab samples will be collected by immersing the sample containers directly into the water being sampled.

Sediment Grabs:

Sediment grab samples will be collected using clean stainless steel spoons and placed into sample containers.

Soil Grabs:

Soil grab samples will be collected from the excavation using clean stainless steel spoons or trowels. The outside or top layer of soil will be scraped off and the soil immediately beneath will be collected into a clean aluminum foil pan, homogenized, and placed into the appropriate sample containers.

The approximate number of samples to be collected are as follows (subject to change based on field conditions and observations):

Soil grabs - 9	Surface water grabs - 5
Groundwater grabs - 2	Sediment grabs - 3

The above estimate includes QA/QC (Quality Assurance/Quality Control) samples.

Sample Container and Preservation Requirements:

Water samples:

Parameter	Container(s)/Volume	Preservative(s)	HoldingTimes
Base Neutrals/ Acid Extractables	Two 1-liter glass amber jars	Cool, solvent rinsed containers	7 days to extract
Total metals	One 1-liter cubitainer	Cool, HNO_3 to pH <2	6 months

pH - Determined in the field

Sediment/Soil samples:

Parameter	Container(s)/Volume	Preservative(s)	Holding Times
Base Neutrals/ Acid Extractables	One 4-oz glass jar	Cool, solvent rinsed container	7 days to extract
Total Metals	One 4-oz glass jar	Cool	6 months

All samples will either be collected in pre-preserved sample containers or preserved in the field as appropriate.

Each sample will receive a numbered tag and the corresponding number entered onto a chain-of-custody form indicating the location, date, and time of collection as well as parameters to be analyzed. Samples will be stored and transported on ice in coolers. Custody of the samples will be maintained by ESP field personnel until relinquishing the samples to personnel at the state's environmental laboratory within the Environmental Services Program in Jefferson City for analyses.

DATA QUALITY OBJECTIVES

To help ensure precise, accurate, representative, complete, and comparable data are achieved, ESP field personnel will consistently use the following protocols for sampling conducted at the Eisenberg Fill Site.

Clean disposable gloves will be worn by sampling personnel for each sample collected.

Clean or field decontaminated equipment will be utilized for all sample collections.

Field decontamination, if required, will be accomplished by washing the equipment using a non-phosphate detergent and potable water solution, followed by a tap water rinse, a 10% nitric acid rinse, a deionized water rinse, a methanol rinse, a hexane rinse, and a final deionized water rinse. Equipment will be stored on clean plastic, allowed to air dry, and wrapped in foil until used again. If it is required that field decontaminated equipment be used for sampling, an equipment rinsate blank will be collected to ensure no cross contamination has occurred between samples.

Samples will be accompanied by a trip blank to ensure cross contamination does not occur during sample transport. In addition, at least one duplicate sample will be collected for each media sampled. Duplicate samples will be collected simultaneously using the same techniques as are used to collect the true samples.

INVESTIGATION DERIVED WASTE (IDW)

Efforts will be made to minimize IDW generation. IDW may include soil, sediment, aqueous liquids (groundwater, surface water, wastewater), decontamination fluids, disposable sampling equipment, and disposable personnel protective equipment (PPE).

Field personnel will make every attempt to return soils, sediments, and sludges to their source immediately after generation. Disposable PPE will generally be treated and disposed as solid waste. Decontamination fluids may be discharged on-site, discharged to a publicly owned treatment works, or may be containerized and transported back to the ESP for proper disposal.

SAFETY PROTOCOL

Protective gloves and boots should be worn when working with potentially contaminated samples.

A site safety plan has been prepared and is attached as Appendix B. All personnel involved with sampling will be required to read and initial the safety plan prior to starting work.

All personnel working at the site should have a current annual physical and be trained in the handling of hazardous materials.

REPORTING

The analytical results of the samples collected will be presented, along with methods of sample collection and observations, in a formal report to be submitted to the HWP.

Submitted by:

Larry Alderson
Supervisor
Superfund Unit
Environmental Services Program

Date: 4-5-95

Approved by:

Douglas N. Edwards
Supervisor
Field Services Section
Environmental Services Program

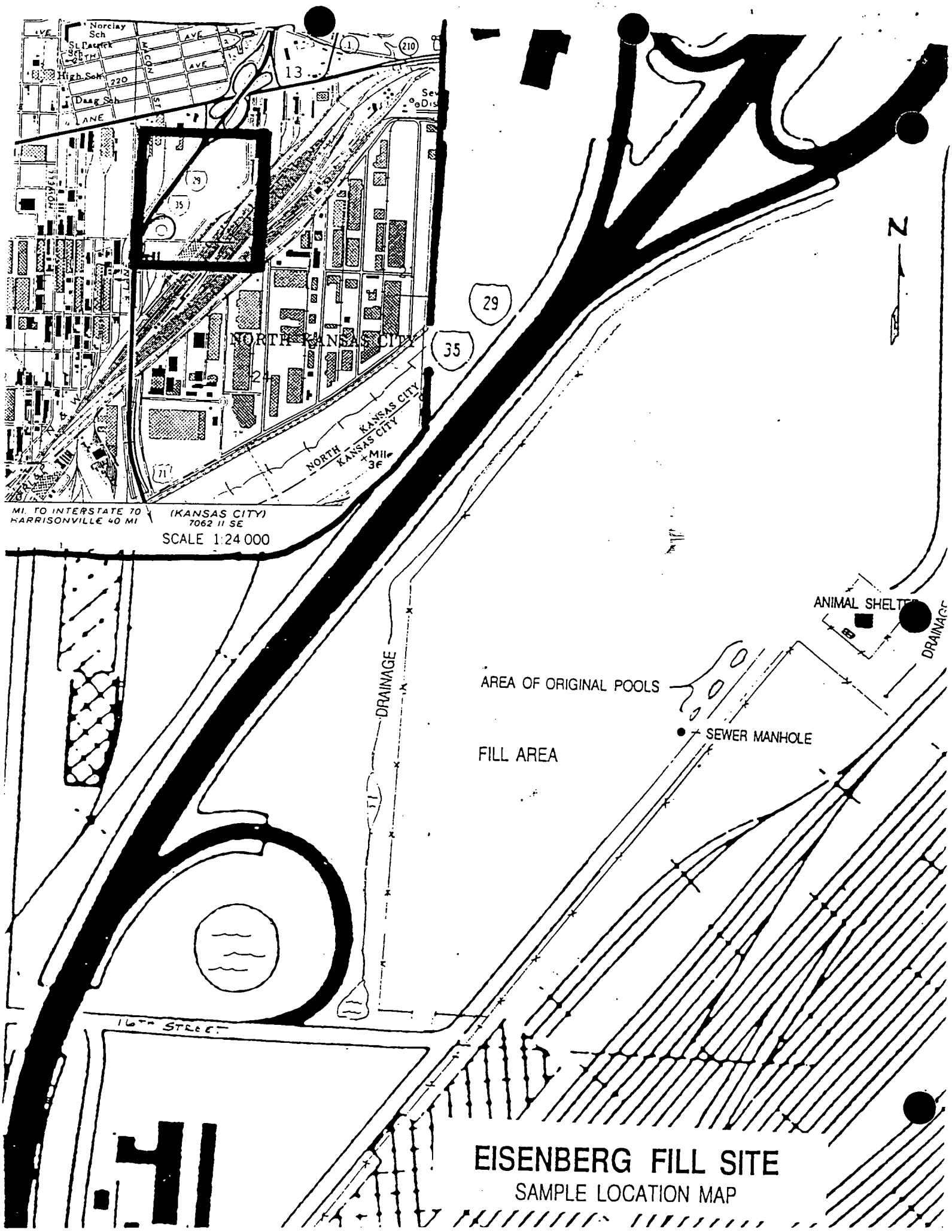
DE:lad

c: Kris Davidson, Environmental Specialist, HWP
James Macy, Regional Director, Kansas City Regional Office

APPENDIX A

Site Map

Eisenberg Fill Site
Kansas City, Missouri



EISENBERG FILL SITE
SAMPLE LOCATION MAP

APPENDIX B

Site Safety Plan

Eisenberg Fill Site
Kansas City, Missouri

SAFETY OUTLINE
(Use back of page to complete items)
(Attach pertinent documents)

County: JACKSON
Site/Location: Eisenberg Fill

Date Prepared: 03/08/95 Date Used: _____

		Initials		Initials
1. Prepared by:	Larry Alderson	LDA		
for:				

2. Purpose of Activity and Procedures: To collect samples for analyses to be used in scoring the site's potential as a hazardous waste site.

3. Material(s): Heavy metals and BNA's contaminated soil and water

4. Possible Hazards: Contact with hazardous materials associated with heavy metals and base neutrals.

5. Personnel Monitoring: All sampling personnel will be involved in a medical monitoring program and be current. Air monitoring will be conducted for volatile organic vapors during sampling. If vapors are encountered three times above background, personnel will be required to leave the area until levels decrease.

6. Site Monitoring: A PID will be used to monitor vapors during soil excavation.

7. Protective Level: A B C D

8. Protective Gear:

	Use	Expended		Use	Expended
Steel toed rubber boots	X		full face respirator	X	
gloves, latex, inner	X		resp. cart.	X	
gloves, nitrile, outer	X				
suit, tyvek	X				
tape joints	X				
SCBA					

9. Decontamination Procedures: Personnel will utilize boots, gloves, and protective clothing during sampling. Personnel will wash hands upon departing the site and properly containerize and dispose of spent equipment.

10. Precautions, Site Control, Emergency Exit: Environmental hazards will be evaluated on site and discussed in the on site H & S meeting. Only personnel who have read and initialed this outline will be involved in sample collection. Emergency exit will be to 16th St.

11. Hospital Location: _____ Ambulance # 911
Police#: 911, Fire#: 911, Poison Control#: _____

Eisenberg Fill Site
(alias: Leo Eisenberg's Property)
MOD985768175
PA/SI Reference 6

DEPARTMENT OF NATURAL RESOURCES
Division of Environmental Quality

TELEPHONE OR CONFERENCE RECORD

FILE: Eisenberg Fill site
Superfund technical file

DATE: April 18, 1995

TELEPHONE:

Incoming ( )
Outgoing (X)

CONFERENCE:

Field ( )
Office ( )

SUBJECT: Requesting permission for sampling at the Eisenberg Fill site

PERSONS INVOLVED:

NAME	REPRESENTING
Ms. Julie A. Bloss	MDNR/HWP/Superfund
Ms. Carol Seyller	Mo-Kan Container Service (816) 421-3100

SUMMARY OF CONVERSATION:

I spoke with Ms. Carol Seyller about the Eisenberg Fill site located north of 16th street, east of I-35, in Kansas City, Missouri. Mo-Kan Container Service leases 10 acres of the 30 acre Eisenberg Fill site. Ms. Seyller said that Mo-Kan Container Service is located at 1620 Railroad Avenue and leases the property from NT Realty (816-221-2300).

ACTION TAKEN:

Ms. Seyller granted permission for the Missouri Department of Natural Resoures (MDNR) to sample the property Mo-Kan Container is leasing. She wanted to know if we would be bringing equipment on-site that would disrupt normal operation of the facility. I said that I did not think so, that I anticipated us taking several soil samples from the 0-2 foot depth using a pick and that we would likely collect several surface water/sediment samples.

I asked Ms. Seyller if we were to report in to anyone on-site. She asked that we report in to Mr. Tom Vodde, the yard manager (816-421-5008). I told Ms. Seyller that I would call her if MDNR's plans changed.

Julie A. Bloss
Julie A. Bloss
Environmental Specialist

JAB:dal

c: Mr. Larry Alderson, ESP

Eisenberg Fill Site
(alias: Leo Eisenberg's Propety)
MOD985768175
PA/SI Reference 7

MISSOURI DEPARTMENT OF NATURAL RESOURCE
DIVISION OF ENVIRONMENTAL QUALITY
LABORATORY SERVICES PROGRAM

Site Investigation Sampling Report
Leo Eisenberg's Property
Kansas City, MO

Information received by the Missouri Department of Natural Resources (MDNR) indicates that wastes may have been disposed of on the property of Mr. Leo Eisenberg in Clay County at Kansas City, Missouri. As part of a Site Investigation (SI) requested by the Waste Management Program (WMP), sampling was conducted by Larry Alderson and Larry Coen of the Laboratory Services Program accompanied by John Schofield of the Kansas City Regional Office on July 25, 1989. The results of the sampling will aid the WMP in scoring the site according to the Hazard Ranking System (HRS).

SITE DESCRIPTION & HISTORY

On April 6, 1988, the Emergency Planning and Response Branch of EPA received a call from the Kansas City Fire Department reporting several pools of an unknown liquid in a fill near the intersection of 16th Street and Interstate 35. A subsequent investigation by EPA revealed three puddles of dark stained water at the base of the northeast corner of the fill area. The results of a sample collected by EPA indicated the presence of vanadium and arsenic.

METHODS

Composited sediment samples were collected and thoroughly mixed with the aid of stainless steel spoons and placed into one pint glass containers. Water samples were collected by submerging the appropriate containers below the surface of the water until they were full.

Each sample was given a numbered tag at the time of collection and a corresponding number was recorded on a chain-of-custody sheet. All samples were hand delivered to the Divisional Laboratory in Jefferson City for analyses of volatile organics, total metals (Ba, Hg, Ag, Cd, Cr, Pb, Se, As and V) and base/neutrals.

OBSERVATIONS

Only two small shallow pools, approximately six feet in diameter and five or six inches deep, were found at the site during this investigation (see sample location map attached as Appendix A). Both pools contained a chocolate brown colored water. The presence of the pools seemed unusual considering that there had not been any recent rainfall in the area and that the area was made-up, to a large extent, of rock and gravel fill. Several midge or mosquito larva were observed swimming in the pool from which the water sample, 89-1738, was collected.

A sediment sample, 89-1736, was collected from the pool area. A background or upgradient sediment sample, 89-1737, was also collected approximately 50 feet south of the pools. Core samples were not collected during this investigation because the rock and gravel fill in the area of the pools did not allow for the use of hand augers.

DATA REPORTING

The analytical results of samples collected during this Site Investigation are attached as Appendix B.

Submitted by: Larry Alderson

Larry D. Alderson
Environmental Emergency Specialist
Field Services Section
Laboratory Services Program

Date: January 24, 1990

Approved by: James H. Long

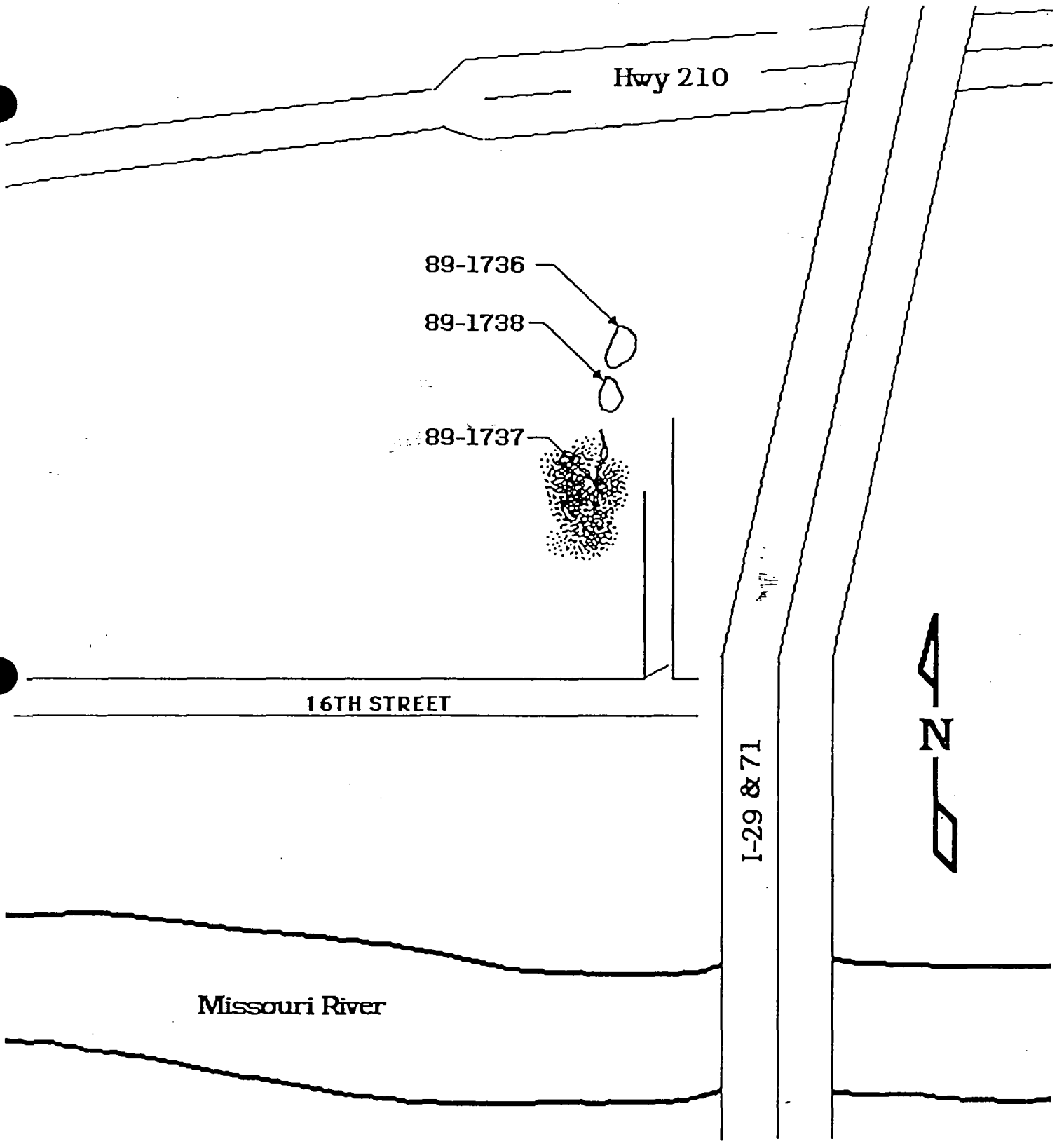
James H. Long
Director
Laboratory Services Program

JHL:lad

cc: Keith Schardein, Superfund Section Chief, Waste Management Program
Jim McConathy, Regional Administrator, Kansas City Regional Office

APPENDIX A

Sample Location Sketch
Leo Eisenberg's Property
Kansas City, MO



Leo Eisenberg's Property

Sample location sketch
July 25, 1989

not to scale

APPENDIX B

Analytical Results
Leo Eisenberg's Property
Kansas City, MO

LABORATORY SERVICES PROGRAM
RESULT OF SAMPLE ANALYSIS

Sample No. 89-1736

Reported to: LARRY ALDERSON
Affiliation: EER

Date: 12/07/89
Project Code: 3535/3000

Sample Description:
LEO EISENBERG'S PROPERTY
SEDIMENT SAMPLE FROM POOL AREA

Collected by: LARRY ALDERSON
Affiliation: EER

Date: 07/25/89

PARAMETERS	RESULTS
TOTAL SILVER COMMENTS : Dry Weight	170 ug/Kg
TOTAL BARIUM COMMENTS : Dry Weight	140,000 ug/Kg
TOTAL CADMIUM COMMENTS : Dry Weight	3600 ug/Kg
TOTAL CHROMIUM COMMENTS : Dry Weight	10,000 ug/Kg
TOTAL MERCURY	1500 ug/Kg
TOTAL LEAD COMMENTS : Dry Weight	84,000 ug/Kg
TOTAL SELENIUM COMMENTS : Dry Weight	200 ug/Kg
TOTAL VANADIUM	85,000 ug/Kg Dry Weight
Acrolein	Not analyzed
Acrylonitrile	Not analyzed
Acetone	< 100 ug/Kg
Benzene	< 25 ug/Kg

Sample no. 89-1736
Date 12/07/89

PARAMETERS	RESULTS
Bromomethane	< 25 ug/Kg
Bromodichloromethane	< 25 ug/Kg
Bromoform	< 25 ug/Kg
2-Butanone	< 100 ug/Kg
Carbon Disulfide	< 25 ug/Kg
Carbon Tetrachloride	< 25 ug/Kg
Chlorobenzene	< 25 ug/Kg
Chloroethane	< 25 ug/Kg
2-Chloroethylvinyl ether	Not Analyzed
Chloroform	< 25 ug/Kg
Chloromethane	< 25 ug/Kg
Dibromochloromethane	< 25 ug/Kg
1,1-Dichloroethane	< 25 ug/Kg
1,2-Dichloroethane	< 25 ug/Kg
1,1-Dichloroethylene	< 25 ug/Kg
1,2-Dichloroethylene	< 25 ug/Kg
1,2-Dichloropropane	< 25 ug/Kg
cis-1,3-Dichloropropene	< 25 ug/Kg
trans-1,3-Dichloropropene	< 25 ug/Kg
Ethylbenzene	< 25 ug/Kg
2-Hexanone	< 100 ug/Kg
Methylene Chloride	< 100 ug/Kg
4-Methyl-2-Pentanone	< 100 ug/Kg
Styrene	< 25 ug/Kg
1,1,2,2-Tetrachloroethane	< 25 ug/Kg
Tetrachloroethylene	< 25 ug/Kg
1,1,1-Trichloroethane	< 25 ug/Kg
1,1,2-Trichloroethane	< 25 ug/Kg
Trichloroethylene	< 25 ug/Kg
Trichlorofluoromethane	Not analyzed
Toluene	< 25 ug/Kg
Total Xylenes	< 50 ug/Kg
Vinyl Acetate	< 100 ug/Kg
Vinyl Chloride	< 25 ug/Kg

COMMENTS: Analyzed by GC/MS at the Missouri Department of Natural Resources Laboratory.

Acenaphthene	< 500 ug/Kg
Acenaphthylene	< 500 ug/Kg

Page 3
Sample no. 89-1736
Date 12/07/89

PARAMETERS	RESULTS
Aniline	Not Analyzed
Anthracene	< 500 ug/Kg
Benzo(a)anthracene	3800 ug/Kg
Benzo(a)pyrene	3800 ug/Kg
Benzo(b)fluoranthene	7400 ug/Kg
Benzo(ghi)perylene	3500 ug/Kg
Benzoic acid	Not Analyzed
Benzo(k)fluoranthene	< 500 ug/Kg
Benzyl alcohol	Not Analyzed
Bis(2-chloroethoxy)methane	< 500 ug/Kg
Bis(2-chloroethyl)ether	< 500 ug/Kg
Bis(2-chloroisopropyl)ether	< 500 ug/Kg
Bis(2-ethylhexyl)phthalate	600 ug/Kg
4-Bromophenyl phenyl ether	< 500 ug/Kg
Butyl benzyl phthalate	< 500 ug/Kg
4-Chloroaniline	Not Analyzed
2-Chloronaphthalene	< 500 ug/Kg
4-Chlorophenyl phenyl ether	< 500 ug/Kg
Chrysene	5100 ug/Kg
Dibenzo(a,h)anthracene	< 500 ug/Kg
Dibenzofuran	Not Analyzed
1,2-Dichlorobenzene	< 500 ug/Kg
1,3-Dichlorobenzene	< 500 ug/Kg
1,4-Dichlorobenzene	< 500 ug/Kg
3,3-Dichlorobenzidine	< 5000 ug/Kg
Diethylphthalate	< 500 ug/Kg
Dimethylphthalate	< 500 ug/Kg
Di-N-Butylphthalate	< 500 ug/Kg
2,4-Dinitrotoluene	< 500 ug/Kg
2,6-Dinitrotoluene	< 500 ug/Kg
Di-n-octyl phthalate	< 500 ug/Kg
Fluoranthene	7600 ug/Kg
Fluorene	< 500 ug/Kg
Hexachlorobenzene	< 500 ug/Kg
Hexachlorobutadiene	< 500 ug/Kg
Hexachlorocyclopentadiene	< 500 ug/Kg
Hexachloroethane	< 500 ug/Kg
Indeno(1,2,3-cd)pyrene	3000 ug/Kg
Isophorone	< 500 ug/Kg

Sample no. 89-1736
Date 12/07/89

PARAMETERS	RESULTS
2-Methylnaphthalene	Not Analyzed
Naphthalene	< 500 ug/Kg
2-Nitroaniline	Not Analyzed
3-Nitroaniline	Not Analyzed
4-Nitroaniline	Not Analyzed
N-Nitrosodimethylamine	< 500 ug/Kg
N-Nitrosodi-n-propylamine	< 500 ug/Kg
N-Nitrosodiphenylamine	< 500 ug/Kg
Phenanthrene	3900 ug/Kg
Pyrene	9500 ug/Kg
1,2,4-Trichlorobenzene	< 500 ug/Kg

COMMENTS: Analyzed by GC/MS at Continental Analytical Services, Inc.

LABORATORY SERVICES PROGRAM
RESULT OF SAMPLE ANALYSIS

Sample No. 89-1737

Reported to: LARRY ALDERSON
Affiliation: EER

Date: 12/07/89
Project Code: 3535/3000

Sample Description:
LEO EISENBERG'S PROPERTY
SEDIMENT SAMPLE UPGRADIENT OF POOL AREA

Collected by: LARRY ALDERSON
Affiliation: EER

Date: 07/25/89

PARAMETERS	RESULTS
TOTAL SILVER COMMENTS : Dry Weight	72 ug/Kg
TOTAL BARIUM COMMENTS : Dry Weight	200,000 ug/Kg
TOTAL CADMIUM COMMENTS : Dry Weight	2300 ug/Kg
TOTAL CHROMIUM COMMENTS : Dry Weight	12,000 ug/Kg
TOTAL MERCURY	850 ug/Kg
TOTAL LEAD COMMENTS : Dry Weight	38,000 ug/Kg
TOTAL SELENIUM COMMENTS : Dry Weight	120 ug/Kg
TOTAL VANADIUM	17,000 ug/Kg Dry Weight
Acrolein	Not analyzed
Acrylonitrile	Not analyzed
Acetone	< 100 ug/Kg
Benzene	< 25 ug/Kg

Sample no. 89-1737
Date 12/07/89

PARAMETERS	RESULTS
Bromomethane	< 25 ug/Kg
Bromodichloromethane	< 25 ug/Kg
Bromoform	< 25 ug/Kg
2-Butanone	< 100 ug/Kg
Carbon Disulfide	< 25 ug/Kg
Carbon Tetrachloride	< 25 ug/Kg
Chlorobenzene	< 25 ug/Kg
Chloroethane	< 25 ug/Kg
2-Chloroethylvinyl ether	Not Analyzed
Chloroform	< 25 ug/Kg
Chloromethane	< 25 ug/Kg
Dibromochloromethane	< 25 ug/Kg
1,1-Dichloroethane	< 25 ug/Kg
1,2-Dichloroethane	< 25 ug/Kg
1,1-Dichloroethylene	< 25 ug/Kg
1,2-Dichloroethylene	< 25 ug/Kg
1,2-Dichloropropane	< 25 ug/Kg
cis-1,3-Dichloropropene	< 25 ug/Kg
trans-1,3-Dichloropropene	< 25 ug/Kg
Ethylbenzene	< 25 ug/Kg
2-Hexanone	< 100 ug/Kg
Methylene Chloride	< 100 ug/Kg
4-Methyl-2-Pentanone	< 100 ug/Kg
Styrene	< 25 ug/Kg
1,1,2,2-Tetrachloroethane	< 25 ug/Kg
Tetrachloroethylene	< 25 ug/Kg
1,1,1-Trichloroethane	< 25 ug/Kg
],1,2-Trichloroethane	< 25 ug/Kg
Trichloroethylene	< 25 ug/Kg
Trichlorofluoromethane	Not analyzed
Toluene	< 25 ug/Kg
Total Xylenes	< 50 ug/Kg
Vinyl Acetate	< 100 ug/Kg
Vinyl Chloride	< 25 ug/Kg

COMMENTS: Analyzed by GC/MS at the Missouri Department of Natural Resources Laboratory.

Acenaphthene	< 500 ug/Kg
Acenaphthylene	< 500 ug/Kg

Sample no. 89-1737
Date 12/07/89

PARAMETERS	RESULTS
Aniline	Not Analyzed
Anthracene	< 500 ug/Kg
Benzo(a)anthracene	< 500 ug/Kg
Benzo(a)pyrene	800 ug/Kg
Benzo(b)fluoranthene	700 ug/Kg
Benzo(ghi)perylene	< 500 ug/Kg
Benzoic acid	Not Analyzed
Benzo(k)fluoranthene	< 500 ug/Kg
Benzyl alcohol	Not Analyzed
Bis(2-chloroethoxy)methane	< 500 ug/Kg
Bis(2-chloroethyl)ether	< 500 ug/Kg
Bis(2-chloroisopropyl)ether	< 500 ug/Kg
Bis(2-ethylhexyl)phthalate	600 ug/Kg
4-Bromophenyl phenyl ether	< 500 ug/Kg
Butyl benzyl phthalate	< 500 ug/Kg
4-Chloroaniline	Not Analyzed
2-Chloronaphthalene	< 500 ug/Kg
4-Chlorophenyl phenyl ether	< 500 ug/Kg
Chrysene	600 ug/Kg
Dibenzo(a,h)anthracene	< 500 ug/Kg
Dibenzofuran	Not Analyzed
1,2-Dichlorobenzene	< 500 ug/Kg
1,3-Dichlorobenzene	< 500 ug/Kg
1,4-Dichlorobenzene	< 500 ug/Kg
3,3-Dichlorobenzidine	< 5000 ug/Kg
Diethylphthalate	< 500 ug/Kg
Dimethylphthalate	< 500 ug/Kg
Di-N-Butylphthalate	< 500 ug/Kg
2,4-Dinitrotoluene	< 500 ug/Kg
2,6-Dinitrotoluene	< 500 ug/Kg
Di-n-octyl phthalate	< 500 ug/Kg
Fluoranthene	800 ug/Kg
Fluorene	< 500 ug/Kg
Hexachlorobenzene	< 500 ug/Kg
Hexachlorobutadiene	< 500 ug/Kg
Hexachlorocyclopentadiene	< 500 ug/Kg
Hexachloroethane	< 500 ug/Kg
Indeno(1,2,3-cd)pyrene	< 500 ug/Kg
Isophorone	< 500 ug/Kg

Sample no. 89-1737
Date 12/07/89

PARAMETERS	RESULTS
2-Methylnaphthalene	Not Analyzed
Naphthalene	< 500 ug/Kg
2-Nitroaniline	Not Analyzed
3-Nitroaniline	Not Analyzed
4-Nitroaniline	Not Analyzed
N-Nitrosodimethylamine	< 500 ug/Kg
N-Nitrosodi-n-propylamine	< 500 ug/Kg
N-Nitrosodiphenylamine	< 500 ug/Kg
Phenanthrene	< 500 ug/Kg
Pyrene	700 ug/Kg
1,2,4-Trichlorobenzene	< 500 ug/Kg

COMMENTS: Analyzed by GC/MS at Continental Analytical Services, Inc.

LABORATORY SERVICES PROGRAM
RESULT OF SAMPLE ANALYSIS

Sample No. 89-1738

Reported to: LARRY ALDERSON
Affiliation: EER

Date: 12/08/89
Project Code: 3535/3000

Sample Description:
LEO EISENBERG'S PROPERTY
WATER SAMPLE FROM POOL

Collected by: LARRY ALDERSON
Affiliation: EER

Date: 07/25/89

PARAMETERS	RESULTS
TOTAL SILVER	7.1 ug/L
TOTAL BARIUM	600 ug/L
TOTAL CADMIUM	57 ug/L
TOTAL CHROMIUM	170 ug/L
TOTAL MERCURY	690 ug/L
TOTAL LEAD	180 ug/L
TOTAL SELENIUM	15 ug/L
TOTAL VANADIUM	1900 ug/L
Acrolein	Not analyzed
Acrylonitrile	Not analyzed
Acetone	< 100 ug/L
Benzene	< 25 ug/L
Bromomethane	< 25 ug/L
Bromodichloromethane	< 25 ug/L
Bromoform	< 25 ug/L
2-Butanone	< 100 ug/L
Carbon Disulfide	< 25 ug/L
Carbon Tetrachloride	< 25 ug/L
Chlorobenzene	< 25 ug/L

Sample no. 89-1738
Date 12/08/89

PARAMETERS	RESULTS
Chloroethane	< 25 ug/L
2-Chloroethylvinyl ether	Not Analyzed
Chloroform	< 25 ug/L
Chloromethane	< 25 ug/L
Dibromochloromethane	< 25 ug/L
1,1-Dichloroethane	< 25 ug/L
1,2-Dichloroethane	< 25 ug/L
1,1-Dichloroethylene	< 25 ug/L
1,2-Dichloroethylene	< 25 ug/L
1,2-Dichloropropane	< 25 ug/L
cis-1,3-Dichloropropene	< 25 ug/L
trans-1,3-Dichloropropene	< 25 ug/L
Ethylbenzene	< 25 ug/L
2-Hexanone	< 100 ug/L
Methylene Chloride	< 100 ug/L
4-Methyl-2-Pentanone	< 100 ug/L
Styrene	< 25 ug/L
1,1,2,2-Tetrachloroethane	< 25 ug/L
Tetrachloroethylene	< 25 ug/L
1,1,1-Trichloroethane	< 25 ug/L
],1,2-Trichloroethane	< 25 ug/L
Trichloroethylene	< 25 ug/L
Trichlorofluoromethane	Not analyzed
Toluene	< 25 ug/L
Total Xylenes	< 50 ug/L
Vinyl Acetate	< 100 ug/L
Vinyl Chloride	< 25 ug/L

COMMENTS: Analyzed by GC/MS at the Missouri Department of Natural Resources Laboratory. Detection limits are elevated for this sample due to foaming problems during purging, requiring sample dilution.

Acenaphthene	< 5.0 ug/L
Acenaphthylene	< 5.0 ug/L
Aniline	Not Analyzed
Anthracene	< 5.0 ug/L
Benzo(a)anthracene	< 5.0 ug/L
Benzo(a)pyrene	< 5.0 ug/L

Page 3
Sample no. 89-1738
Date 12/08/89

PARAMETERS	RESULTS
Benzo(b)fluoranthene	< 5.0 ug/L
Benzo(ghi)perylene	< 5.0 ug/L
Benzoic acid	Not Analyzed
Benzo(k)fluoranthene	< 5.0 ug/L
Benzyl alcohol	Not Analyzed
Bis(2-chloroethoxy)methane	< 5.0 ug/L
Bis(2-chloroethyl)ether	< 5.0 ug/L
Bis(2-chloroisopropyl)ether	< 5.0 ug/L
Bis(2-ethylhexyl)phthalate	37 ug/L
4-Bromophenyl phenyl ether	< 5.0 ug/L
Butyl benzyl phthalate	< 5.0 ug/L
4-Chloroaniline	Not Analyzed
2-Chloronaphthalene	< 5.0 ug/L
4-Chlorophenyl phenyl ether	< 5.0 ug/L
Chrysene	< 5.0 ug/L
Dibenzo(a,h)anthracene	< 5.0 ug/L
Dibenzofuran	Not Analyzed
1,2-Dichlorobenzene	< 5.0 ug/L
1,3-Dichlorobenzene	< 5.0 ug/L
1,4-Dichlorobenzene	< 5.0 ug/L
3,3-Dichlorobenzidine	< 50 ug/L
Diethylphthalate	< 5.0 ug/L
Dimethylphthalate	< 5.0 ug/L
Di-N-Butylphthalate	< 5.0 ug/L
2,4-Dinitrotoluene	< 5.0 ug/L
2,6-Dinitrotoluene	< 5.0 ug/L
Di-n-octyl phthalate	< 5.0 ug/L
Fluoranthene	< 5.0 ug/L
Fluorene	< 5.0 ug/L
Hexachlorobenzene	< 5.0 ug/L
Hexachlorobutadiene	< 5.0 ug/L
Hexachlorocyclopentadiene	< 5.0 ug/L
Hexachloroethane	< 5.0 ug/L
Indeno(1,2,3-cd)pyrene	< 5.0 ug/L
Isophorone	< 5.0 ug/L
2-Methylnaphthalene	Not Analyzed
Naphthalene	< 5.0 ug/L
2-Nitroaniline	Not Analyzed
3-Nitroaniline	Not Analyzed

Sample no. 89-1738
Date 12/08/89

PARAMETERS	RESULTS
4-Nitroaniline	Not Analyzed
N-Nitrosodimethylamine	< 5.0 ug/L
N-Nitrosodi-n-propylamine	< 5.0 ug/L
N-Nitrosodiphenylamine	< 5.0 ug/L
Phenanthrene	< 5.0 ug/L
Pyrene	< 5.0 ug/L
1,2,4-Trichlorobenzene	< 5.0 ug/L

COMMENTS: Analyzed by GC/MS at the Missouri Department of Natural Resources Laboratory

Eisenberg Fill Site
(alias: Leo Eisenberg's Property)
MOD985768175
PA/SI Reference 8

JOHN ASHCROFT
Governor

G. TRACY MEHAN III
Director

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES

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

MEMORANDUM

RECEIVED
JUL 12 1989
WASTE MANAGEMENT PROGRAM

DATE: July 10, 1989

TO: Sam Brenneke, Lab Services Program, DEQ

FROM: Myrna L. Reiff, Geologist, Engineering/Environmental Geology, DGLS

SUBJECT: Eisenberg Fill Area PA/SI

Following my site reconnaissance visit on June 27, 1989, I conducted a quick literature search of pertinent geologic and hydrologic information for the subject site.

The site is located on the Missouri River floodplain in an industrial area a short distance east of Interstate 29 and 35 in North Kansas City, Missouri. The topographic surface of the floodplain is nearly level. It is expected that the thickness of alluvial material above bedrock is in the range of 70 to 140 feet, averaging 85 to 90 feet. Variations in thickness of alluvium is controlled by irregularities in the bedrock surface. The composition of the alluvium varies from highly permeable coarse materials (sand and gravel about 60 feet thick) above bedrock to finer sand (about 60 feet thick) which is overlain by slowly permeable silty clay and clay (CL and CH) about 3 feet thick of possible colluvial/glacial origin near the original surface. It is estimated that 10 ± feet of fill material composed of concrete, brick, iron, rebar and fine-grained soil, has been placed upon the natural soils. Bedrock was not observed at the site, because of the thick alluvial cover. Data from the Missouri Highway Department bridge exploration at Highway 210 and the Norfolk and Western Railroad indicates that bedrock in this area is slowly permeable shale probably of Pennsylvanian age. This shale unit would be expected to act as an aquitard, thus limiting downward movement of groundwater into the deeper groundwater system.

Since the site is located on the Missouri River floodplain, it is also considered to be in the Missouri River watershed. There is a definite hydrologic connection between the alluvium and the river. The main groundwater discharge is seepage from the aquifer to the Missouri River. The alluvial aquifer is in turn recharged by the Missouri River especially during prolonged high-river stages. The dominant regional groundwater flow direction is toward the south and the Missouri River from the surrounding uplands and bedrock areas. The groundwater flow direction in the alluvial deposits varies, generally depending upon the time of year. The direction of groundwater movement may be reversed during periods of prolonged high-river stage when the alluvial aquifer is recharged. In general, the greatest amount of fluctuation occurs in areas nearest to the river and would not be expected to change very much at the subject site

because it is about a mile from the river.

The water table is expected to be from 15 to 30 feet below the natural surface. A seasonal (winter and spring) high water table of 1 t 3 feet of depth in the natural soils is reported to occur in this area, according to the Soil Survey of Clay and Ray Counties.

The Missouri River alluvium is the major aquifer in northwest Missouri. Large quantities of water are obtainable from the saturated sand and gravel of the alluvium. Groundwater in the alluvial aquifer occurs under water table (unconfined) and artesian (confined) conditions. These conditions vary in location and over time. Deep bedrock groundwater in Pennsylvanian-aged rock is highly mineralized and is non-potable.

This site is a good candidate for the installation of a groundwater monitoring system. I would be glad to help in preparing contract specifications for a monitoring system, should the decision be made to install wells.

I recommend that water samples be taken from the ponded water at the site. Soil samples may be obtained adjacent to the ponded water and in the surrounding area using power driven equipment or grab-samples of the fine-grained portion of the fill. Drilling through the fill will be difficult. Below the fill, drilling should be easier to a depth of 50-70 feet where gravel may be encountered.

In summary, the following general site conditions have been established. The subject site is located on the Missouri River floodplain which is the largest potential source of fresh groundwater in northwestern Missouri. The soils at the site are thick saturated alluvial materials grading upward from highly permeable sand and gravel at the base to sand, to slowly permeable silty clay and clay and permeable fill at the surface. Bedrock is composed of slowly permeable Pennsylvanian-aged shale which contains highly mineralized groundwater. Because of the permeable nature of the alluvium, the alluvial aquifer is potentially at risk at the site.

cc: John Madras, DEQ
cc: Jim Armes, DEQ
cc: Larry Alderson, DEQ

Eisenberg Fill Site
(alias: Leo Eisenberg's Property)
MOD985768175
PA/SI Reference 9

UNITED STATES ENVIRONMENTAL PROTECTION

REGION 7
25 FUNSTON ROAD
KANSAS CITY, KANSAS 66115

FEB 27 1989

ECRO

April 26, 1988

MEMORANDUM

SUBJECT: Leo Eisenberg's Property, Interstate 35 and Armour Road, North Kansas City, Missouri

FROM: Charles P. Hensley
Chief, EP&R/ENSV

TO: Robert Morby
Chief, SPFD/WSMD

On April 6, 1988, the Emergency Planning and Response Branch (EP&R) received a call on the emergency spill line from Mr. Terry Williams, North Kansas City Fire Department. Mr. Williams reported several black-colored, liquid puddles located at a fill area near the intersection of 16th Street and Interstate 35, North Kansas City.

Bruce Morrison, EP&R, met Mr. Williams at the site at 1500 on April 6. The property is approximately five acres of low-lying land being used as a construction debris fill area. Covering the property is approximately three feet of recent fill consisting of soil, of concrete, of asphalt, and of metal debris. Three large puddles (5 feet by 10 feet) of a black-stained water were observed at the base of the northeast corner of the fill area. A sample was collected from the puddles and analyzed for metals and organic pollutants.

The attached analytical data indicates the presence of high levels of vanadium (100 ppm) and arsenic (4.4 ppm). Also included is the completed preliminary assessment form. Attempts to contact the property owner, Mr. Eisenberg, have been unsuccessful (221-8000).

Please review this site data. If further information is needed, please contact Bruce Morrison of my staff. If you would like to take further action, please advise.

RECEIVED
APR 28 1988
SUPERFUND BRANCH

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 1 - SITE INFORMATION AND ASSESSMENT

I. IDENTIFICATION
01 STATE | 02 SITE NUMBER

II. SITE NAME AND LOCATION

01 SITE NAME: HWY 35 & ARMOUR RD. FILL AREA
02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER: UNKNOWN
03 CITY: NORTH KANSAS CITY
04 STATE: MO.
05 ZIP CODE: 66116
06 COUNTY: CLAY
07 COUNTY CODE
08 CONG DIST
09 COORDINATES LATITUDE: 39° 08' 20" | LONGITUDE: 094° 33' 45"
10 DIRECTIONS TO SITE:

III. RESPONSIBLE PARTIES

01 OWNER: LEO EISENBERG
02 STREET: ~~UNKNOWN~~ 1101 WALNUT
03 CITY: KANSAS CITY
04 STATE: MO.
05 ZIP CODE:
06 TELEPHONE NUMBER: ~~221-8000~~ (816) 221-8000
07 OPERATOR: UNKNOWN
08 STREET:
09 CITY:
10 STATE:
11 ZIP CODE:
12 TELEPHONE NUMBER: ( )

13 TYPE OF OWNERSHIP
☐ A PRIVATE ☐ B FEDERAL _____ ☐ C STATE ☐ D COUNTY ☐ E MUNICIPAL
☐ F OTHER _____ ☐ G UNKNOWN

14 OWNER/OPERATOR NOTIFICATION ON FILE
☐ A RCRA 3001 DATE RECEIVED ___/___/___ ☐ B UNCONTROLLED WASTE SITE (CERCLA 103 c) DATE RECEIVED ___/___/___ ☒ C NONE

IV. CHARACTERIZATION OF POTENTIAL HAZARD

01 ON SITE INSPECTION
☒ YES DATE 4 . 6 . 88
☐ NO

BY
☒ A EPA ☐ B EPA CONTRACTOR ☐ C STATE ☐ D OTHER CONTRACTOR
☒ E LOCAL HEALTH OFFICIAL ☐ F. OTHER _____
CONTRACTOR NAME(S) _____

02 SITE STATUS
☐ A ACTIVE ☒ B INACTIVE ☐ C UNKNOWN

03 YEARS OF OPERATION
BEGINNING YEAR | ENDING YEAR ☒ UNKNOWN

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN OR ALLEGED
WATER SAMPLE COLLECTED - INDICATED: VANADIUM - 100 PPM, ARSENIC - 4.4 PPM

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION
POSSIBLE GROUNDWATER CONTAMINATION AND SURFACE RUNOFF.

V. PRIORITY ASSESSMENT

01 PRIORITY FOR INSPECTION
☐ A HIGH ☒ B MEDIUM ☐ C LOW ☐ D NONE

VI. INFORMATION AVAILABLE FROM

01 CONTACT: BRUCE A. MORRISON
02 OF (Agency/Organization): USEPA
03 TELEPHONE NUMBER: (913) 236-3888
04 PERSON RESPONSIBLE FOR ASSESSMENT: BRUCE A. MORRISON
05 AGENCY: EPA
06 ORGANIZATION: EPA R
07 TELEPHONE NUMBER: (913) 236-3888
08 DATE: 4 13 88

EPA FORM 2070-12 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 ☒ A GROUNDWATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED >10,000
02 ☐ OBSERVED (DATE ~~4-6-88~~) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
~~NEA~~ UNKNOWN EXTENT OF METALS CONTAMINATION PRESENTS A THREAT TO GROUNDWATER DUE TO PERCOLATION

01 ☒ B SURFACE WATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED >10,000
02 ☒ OBSERVED (DATE 4-6-88) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
BLACK ~~WAT~~ STAINED WATER WAS OBSERVED & ANALYZED, VANADIUM & ARSENIC CONTAMINATION WERE DETECTED

01 ☐ C CONTAMINATION OF AIR
03 POPULATION POTENTIALLY AFFECTED _____
02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ D FIRE EXPLOSIVE CONDITIONS
03 POPULATION POTENTIALLY AFFECTED _____
02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☒ E DIRECT CONTACT
03 POPULATION POTENTIALLY AFFECTED >10,000
02 ☒ OBSERVED (DATE 4-6-88) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
UNSECURED SURFACE WATER CONTAMINATION OBSERVED.

01 ☐ F CONTAMINATION OF SOIL
03 AREA POTENTIALLY AFFECTED 5 ACRES (Acres)
02 ☐ OBSERVED (DATE _____) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
SURFACE WATER CONTAMINATION WAS DETECTED IN STANDING WATER. (PUDDLES ON GROUND)

01 ☒ G DRINKING WATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED >10,00
02 ☐ OBSERVED (DATE _____) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
GROUNDWATER IS USED FOR DRINKING WATER IN THE AREA.

01 ☐ H WORKER EXPOSURE/INJURY
03 WORKERS POTENTIALLY AFFECTED _____
02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☒ I POPULATION EXPOSURE/INJURY
03 POPULATION POTENTIALLY AFFECTED >10,000
02 ☒ OBSERVED (DATE 4-6-88) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
THE PROPERTY IS UNSECURED, AND IS EASILY ACCESSABLE TO PUBLIC.

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

- ☐ A SOLID
- ☐ B POWDER FINES
- ☐ C SLUDGE
- ☐ D OTHER _____ (Specify)
- ☐ E SLURRY
- ☐ F LIQUID
- ☐ G GAS

02 WASTE QUANTITY AT SITE (Measures of waste quantities must be independent)

TONS _____

CUBIC YARDS _____

NO OF DRUMS _____

03 WASTE CHARACTERISTICS (Check all that apply)

- ☐ A TOXIC
- ☐ B CORROSIVE
- ☐ C RADIOACTIVE
- ☐ D PERSISTENT
- ☐ E SOLUBLE
- ☐ F INFECTIOUS
- ☐ G FLAMMABLE
- ☐ H IGNITABLE
- ☐ I HIGHLY VOLATILE
- ☐ J EXPLOSIVE
- ☐ K REACTIVE
- ☐ L INCOMPATIBLE
- ☐ M NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE			
OLW	OILY WASTE			
SOL	SOLVENTS			
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS			
IOC	INORGANIC CHEMICALS			
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS	UNKNOWN	—	DETECTED IN SURFACE WATER

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
	VANADIUM		NONE	100.	PPM
	ARSENIC		NONE	4.4	PPM
	SODIUM		NONE	10.	PPM

V. FEEDSTOCKS (See Appendix for CAS numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g. state files, sample analysis, reports)

EPA ANALYTICAL RESULTS

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 STATE | 02 SITE NUMBER

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☒ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
NO FLORA OBSERVED

01 ☐ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION (Include name(s) of species)
NONE OBSERVED

01 ☐ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE _____) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
NONE OBSERVED

01 ☐ M. UNSTABLE CONTAINMENT OF WASTES (Spills/runoff/standing liquids/flying drums) — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED _____ — 04 NARRATIVE DESCRIPTION
N/A

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
NONE OBSERVED

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE _____) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
RUNOFF FROM SITE WILL REACH STORM SEWERS

01 ☒ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☒ OBSERVED (DATE 4-6-88) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
THE FILL MATERIAL MAY CONTAIN MATERIALS THAT ARE ILLEGAL TO DUMP.

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

III. TOTAL POPULATION POTENTIALLY AFFECTED: >10000

IV. COMMENTS

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

SITE VISIT 4-6-1988.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 7
25 FUNSTON ROAD
KANSAS CITY, KANSAS 66115

Date: 4/13/88

MEMORANDUM

SUBJECT: Data Transmittal for Activity #: PK825,
Site Description: I-35 & Armour Fill Area

FROM: Robert D. Kleopfer, Ph.D. RDK
Chief, Laboratory Branch, ENSV

TO: Charles P. Hensley
Chief, Emergency Planning and Response Branch, ENSV

ATTN: B. Morrison

Attached is the data transmittal for the above referenced site. This should be considered a ___ Partial or X Complete data transmittal (completes transmittal of _____). If you have any questions or comments, please contact Dee Simmons at 236-3881.

Attachments

cc: Data File

EPA Region VII

Data Qualification Codes

U - The material was analyzed for, but was not detected. The associated numerical value is the sample quantitation limit.

M - Compound was qualitatively identified; however, quantitative value is less than contract required quantitation limits (CLP data); or value is less than limit of quantitation (EPA data) and is, therefore, an estimated value.

J - The associated numerical value is an estimated quantity.

I - The data are invalid (compound may or may not be present). Resampling and/or reanalysis is necessary for verification.

O - Sample lost or not analyzed.

L - Value known to be higher than value reported.

N - Presumptive evidence of presence of material.

NA - Sample was not analyzed for this compound.

NJ - Presumptive evidence of the presence of the material at an estimated quantity.

UJ - The material was analyzed for, but was not detected. The sample quantitation limit is an estimated quantity.

Codes for Flash Point Data

L - The sample did not ignite or "flash." This is the highest temperature at which the sample was tested. It is possible that the material may be ignitable at higher temperatures.

K - The sample did ignite or "flash" at the lowest temperature tested. This is usually the ambient temperature at the time of the test. It is possible that the material may be ignitable at even lower temperatures.

FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Site Name: I-35 & Armour Fill Area Site Number:
Location: N. Kansas City, MO Site Code:

Collected: YR: 88 MO: 04 Day: 06 Time: 1505 Leader:

Sample Number: PK825001 SMO #: _____

Sample Media (circle one):
SOIL, DUST, RINSATE, SEDIMENT, WATER, (OTHER) Liquid

Sample Split (circle one): YES (NO)

Sample Container	Tag Color	Preservative	Analysis Requested
8 oz. Glass	Blue		Organic Scan / Metals

Depth: _____ Fan #: _____ Aliquots: _____

Samplers: Morrison
Weatherford

COMMENTS OF FIELD PERSONNEL

Site Description: Sample from dark brown opaque liquid in puddles seeping from recent fill area.

IBM-PC

ANALYSIS TYPE: TOTAL METALS

SITE: I-35 3 ARMOUR
LAB: EPA REGION VII
SAMPLE PREP: GLM ANALYST/ENTRY: GRS
DKS

MATRIX: WATER
METHOD: 2001W77
REVIEWER: ---
DATA FILE: GRS

UNITS: UG/L
CASE:
DATE: 04/11/88

PK825001

SILVER	UG/L	100.0U
ALUMINUM	UG/L	28000.0
ARSENIC	UG/L	4400.0
BARIUM	UG/L	740.0
BERYLLIUM	UG/L	20.0U
CADMIUM	UG/L	50.0U
COBALT	UG/L	150.0
CHROMIUM	UG/L	500.0
COPPER	UG/L	5500.0
IRON	UG/L	43000.0
MANGANESE	UG/L	1800.0
MOLYBDENUM	UG/L	1700.0
NICKEL	UG/L	5000.0
LEAD	UG/L	190.0
ANTIMONY	UG/L	500.0U
SELENIUM	UG/L	N/A
TITANIUM	UG/L	870.0
THALLIUM	UG/L	3000.0U
VANADIUM	UG/L	100000.0
ZINC	UG/L	610.0
CALCIUM	MG/L	150.0
MAGNESIUM	MG/L	20.0U
SODIUM	MG/L	10000.0
POTASSIUM	MG/L	N/A

DATE: 4/12/88

FROM: Barry Miller; ESAT Chemist BLM

THRU: T. S. Viswanathan; ESAT Manager

TO: Dr. R. D. Kleopfer, EPA; DPO ESAT Program RDK

SUBJECT: Analysis of liquid sample for semivolatiles PK82501
EPA TID# 07-8803-061
ICF ACCT# 26-061-01
NSI ACCT# 4631-0611

100 ml of sample PK82501 was extracted with methylene chloride (BNA extraction). The sample had a neutral pH. The extract was highly colored and would not concentrate to less than 1 ml. 2 ul of the extract were injected along with 100 ng HEB as an internal standard. The 4000 was operated in the full scan mode (masses 45-450 with a one second scan rate). The GC program was the same as for a BNA run (55C for four minutes to 300C at 8C/min., hold at 300C for 15 minutes). The only significant peaks found appeared to be a series of phthalate esters at concentrations from 50 to 200ug/L (ppb). However, a close examination of the sample container revealed that the plastic cap was not teflon lined. This sample was also analyzed for metals.

___ Computer
___ Distribution
___ Reviewed

REGION VII INCIDENT NOTIFICATION REPORT

1. Incident Number 04068-Cit-1400

Date Closed ___/___/___ Real Spill: Y or (N)

2. Reported: (mm/dd/yy) 4/6/88 | 3. Time: 1400 | Recorded By: G. Hess

4. ☐ Through NRC: | 5. NRC Case No.:

A. REPORTER

6. Reported By: Terry Williams Mon-Fri 8-4

7. Organization Name: N. KC Fire Dept

8. Organization: ☐ 9. discharger ☐ 10. public ☐ 11. state ☒ 12. local ☐ 13. federal

14. Address: 1710 E 18th Ave.

15. City: N. Kansas City | 16. County: Clay | 17. State MO

18. Zip: 66116 | 19. Phone: (816) 274-6026

Reporter Code ☐☐ X-Code ☐☐

1- Spiller 5- IDNR 9- Other EPA 13- KS Other
2- NRC 6- NDEC 10- MO Other 14- Other Fed.
3- USCG 7- KDHE 11- IA Other 15- ANON
4- MDNR 8- Priv. Citizen 12- NE Other 16- EPA

	Trans.	Fixed Fac.	Other
Petroleum	1	2	3
Misc. Chem. Spills	4	5	6
PCB Spills	7	8	9
Other Incidents	10	11	12

B. DISCHARGER

20. ☐ As Above in A If 9 applies | 21. Name: Eisenberg Co.

22. Address: 1101 Walnut

23. City: Kansas City | 24. County: | 25. State MO

26. Zip: | 27. Phone: ( ) 221-8000

C. INCIDENT LOCATION

28. ☐ As Above in B | 29. Street or Approx. Location: I35 North to 16th Street, left. Old Truck Dock,

30. City: N. Kansas City | 31. County: Clay | 32. State MO

D. DATE

33 Spill Date: (mm/dd/yy) | 34. Spill Time:

Discovery Date: (mm/dd/yy) 4/6/87 | Discovery Time: 12:30

E. MATERIAL

Material Type (Name):	☐ hazardous substance ☒ oil ☐ other	35. Material ☐ Unknown	UN/ DOT No	CAS No.	CHRIS Code	Quantity Spilled	Units (Circle 1)
36 WASTE OIL			37.	38.	39	40 50	41. lb (gal) bbl cf
42			43	44	45	46	47 lb gal bbl cf
48			49	50	51	52	53 lb gal bbl cf

Primary Material Code 09

1- PCB
2- Dioxin
3- Crude Oil
4- Gasoline
5- Diesel Oil
6- Other Distillate Fuel
7- Asphalt or Other Resid.
8- Animal or Vegetable Oil
9- Waste Oil
10- Other Oil
11- Petrol Solvents
12- Naptha
13- Mineral Spirits
14- Agric Chemicals
15- Herbicides
16- Insecticides
17- Fertilizer
18- Metals
19- Acids
20- Org Solvents
21- Caustics
22- Alcohol
23- Amine
24- Aldehyde
25- Other
26- Unknown
27- Radiological
28- Brine
29- Sewage
99- NOT A SPILL

Unit Code 1

1- Gallons
2- Pounds
3- Barrels
4- Tons
5- Sheen
6- Unknown Qty.
7- PPM
8- Pint
9- Quart

F. SOURCE

Source of Spill: ☐ 54. highway ☐ 55. air transport ☐ 56. railway ☐ 57. vessel ☒ 58. fixed facility ☐ 59 pipeline ☐ 60. offshore | 61. Vehicle ID or Carrier No.

Incident Type 08

1- Motor Vehicle
2- Rail
3- Marine
4- Pipeline
5- Aircraft
6- Tank
7- Ug Tank
8- Discharge
9- Fixed Fac
10- Other
11- From Fire
12- Air Release

Project No.

62 Description: uncontrol site

H. CAUSE

Reported Cause: ☐ 69. transportation accident ☐ 70. equipment failure ☐ 71 operational error ☐ 72. natural phenomenon ☒ 73. dumping ☐ 74. unknown ☐ 75. other

76 Description: Puddles

I. RECEIVED

Medium Affected: ☐ 63. air ☒ 64. land ☐ 65. water ☐ 66. groundwater ☐ 67. within facility only

Waterway Affected:

Water Code ☐☐ 1- River 2- Stream 3- Creek 4- Storm Sewer 5- Sanitary Sewer 6- Lake 7- Pond 8- Ditch 9- Ground Water 10- Reservoir 11- Canal

J. ACTIONS

Damages: 77. no of injuries _____ 78. no of deaths _____ ☐ 79. property damage > $50,000

80. ☐ Evacuation | 81. Response Action Taken:

Evacuation Y or N

Amount of Material Recovered _____

Hours Spent _____

K. NOTIFIED

Caller Has Notified: ☐ 82. state/local ☐ 83. discharger ☐ 84. USCG ☐ 85. other ☐ 86. unknown

Agency Name & Contact Name

Did State Investigate? Y or N Was EPA on Scene ? Y or N

M. REGIONAL DATA FIELDS

Response Type Code ☐☐

1- Physically Removed
2- Neutralized
3- Stabilized
4- Incinerated
5- Diluted
6- Biodegraded
7- Recycle
8- No Cleanup
9- Other
10- Unknown
11- Pending
12- Monitoring

Resolution Code ☐ 1- Pending 2- Closed

Resolution Date: ___/___/___

Date State Response Received: ___/___/___

Responding Agency Code ☐☐

1- EPA/EP&R
2- EPA/TAT
3- EPA/ARTX
4- EPA/PEST
5- EPA/ENFC
6- EPA/MDNR
7- EPA/IDNR
8- EPA/NDEC
9- EPA/KDHE
10- MDNR
11- HHS/CDC
12- IDNR
13- NDEC
14- KDHE
15- USCG
16- OSHA
17- FEMA
18- Local Health
19- Local Fire
20- Local Police
21- County
22- State Fire Marshal
23- NONE
24- State Conservation
25- Other

L. COMMENTS

87. Comments:

NOT ON GROUND LAST WEEK. CITY EMPLOYEE NOTIFIED MONDAY WITHIN 100 YDS OF SEWER PUMP STA. ☐ Additional Information

Additional Comments:

DUTY CHIEF -V
LOW 18TH TO HOWELL (5 BLOCKS)
PARKING LOT SOUTH SIDE

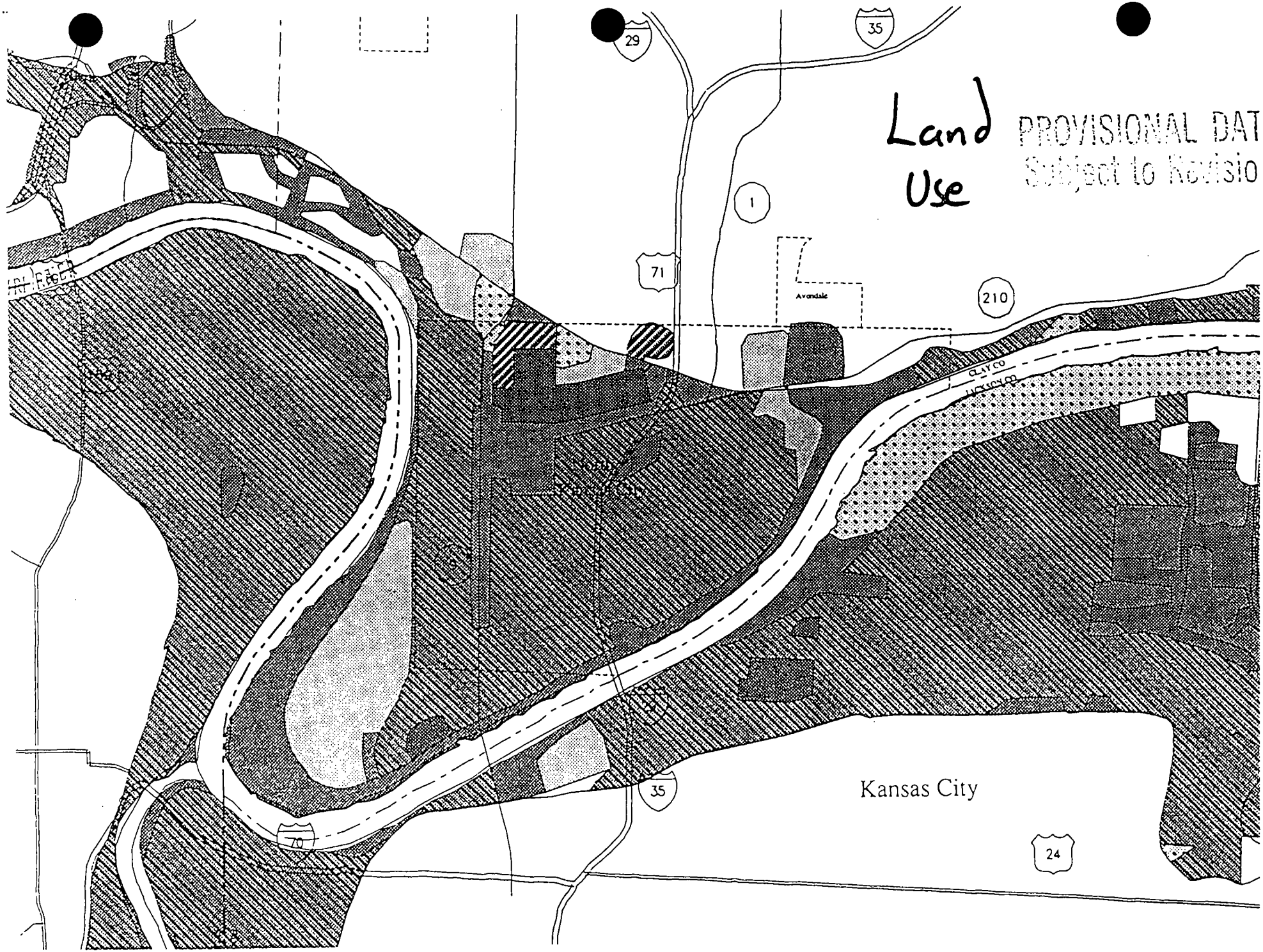
Eisenberg Fill Site
(alias: Leo Eisenberg's Propety)
MOD985768175
PA/SI Reference 10

NORTH KANSAS CITY

KANSAS CITY

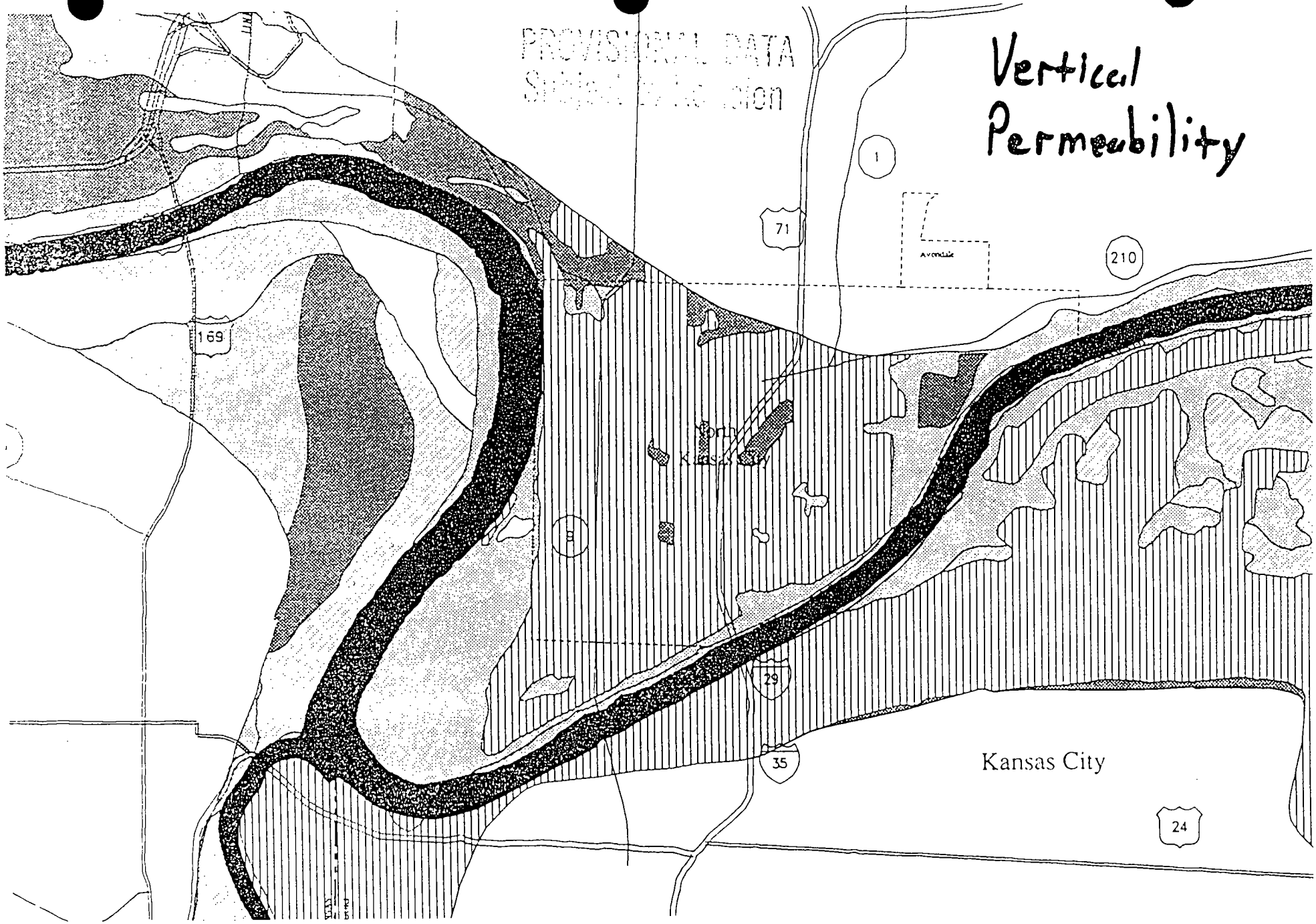
GLADSTONE

Data provided to Jerry Foster, HWP, MDNR by Mid-America Regional Council of Kansas City


Land Use
PROVISIONAL DAT
Subject to Revisio
29
35
1
71
Avondale
210
CLAY CO
JACKSON CO
35
Kansas City
70
24

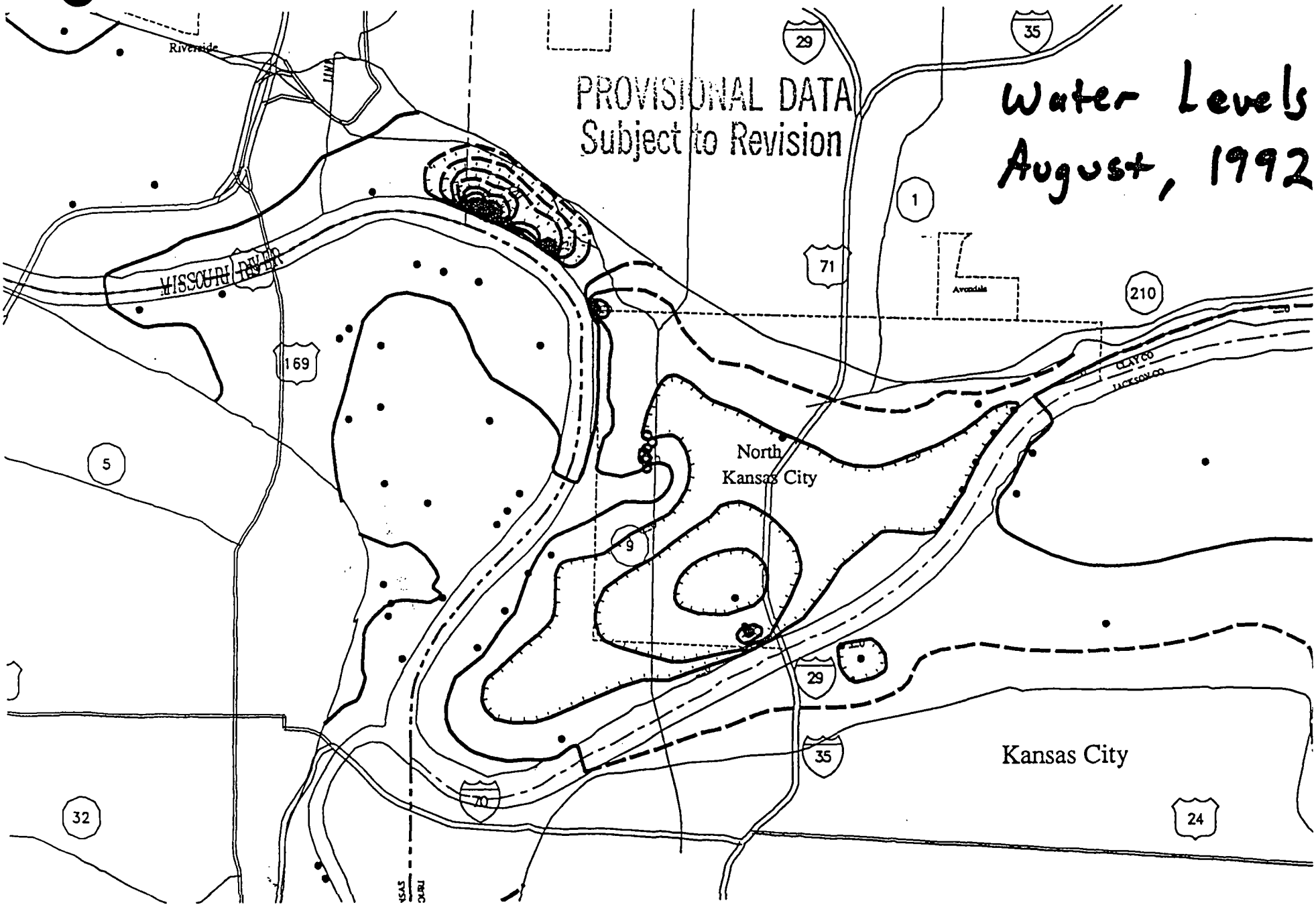
LAND USE KEY

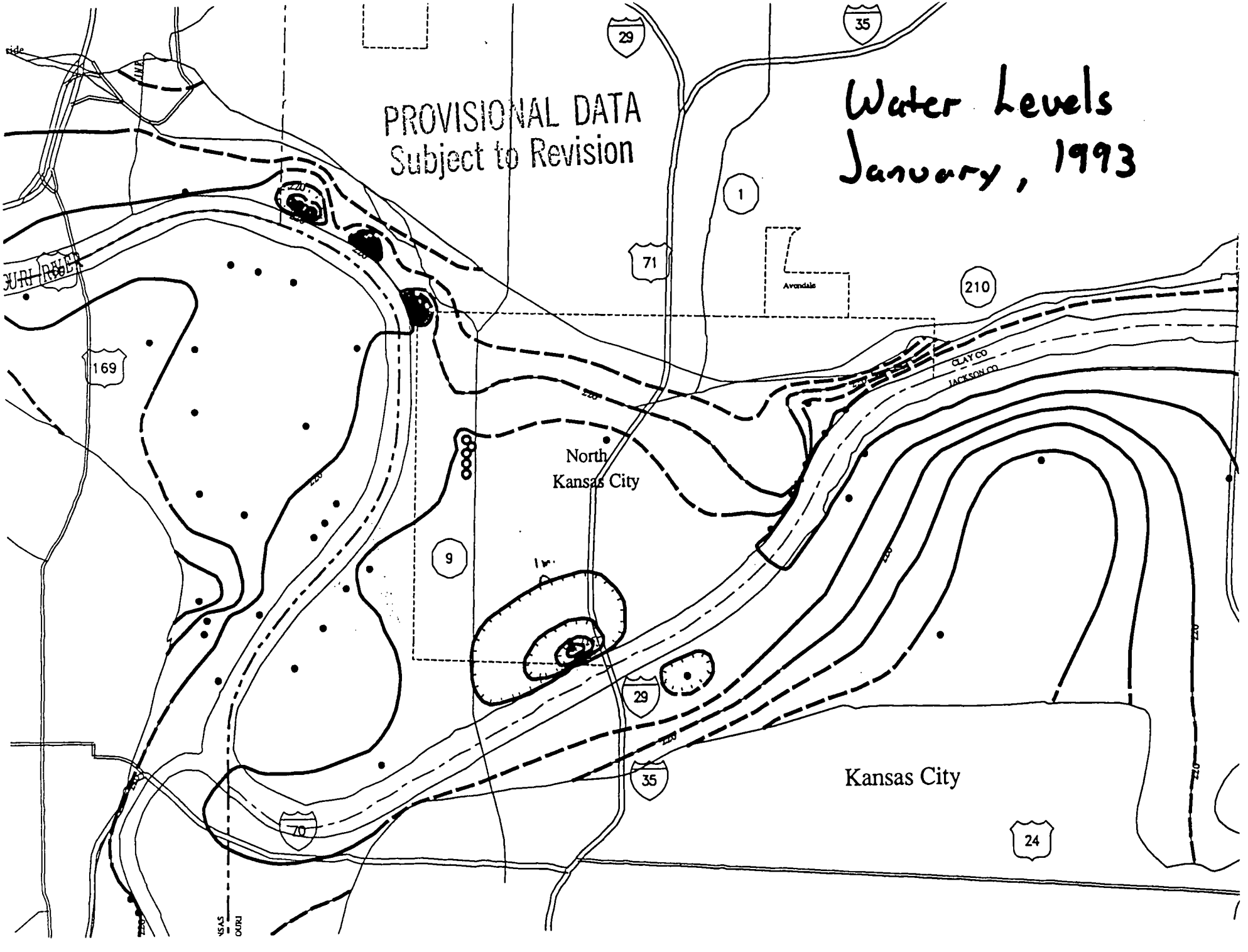
- Single Family
- Agricultural
- Undeveloped
- Commercial
- Public
- Parks
- Industrial
- Multi Family


Vertical Permeability
PROVISIONAL DATA
71
210
169
29
35
24
Kansas City

PERMEABILITY MAP KEY

- < 0.015 M/HR
- 0.015 – 0.023 M/HR
- 0.023 – 0.043 M/HR
- 0.043 – 0.152 M/HR
- > 0.152 M/HR
- UNKNOWN


PROVISIONAL DATA
Subject to Revision
Water Levels
August, 1992
Riverside
MISSOURI RIVER
North
Kansas City
Kansas City
Avondale
CLAY CO
JACKSON CO
29
35
1
71
210
169
5
9
29
35
70
32
24


PROVISIONAL DATA
Subject to Revision
Water Levels
January, 1993
North
Kansas City
Kansas City
Avondale
CLAY CO
JACKSON CO
29
35
1
71
210
169
9
29
35
70
24

POTENTIOMETRIC MAP KEY

POTENTIOMETRIC CONTOUR—Altitude to which water in a tightly cased well would have risen from hydrostatic pressure in aquifer, (dotted where approximate).

PUBLIC WATER SUPPLY WELL—Number is altitude of observed potentiometric surface in meters above sea level (measurements conducted when pumps not in operation)

OBSERVATION WELL—Number is altitude of observed potentiometric surface in meters above sea level

DRAFT

GROUNDWATER PROTECTION PLAN
MISSOURI RIVER AQUIFER, KANSAS CITY REGION

INTRODUCTION

In late 1990, the Mid-America Regional Council, area local governments, public water supply districts and the U.S. Geological Survey began work on a groundwater protection plan for the Missouri River aquifer in the Kansas City metropolitan area. The Missouri River aquifer covers approximately 150 square miles through the Kansas City area and is more intensively used for drinking water than any other aquifer in Missouri. The Missouri River aquifer supplies over 30 million gallons of water per day, impacting about one-third to one-half of the drinking water in the metropolitan area provided by over 20 cities and public water supply districts. The water suppliers using this resource include Independence, North Kansas City, Kansas City, Missouri, Gladstone, Parkville, Excelsior Springs, Liberty, Richmond, Ray County PWSD #2, Orrick, Hardin, Henrietta, Platte City, Weston, Platte County PWSD #1, #2 and #4, Clay County PWSD # 8, Kearney, Mosby, Community Water and Tri-County Water Company. Besides drinking water, the aquifer is the source of water for agricultural irrigation and industrial production.

The project is funded by the Missouri Department of Natural Resources with Section 319 Nonpoint Source Pollution funds provided by the U.S. Environmental Protection Agency. The U.S.G.S., MARC and local governments are providing matching resources for the study.

Summary Of Study Area

The study area or area of influence for the Missouri River aquifer through the Kansas City region has been defined by the U.S. Geological Survey to include the entire width of the Missouri River flood plain from bluff to bluff, and its length from its intersection with the Wyandotte/Leavenworth County line on the northwest side of the Kansas City metropolitan area continuing to the east side of the metro area at the Jackson/Lafayette County line. Additionally, the "West Bottoms" at the mouth of the Kansas River, the "East Bottoms" at the mouth of the Blue River, and the bottom lands at the mouth of the Little Blue River are part of the area of influence.

The area of influence is that land area where contaminants introduced into the soil are eventually drawn into the aquifer. The more quickly that contaminants move through surface materials to the groundwater resource, the more sensitive the area. More sensitive areas are those with higher levels of soil permeability. The areas with the highest soil permeability include portions of the Fairfax area of Kansas City, Kansas, the North Kansas City/Birmingham bottoms in southern Clay County, the area around Parkville's well fields in southern Platte County, the northeast industrial area in Kansas City, Missouri, Independence's well fields area and the unincorporated area in Jackson County near Jackass Bend.

Approximately 75 percent of the land above the aquifer is involved in intensive row-crop agriculture with some irrigation. Most well fields within the metropolitan area are located in areas where agricultural production is the predominant land use. The primary crops are corn, soybeans, and wheat with minor amounts of sorghum and potatoes. The Missouri River aquifer has shallow water tables and sandy soil textures; however, a deposit of clay covers part of the aquifer and provides greater levels of protection.

The remaining land area is in industrial use; with much of the area developed in Kansas City's early history along the riverfront. Some of the area has been in industrial use for so long a period of time that the permeability of the soil cannot be determined.

Both agriculture and industrial land use activity endanger the quality of water from the aquifer. Several documented cases of contamination have occurred recently, including TCE at Liberty and cyanide at Conservation Chemical in Kansas City. Many industries located in the study area produce heavy metal and solvent wastes that could pose a threat to the aquifer.

The Importance of Protecting the Missouri River Aquifer

The Missouri River aquifer offers water suppliers a consistent, relatively high quality resource. Groundwater problems can render a community's water supply unusable for an indefinite period, and once contaminated, cleanup efforts are often cost-prohibitive. Preventing groundwater contamination is the most efficient and cost-effective way to protect valuable water resources.

With increasing industrial activity, use of chemicals in both agricultural and industrial processes, and the transportation of hazardous chemicals throughout the metropolitan area, protecting groundwater resources is of increasing concern. Additionally, actions by the U.S. Army Corps of Engineers to restrict Missouri River water levels may result in greater dependency by water suppliers on the aquifer rather than the river.

Sources of potential contamination might include landfills, underground storage tanks, wastewater treatment plants, pipelines, industrial operations, and the application of chemicals in agricultural production. Protection strategies may include source controls to limit the potential for contamination. These strategies could range from education programs aimed at farmers to minimize pesticide use to limitations on further industrial development in sensitive areas.

Land Use Analysis and Protection Strategies

The study area's land use has been analyzed using 1990 aerial photography, information from local land use plans and agricultural production information from county conservation offices. The soil permeability of each area and the location of existing well

fields have been identified and mapped by the U.S. Geological Survey. This information has been used to identify areas for priority attention and possible protection strategies for local communities to consider.

The Missouri River groundwater protection planning effort is more complex than most community-oriented groundwater protection projects for a number of reasons. First, the project area is extremely large and affects multiple communities in two states. Second, the variety of land uses, both past and current, the extent of industrial activity and development potential in some areas will make the consideration of multiple strategies more likely. Finally, the protection strategies that may be necessary to protect the groundwater resource may require action by communities that do not use the aquifer as their source of water.

At a minimum, an effective groundwater protection strategy effort at the local or regional level should involve:

- a willingness by local communities to make a long-term commitment to protecting groundwater resources
- selecting management techniques that are best suited to the local or regional situation
- gaining public support through education of the importance of the resource and how the public can help protect the environment
- an on-going monitoring effort is needed to ensure program success
- the capacity to take remedial action to address contamination problems

The following plan identifies specific strategies that may be appropriate for area local governments and for various land use situations. The determination on which strategies will be used and the manner in which they will be implemented will be made by each area local government.

In determining the appropriateness of specific strategies, local communities will need to evaluate information on land use and the characteristics of the soil and subsurface materials for the areas both within the area of influence and the area specifically impacting their well fields. A computer model relying upon the database complied through this project will be available to area communities and public water supply districts to assess the need and appropriateness of various protection strategies.

A set of criteria has been identified to assist local communities in evaluating alternative management and regulatory strategies. Such criteria include:

- legal authority

Center, Birmingham Farms, Great Midwest, the International Trade Center and Northland Industries.

Jackson County

Jackson County contains the eastern portion of the study area south of the Missouri River. The study area contained within the limits of Kansas City is the most heavily industrialized area in the region. Industrial uses dominate the study area from the West Bottoms to Interstate 435 on the east. This area has a small, declining residential base of approximately 5,000 residents and large, stable industrial workforce of around 20,000.

The study area also is the location of recreation facilities such as Kemper Arena and the American Royal; extensive transportation facilities such as ports, highways and rail; wastewater treatment facilities; and major power plants operated by Kansas City Power and Light and Missouri Public Service.

The study area closely follows the bluffs east toward Independence and Sugar Creek. The old Standard/Amoco refinery site is located in the study area. To the east toward the Lafayette County line, a majority of the study are is under agricultural use. However, adjacent to the study area are power plants, a landfill, the Mill Creek Industrial Park and the Lake City Army Ammunition Plant. Proposed uses adjacent to the study area include a second landfill and the Riverfront and Little Blue Expressways, which may spawn additional development.

Soil Permeability

The U.S. Geological Survey identified areas with high soil permeability. Contaminants introduced to the soil through surface materials may infiltrate groundwater more quickly in these areas. The areas with the highest soil permeability include the following:

Platte County

- The area around the Missouri City Water Company's wellfield in Parkville north of the river and south of 9 Highway.
- The industrial area of Riverside south of 9 Highway adjacent to Interstate 635.

Kansas City, Kansas (Wyandotte County)

- The Fairfax area.
- The Armordale area.

North Kansas City (Clay County)

- The industrial area of North Kansas City from 210 Highway south to the river.

Clay County

- The Birmingham bottoms area in south, central Clay County.

Kansas City, Missouri (Jackson County)

- The West Bottoms area
- The East Bottoms area.

Jackson County

- The Amoco refinery area in western Sugar Creek near Jackass bend.

The U.S. Geological Survey identified and mapped the location of existing wellfields. An additional area currently not identified is the estimated area of groundwater supply for the existing wellfields. The supply areas commonly are referred to as the zone of contribution, which may vary over time, and is the area from which the wellfield draws its groundwater supply. It is safe to assume that these areas are highly sensitive to contamination through surface activities. The area of contribution may be defined with information generated by the computer model developed by USGS.

The analysis conducted during this study identified three factors which are critical in the identification of areas which are highly susceptible to contamination. The factors, identified above, are land use, soil permeability and location of wellfields. Recommendations for groundwater protection strategies based on these factors are included in the final section of this report.

STRATEGIES FOR GROUNDWATER PROTECTION

The MARC staff extensively researched federal and state law and successful groundwater protection strategies to try to develop a broad-based protection strategy for the study area. An table showing the existing federal groundwater protection programs is in the attached appendix. The most significant program for public drinking water suppliers was mandated in the 1986 amendments to the federal Safe Drinking Water Act. The amendments require states to adopt programs to protect the wellfields which supply public water systems from contamination. Funding authorized under the SDWA amendments is contingent upon adopting such programs.

The groundwater protection strategies outlined in this section reflect the provisions of the SDWA and the draft Missouri Wellhead Protection Program. The strategies also reflect those used in successful programs from across the country, such as Dayton, Ohio and Broward County, Florida. The draft Missouri WHPP and a summary of the Dayton WHPP are included in the attached appendix.

Groundwater Protection Programs

The 1986 amendments to the federal SDWA established a wellhead protection program (WHPP) to manage water quality control within a certain geographic area. Section 1428 of the SWDA requires that states submit a WHPP to U.S. Environmental Protection Agency. The Missouri Department of Natural Resources, Division of Environmental Quality, drafted the Missouri WHPP in June, 1994. This program complies with all current federal and state law and is the document that local governments should use to tailor their specific groundwater protection plans.

The objective of the Missouri WHPP and of most programs is to protect the drinking water resource from contamination. The SWDA and the MDNR wellhead protection models provide a formal mechanism to attain this objective. A comprehensive WHPP includes the following seven elements which are consistent with the requirements set forth in the SWDA.

1. Specify Roles and Duties of Local Governments

The first step is to determine which local governments, officials or other interested parties have the power to authorize a groundwater protection program. Local governments typically have control over any activities within their corporate limits. Other agencies, such as the State Fire Marshal and the State Department of Transportation, may have environmental authority and duties that also must be defined, such as the responsibility to identify businesses which store specified quantities of hazardous materials.

Many local governments create representative advisory teams that define the goals and objectives of the groundwater protection program and provide technical and political assistance for those programs. The advisory team members ensure that the program

progresses toward designated goals, that program regulations or activities are completed, and that the interests of appropriate organizations and the general public are represented. The establishment of an advisory team provides an opportunity for citizens and local governments to cooperate on appropriate protection measures. It may also provide an opportunity for local governments with limited staff and resources to use interested community organizations, such as the local Sierra Club or Chamber of Commerce, to undertake groundwater protection efforts. For example, the city of Dayton, Ohio, has established an advisory team that oversees the groundwater protection program for a 12-county area.

2. Delineate a Groundwater Protection Area

The next step in protecting groundwater resources is defining the protection area. This is called delineation. Once a protection area is delineated, the groundwater resource can be monitored to determine characteristics such as: existing contamination, hydrogeologic features of the source, and time-of- travel estimates from one point to another in the source; for example from an underground storage tank to the wellhead. Information regarding the "time-of-travel" of groundwater in the protected area enables authorities to take necessary prevention and remediation actions. The protection area may also be used to set development boundaries or limits for the use of hazardous materials which may contaminate groundwater.

Delineating the protected area requires considerable planning. For example, a starting point for local governments is the proposed state requirement of a minimum of one-quarter (1/4) mile circles around a well or wellfield. This method is referred to as a fixed radius method. The state believes that this threshold distance provides minimum time for remediation or source relocation.

The actual size of the area and the method used to define that area will depend on several factors including: the depth of the aquifer, the hydrogeology, the topography, the pumping rate of the well, and the technical and financial capability of the local government. In southern Missouri for example, karst geologic features provide for rapid recharge of the groundwater through subsurface fractures and sinkholes. Several delineation methods are described extensively in the draft Missouri WHPP included in this report. The computer model developed by the USGS for the study area will assist local governments in delineating the protected area. In addition, the MDNR Division of Geology and Land Survey is a valuable resource in determining geologic features in your area and is charged with assisting local governments in defining protection areas.

3. Inventory

Once the protection area is defined, the next step is conducting an inventory of contaminant sources within the area. This process may be simple or complex depending on the level of development in the protected area. Regardless, three steps should be completed: 1) examination of existing data, 2) surveys, and 3) fields searches. Land use

activities which may be a source of contaminants should be identified. For example, agricultural land use poses potential threats to groundwater because of pesticide mixing areas, feedlots and runoff from farm fields. Urban land uses that provide for the storage of hazardous waste or even runoff from golf courses could jeopardize the groundwater quality. Potential sources of contamination include land fills, dumps, septic tanks, animal feed lots, underground storage tanks, underground pipelines, water supply wells, improperly abandoned wells, dry wells and sumps, accidental spills along transportation corridors, pesticide use and mining.

Most communities may be able to rely on existing information to complete a substantial portion of the inventory. Sources such as recent aerial photos, telephone directories, businesses licenses and building permits may be helpful. In addition, the Local Emergency Planning Committee for each county is required under the Emergency Preparedness and Community Right-to-Know Act to maintain a data base of businesses which store hazardous materials above a specified weight threshold.

The city of Dayton, Ohio has taken the inventory element one step further in their groundwater protection program. Their program controls the volume of hazardous chemicals or "regulated substances" which may be stored in businesses located in areas surrounding their well fields. Businesses located within this region which use the regulated substances in excess of specified amounts must report that use to the City Department of Water. In addition, each business must complete an inventory reporting form which contains all of the regulated substances that they use or store at their place of business. The regulations do not apply to single or two family residences and some materials; substances and chemicals which do not pose a threat to groundwater may be exempted from regulation. The business which seeks the exemption carries the burden of proving that the chemicals, substances and materials do not pose a threat.

A complete inventory provides excellent information about the vulnerability of groundwater to contamination. However, efforts must be made to regularly maintain the inventory and monitor potential contaminant sources in the protected area. A formal procedure to conducting a contamination source inventory and vulnerability assessment is included in the draft Missouri WHPP.

4. Management Approaches

Programs to protect groundwater generally fall into two broad categories: source controls and land use controls. Examples of source controls include education programs about proper chemical application methods and adequate design standards for sewer and waste disposal systems. Source controls have proven to be effective in areas with complex geological formations. In addition, local governments may utilize source controls where resources or political supports for comprehensive strategies is limited.

Land use controls generally take the form of zoning and development ordinances. Examples of zoning regulation for groundwater protection are low density residential

zoning, open space requirements or overlay zones limiting contaminating uses. Land acquisition in the protected area may be another option for protecting groundwater.

An important protection strategy is implementing a plan to manage possible contaminant sources. Local governments should rely heavily on the designated advisory committee in developing a management plan that can be successfully implemented and managed, represents broad-base community interests, and meets appropriate environmental needs. Municipalities must determine what types of controls should be placed on chemical wastes and whether or not special zoning ordinances or local ordinances will need to be enacted to prohibit certain pollution sources. Each local community will need to determine what they want to protect and their special needs.

The selection and implementation of adequate management options for groundwater protection is perhaps the most critical part of the WHPP. Many management options require significant financial and political commitment. However, implementation of such options may insure an on-going safe public water supply As noted above, several management options, both source and regulatory controls, are available to local governments. An extensive list of options is included in the draft Missouri WHPP.

It is important for local governments to implement minimal programs to insure water quality. Two of the most important management options are education programs and groundwater monitoring programs. A comprehensive education program may serve as a prevention tool by encouraging voluntary actions which may prevent groundwater contamination. For example, a used motor oil collection program may prevent area residents from illegally disposing of the oil. A comprehensive education program is described separately in this report.

The U.S. Geological Survey (USGS) routinely collects and analyzes water samples from monitoring wells. The greatest benefit of this method is that it can provide an "early warning" of impending water quality problems and give communities an opportunity to access appropriate response actions. The water-quality and streamflow data are reported by water year. For example, the 12 months from October 1, 1992 through September 30, 1993 is one water year. The USGS uses trend analysis, a statistical procedure, to detect changes in stream water quality at a monitoring station over time. The information gathered from these analyses can also direct future groundwater protection management decisions.

Currently, there are several commissions in Missouri that can assist communities interested in managing their groundwater resources. The Clean Water Commission of Missouri can be contacted for information and assistance on issued related to nonpoint source pollution questions in wellhead protection areas. The Soil and Water District Commission of Missouri can be contacted for information and assistance on issues of water and resource conservation. The Safe Drinking Water Commission of Missouri can be contacted on any issue related to wellhead protection for guidance and direction.

County Conservation District Extension Offices
Existing Programs:

- Pesticide Certification and Re-certification Programs: Certain pesticide applicators are required by law to fulfill certification requirements in order to obtain an applicator's license. Pesticide applicators who have a Private Applicator's License are required by law to be recertified within five years following issuance of the license and within each subsequent five-year period.

- Platte County Curriculum Enrichment lists in-school programs that are region-wide.

- Offer a variety of informational materials such as pamphlets, brochures and fact sheets.

Potential Programs:

- Expand materials and training courses to include specific references to Missouri River groundwater resources. Develop an outreach program from existing programs with this location specific information.

Water Districts or Water Departments of City/County Government
Potential Programs:

- Inserts in monthly water bills

- Awards given to local communities that protect their groundwater sources.

City/County Administration
Potential Programs:

- Maintain contact with media representatives and assure the availability of accurate information.

- Articles in local government newsletters

- Press releases or other work with media

RECOMMENDATIONS

As noted in the introduction to this report, a groundwater protection planning effort for the entire metropolitan area is much more complex than most location specific plans. However, the groundwater protection strategies outlined in this report may be appropriate for area local governments and for the various land use situations in the Kansas City metropolitan area. The determination on which strategies will be used and the manner in which they will be implemented will need to be made by each area local government.

In determining the appropriateness of the recommended strategies, local communities will need to evaluate detailed information on land use, soils and geology for the study area within their jurisdiction and the areas specifically impacting their wellfields. A computer model developed by the U.S. Geological Survey relying upon the database compiled through this project will be available to area local governments and public water supply districts to assess the need and appropriateness or various recommended protection strategies.

This section will outline recommendations for groundwater protection strategies based on extensive research. First, general groundwater protection strategy recommendations will be made which are applicable for all communities in the study area. Second, land use specific protection strategies will be recommended. Finally, location specific protection strategies will be discussed.

Comprehensive Groundwater Protection Strategies

It is recommended that groundwater protection strategies at the local and regional level should take the form of an official Groundwater or Wellhead Protection Plan. This plan should be based on the requirements of federal and state laws outlined in the Groundwater Protection Strategies section of this report. This plan minimally should include the following elements:

- An official, long-term commitment by local governments to protect groundwater resources. One example is the adoption of a groundwater or wellhead protection ordinance. A sample is included in the attached appendix.

- Management techniques that are best suited to the local or regional situation. One example is an overlay zoning district which limits development within a specified protection area.

- An education program which gains public support for groundwater protection by showing the importance of the resource and how the public can help to protect that environment.

- An on-going monitoring effort is needed to ensure program success. One example will be the network of monitoring wells the U.S.G.S. is developing for

the Independence wellfield in cooperation with the cities of Independence and Sugar Creek

- The capacity to take remedial action to address contamination problems. One example is a plan for spill remediation within the protected area.

Minimum Groundwater Protection Strategies

All local governments in the Kansas City metropolitan area will not be able to implement comprehensive groundwater protection plans due to limited staff, expertise, financial resources and lack of political commitment. Local governments not able to provide staff or support for groundwater protection efforts may solicit the assistance of the local citizen's organizations such as the Sierra Club or Chamber of Commerce to develop and implement such plans. If local governments are forced to limit the scope of the groundwater protection strategies implemented, it is recommended that concentrated efforts be made to focus on limited strategies for prevention and remediation. Outlined below are the minimal recommended elements that all local governments should use for prevention and remediation of groundwater contamination.

Prevention Strategies

Education (see the Sample Education Program included in the report)

- Existing organizations should expand upon programs to educate various audiences (i.e. farmers, industries) about the Missouri River aquifer, the potential contamination produced by their actions and proper methods of operation to protect the groundwater resource.
- Local governments and public water supply districts within the study area should begin to educate their customers about the groundwater resource and the ways that it can be protected.

Monitoring

- Public water supply districts shall monitor water quality in accordance to federal and state law. Monitoring activities and results may be made part of educational efforts.
- Extensive monitoring networks should be developed near wellfields and in areas where land use activity poses significant threat of contamination, such as near landfills, heavy industry and intensive agricultural areas. One example will be the network of monitoring wells the U.S.G.S. is developing for the Independence wellfield in cooperation with the cities of Independence and Sugar Creek.
- Use of the U.S.G.S. computer model to provide local communities with better planning data for the protection of the groundwater resource; i.e. development of time-of-travel zones around wellheads.

Land Use Controls

- Establish appropriate controls based on contaminant time-of-travel zones. For example, areas close to wellfields may have complete development restrictions while areas further from the wellfields may restrict industrial uses which store hazardous materials.

Remediation Strategies

Wellhead Protection Plan

- As noted above, communities should formally make a commitment to groundwater protection and adopt a wellhead protection plan. This report or the draft Missouri Wellhead Protection Plan may be used as a model.

Response to Spills (see the Contingency Plans section of the report)

- All communities should include in their state required emergency operations plans measures to remedy spills within a designated protected area around their wellfield.
- All communities should have plans for new wells or alternative water supplies should their primary source become contaminated.

Groundwater Protection Strategies and Land Use

The report contains an extensive description of the existing land use in the study area. The land use analysis indicates that the predominant land use in the study area is agriculture. Other land uses which are of significant interest due to the amount of hazardous materials present include: existing industrial uses and proposed industrial and commercial uses.

This section indicates which groundwater protection strategies are recommended for the predominant land uses indicated above. As noted above, it is recommended that all communities develop a WHPP. The strategies introduced in this section may be included in the WHPP.

Agricultural Uses

- Education Programs: Programs targeted at those involved in agricultural production about proper agricultural chemical application may be the most effective. The University of Missouri Extension Service and county conservation offices should expand programs and stress efforts to elevate the awareness of the impact of such chemicals on the groundwater resource.

- Monitoring Programs: Programs should focus on the detection of agricultural contaminants in areas where wellfields are located in predominantly agricultural areas.
- Land Use Controls: Controls such as zoning and site planning may be used to mitigate the impacts of animal feeding and confinement areas.

Existing Industrial Uses

- Education: Programs which focus on existing federal and state law regarding the handling and storage of hazardous materials should be implemented by local governments and public water suppliers. Programs to raise the awareness of the potential contamination of the resource should be introduced. Emergency spill response plans should reflect this awareness and the need to completely remove any spilled contaminant from the study area.
- Monitoring: A comprehensive monitoring program should be constructed with wells located near uses with the high potential to contaminate the resource; i.e. landfills, waste water treatment facilities, paint and solvent manufacturing.
- Land Use Controls: Controls which provide for the on-going monitoring and maintenance of sewer and waste disposal facilities should be implemented. The enforcement of federal and state law regarding hazardous material handling, storage and transportation may prevent groundwater pollution. Finally, strict enforcement of the Emergency Planning and Community Right to Know Act, which requires business and industry to report the storage of specified quantities of hazardous materials to local fire departments and the Local Emergency Planning Committee, should be encouraged.

Proposed Industrial and Commercial Uses

- Education: Programs introducing the best management practices for hazardous material handling, storage and transport should be implemented. In addition, programs which heighten the awareness of the resource and the potential for contamination should be developed by local governments and public water suppliers.
- Monitoring: Monitoring required by federal and state law should be strictly enforced. Local governments may require developers of land use activities with high contamination potential, such as heavy industry, to monitor groundwater at those sites.
- Land Use Controls: Controls such as zoning and development restrictions or subdivision controls should be used to restrict the development of potentially hazardous sues such as waste disposal facilities and heavy industrial uses. Site planning and design standards may prevent groundwater pollution through by ensuring that proposed development is compatible with existing land uses and environmental features. Land use controls should be based on time-of-travel zones from wellfields.

Location Specific Groundwater Protection Strategies

The report contains an extensive description of the existing land use and areas of high soil permeability for specific local government jurisdictions in the study area. The areas with high soil permeability are of significant importance with respect to protecting the groundwater resource in the study area.

This section indicates which groundwater protection strategies are recommended for the areas of high soil permeability in specific local governments in the study area. As noted above, it is recommended that all communities develop a WHPP. The strategies introduced in this section may be included in the WHPP.

Platte County

- Rural Areas: The study area in the county is largely rural and the groundwater protection strategies recommended above for agricultural land use should be implemented in this area.
- Parkville and Riverside: The new and proposed commercial and industrial areas south of Highway 9 and adjacent to Interstate 635 are located within the study area. The protection strategies recommended for proposed commercial and industrial development should be implemented in this area.

Wyandotte County

- Rural Areas: The study area in the county is largely rural and the groundwater protection strategies recommended above for agricultural land use should be implemented in this area.
- Areas along Interstates 435 and 635: These portions of the study area have the potential for development. The protection strategies recommended above for proposed commercial and industrial development should be implemented in this area.
- Fairfax, Armordale and the West Bottoms: These are all existing industrial areas and the protection strategies recommended above for such uses should be implemented.

Clay County

- Rural Areas: The study area in the county is largely rural and the groundwater protection strategies recommended above for agricultural land use should be implemented in this area.
- North Kansas City: The existing industrial area from Highway 210 south to the river in located in the study area. The protection strategies recommended for existing industrial uses should be implemented in this area. In addition, new commercial development in NKC should be evaluated with the above recommended strategies for new and proposed development.

- Areas along Interstate 435 and Highway 291: These portions area of the study area have the potential for development. The protection strategies recommended above for proposed commercial and industrial development should be implemented in this area.

Jackson County

- Study Area in Kansas City including the West and East Bottoms: The study area in Kansas City is largely developed with industrial uses and the area not in industrial use has the potential for new commercial and industrial development. Kansas City should implement the above recommended protection strategies for existing industrial areas and implement the recommended protection strategies for proposed commercial and industrial uses in the undeveloped portions of the study area
- The cities of Independence and Sugar Creek should implement the above recommended protection strategies for proposed commercial and industrial uses adjacent to the Independence wellfield.
- Rural Areas: The study area in the county is largely rural and the groundwater protection strategies recommended above for agricultural land use should be implemented in this area.

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MOD985768175
PA/SI Reference 11

BASIN 15

MISSOURI RIVER AND WEST CENTRAL TRIBS

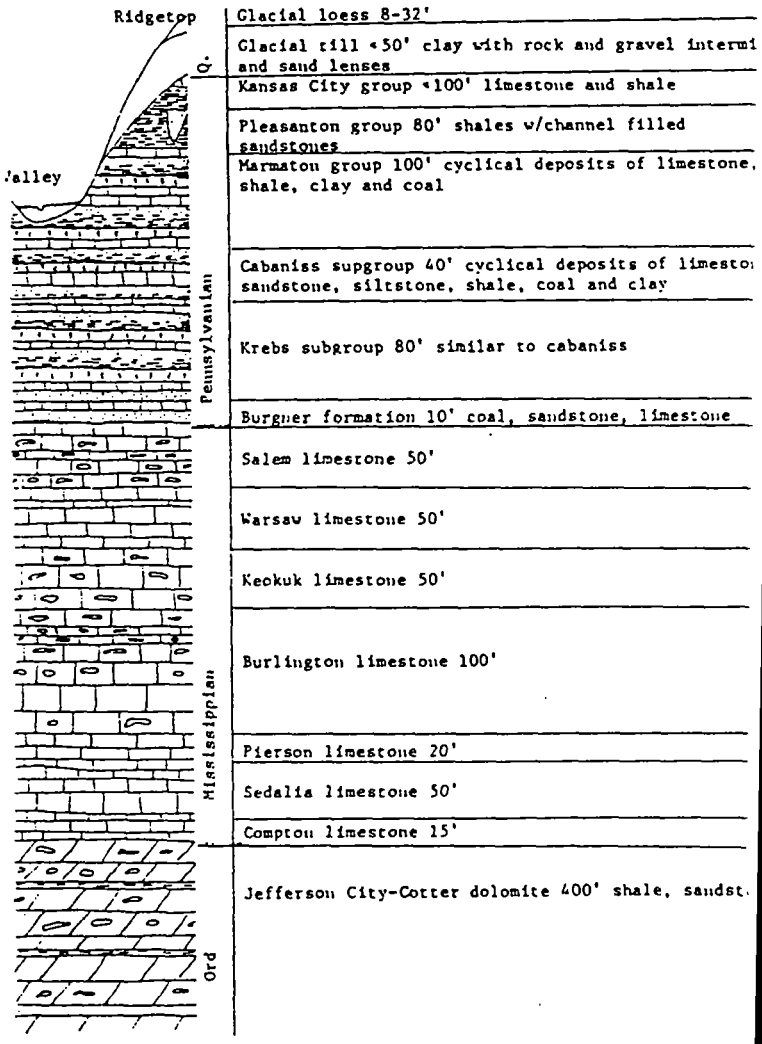
BASIN DESCRIPTION

This basin consists of the Missouri River and its tributaries between the Kansas and Little Chariton Rivers except the Blue, Little Blue, Grand River and Chariton River. This basin lies within the glaciated plains physiographic region in west central Missouri and encompasses 2163 square miles. Ninety percent of the basin is row crop and pasture, approximately 7% is wooded and 3% is urban. Most of the Kansas City metropolitan area withing the State of Missouri lies within this basin.

HYDROGEOLOGY

Except for limited areas where streams may incise Pennsylvanian aged rock, the surface of the basin is glacial till overlain by loess. Depth of the till is highly variable but is generally less than 100 feet north of the Missouri R. and less than 50' south of the river. Loess is 8-32'deep with the greatest depths near the Missouri. The till is predominantly clay with some rock and gravel intermixed and with occasional sand lenses. The glacial deposits are underlain by cyclical(repetitive) layers of siltstone,sandstone,shale,limestone and clay of Pennsylvanian age.

The presence of the clayey till and the underlying shales insures very little water infiltrates to the subsurface. Thus almost all water movement in the basin is surface flow. Most water that does reach the subsurface will resurface locally when a stream valley incises the confining aquatard. There are no notable springs in the basin nor are baseflows well sustained during dry weather. However several tributaries on the north bank of the Missouri have significant portions (5-12 mi.) of their stream length in the sand and gravel aquifer of the Missouri alluvium. Thus, even during prolonged dry weather these streams would have sizeable pools of water if the alluvial aquifer is high enough to intercept these streams.



Location	Years of Record	Maximum	Minimum	Mean	Median	Exceeded 80% of time	Exceeded 90% of time	7-day Q10	7-day Q2
Missouri R, at Kansas City	1897-1987	573,000	1,500	55,920	41,900	24,000	16,600	0	0.2
Missouri R, at Waverly	1928-87	549,000	1,700	51,480	42,100	24,000	16,800		
Rock Cr, at Independence	1968-74,81			4.6	0.9	0.2	0	0	0
Shoal Cr, at Claycomo	1975-81	9,800	0	13.2	2.7	0.6	0.2		
Shoal Cr, near Liberty	1962,64,67 & 70							0.1	1.0
Fishing Cr, at Mosby	1962-65,67							0	0.5
Fishing Cr, near Orrick	1962-65,67							0.2	2.0
Williams Cr, Mosby	1962-65							0	0
E. Fk. Fishing R. at Excelsior Sprgs (1)	1952-72							0	0
Sni-A-Bar Cr, near Tarsney	1971-81			22.6	2.9	0	0		
Sni-A-Bar Cr, near Grain Valley	1962-65,67, 70-71,81							0	0.4
Sni-A-Bar Cr, near Wellington	1962-65,67, 70-71,81							0	0.2
Crooked R, near Richmond	1948-70							0	0.2
W. Fk. Crooked R, at Richmond	1943,45-46, 53 & 62							0	0
Wakenda Cr, at Carrollton	1948-70							0.4	1.6

(U.S. Geological Survey, 1984 and 1987, and Skelton, 1976)

(1) Flow affected by regulation of Crystal Lake since 1970.

WATER QUALITY PROBLEMS - POINT SOURCE

This large area includes most of the Kansas City metropolitan area discharges, as well as many small municipal and private discharges. The small discharges have limited impacts on their receiving streams (see Table 15-2). In the Kansas City area several large point sources which previously discharged to tributaries are now discharging directly to the Missouri River. This should result in considerable improvement to the tributaries, while not adversely affection the Missouri, if secondary treatment and pretreatment requirements are achieved. These include the treatment facilities receiving wastewater from the Little Blue and Blue River watersheds. The Little Blue Valley Sewer District STP has thus far not consistently met its permit requirements. The KC, Blue River STP is now achieving secondary treatment limits in its Missouri River discharge. The KC, Birmingham STP now receives the waste formerly discharging to the Liberty East and West lagoons and to the North Kansas City STP (the latter includes high strength industrial organic wastewater). The Birmingham STP may also eventually receive wastewater now treated at several southern Platte County facilities.

Mobay Corp. has also removed its discharge from the Blue River and now discharges to the Missouri. No effect on the river as a whole is expected, but bioassay testing should assure that there is no acute toxicity in the mixing zone.

The Independence, Rock Creek STP is required to monitor and meet limits for priority pollutants when accepting potentially toxic wastewater on a contract basis.

WATER QUALITY PROBLEMS - NONPOINT SOURCE

The western half of the basin is a mixture of urban, suburban and agricultural land while the eastern half is almost entirely agricultural. Major nonpoint source impacts occur due to agriculture and to dischargee of toxic chemicals from urban and suburban areas.

The SCS has estimated sheet erosion at 9-13 tons per acre per year, a rate which is high nationally but typical for the northern half of Missouri. Gully erosion is estimated at 0.3-0.8 tons/acre/year, which is considered "severe". As a result of these high rates of soil erosion, streams in the basin carry a heavy sediment load and stream bottoms are composed of primarily uncomsolidated silts and clays which make a homogeneous, unstable substrate and thus provide poor aquatic habitat.

During dry weather conditions when stream flows are low, livestock and their wastes are often concentrated in and around streams. These animal wastes can be significant contributors to such problems as low dissolved oxygen, elevated ammonia levels and nuisance algal growths.

Activities in urban and suburban areas of the basin have resulted in important nonpoint source problems in area streams, lakes and the Missouri River alluvial aquifer. Improper landfilling of industrial wastes and leakage and spills of chemicals at industrial sites have caused a number of localized areas of contamination of the Missouri River alluvial aquifer in the Kansas City area. Solvents, heavy metals and pesticides are the pollutants of greatest concern. The municipal water supply at Liberty, Missouri, has been contaminated by solvents and the Independence well field would be threatened if the plume becomes larger.

Sediments of some streams and lakes in the Kansas City area contain PCBs and or chlordane in sufficient quantities to cause fish flesh contamination. The Missouri River in and downstream of the Kansas City area now carries an advisory against consumption of fish due to chlordane contamination. Fish in the Missouri immediately downstream of Blue River also have levels of PCBs exceeding FDA action limits.

Leaks, spills or improper disposal appear to be the major source of PCBs. Because of its particular severity in urban areas, the primary source of chlordane is believed to be associated with its use as a termiticide around buildings, its use on golf courses to protect turf and at nurserys to protect root stock from insects. As of April, 1988, all uses of chlordane were banned by EPA.

Nonpoint water quality problems on the Missouri have been minor compared to the physical changes produced by channelization. The alterations made to facilitate navigation of the Missouri by barges has reduced the width of the river by 50% and greatly reduced the number of sloughs, side channels and other shoal water areas. These are considered to be the best aquatic habitat of large rivers, and data collected by the Missouri Dept. of Conservation suggests that losses of much of this habitat due to channelization has resulted in a drop in commercial fish catch on the river to a level one-third of the pre-channelization era.

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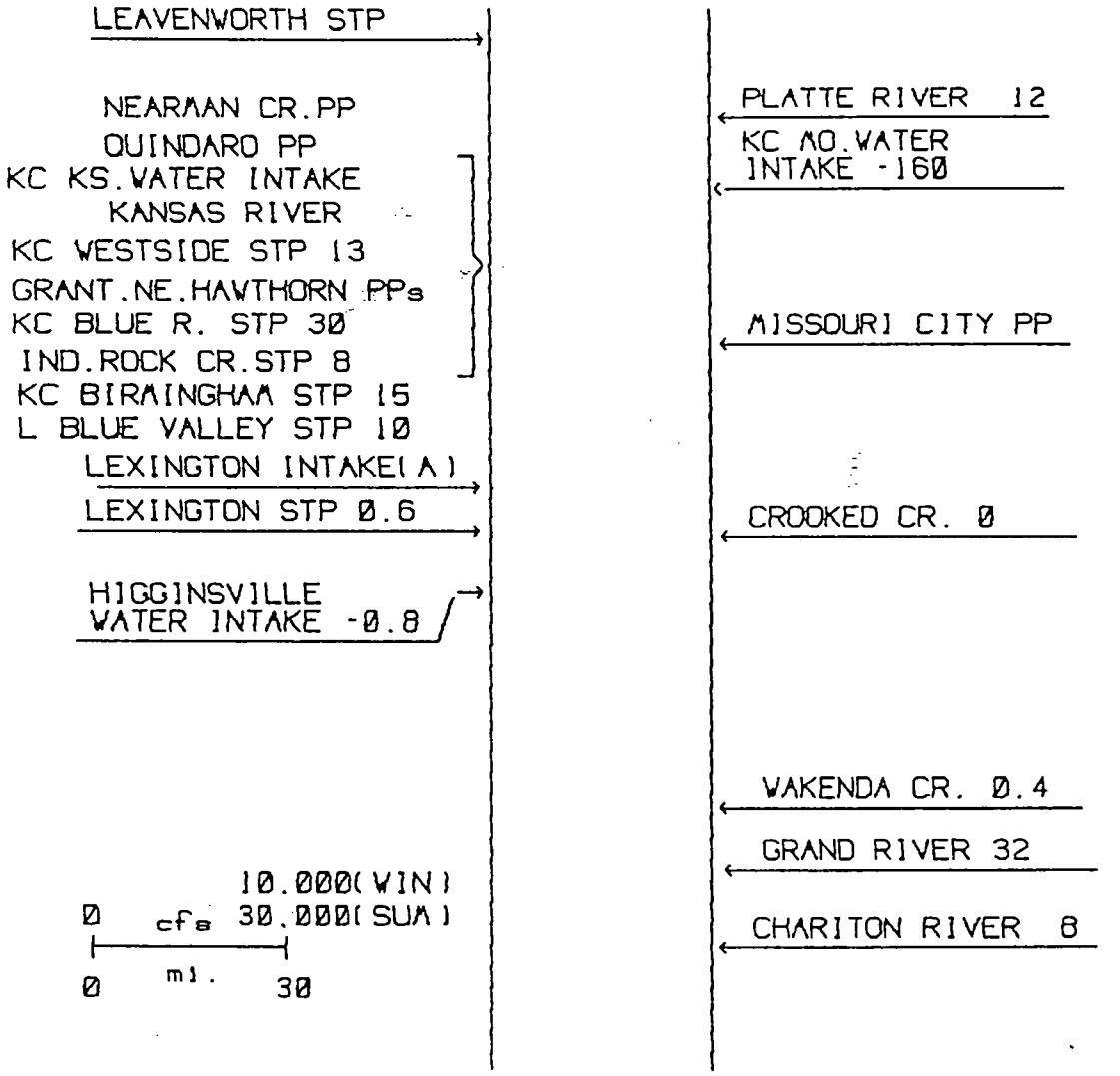
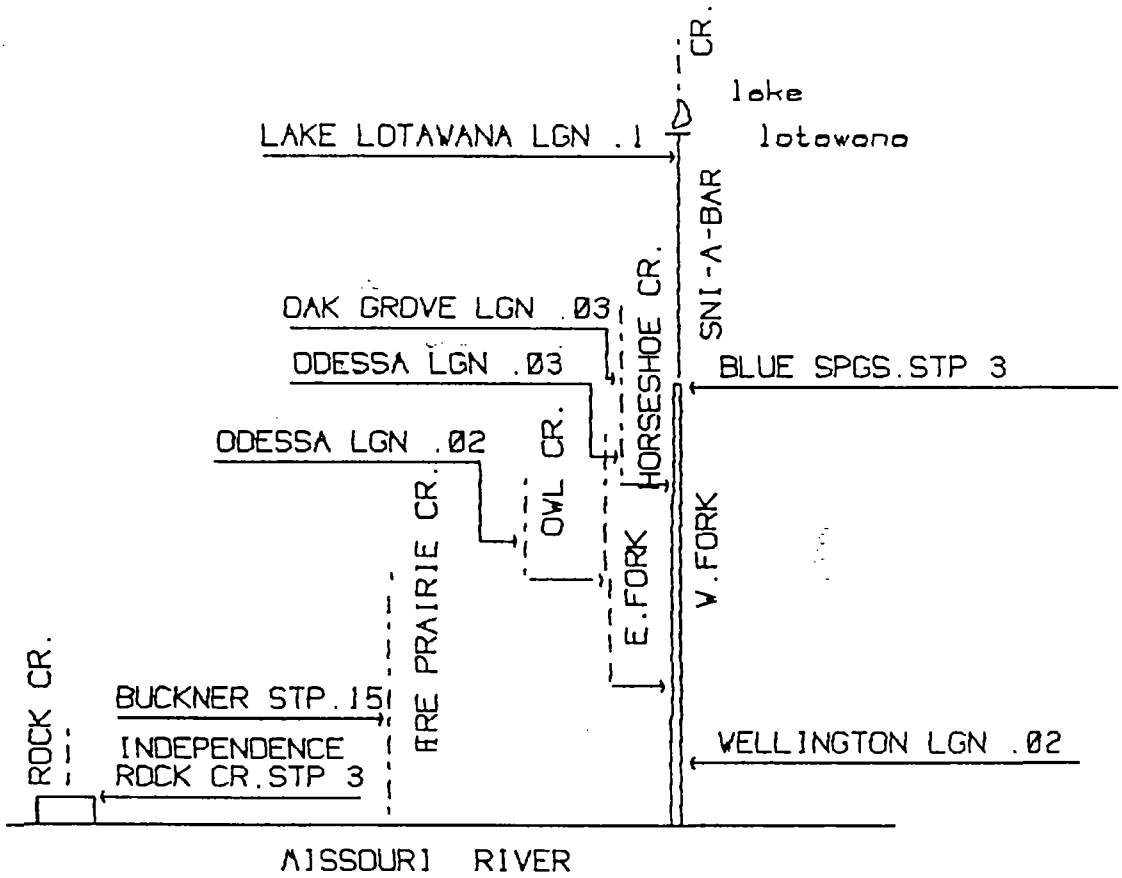
LOW FLOW DIAGRAM
BASIN 15

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SNI-A-BAR
OAK GROVE LGN .03
HORSESHOE CR.
ODESSA LGN .03
BLUE SPGS.STP 3
ODESSA LGN .02
OWL CR.
PRAIRIE CR.
E.FORK
W.FORK
ROCK CR.
BUCKNER STP.15
INDEPENDENCE
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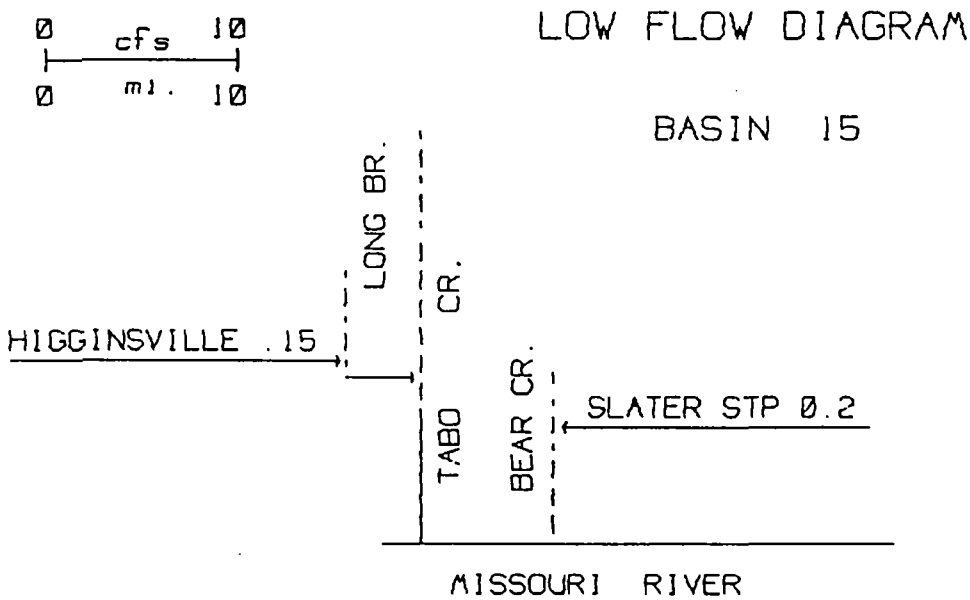
WELLINGTON LGN .02
MISSOURI RIVER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LOW FLOW DIAGRAM
BASIN 15
LONG BR.
CR.
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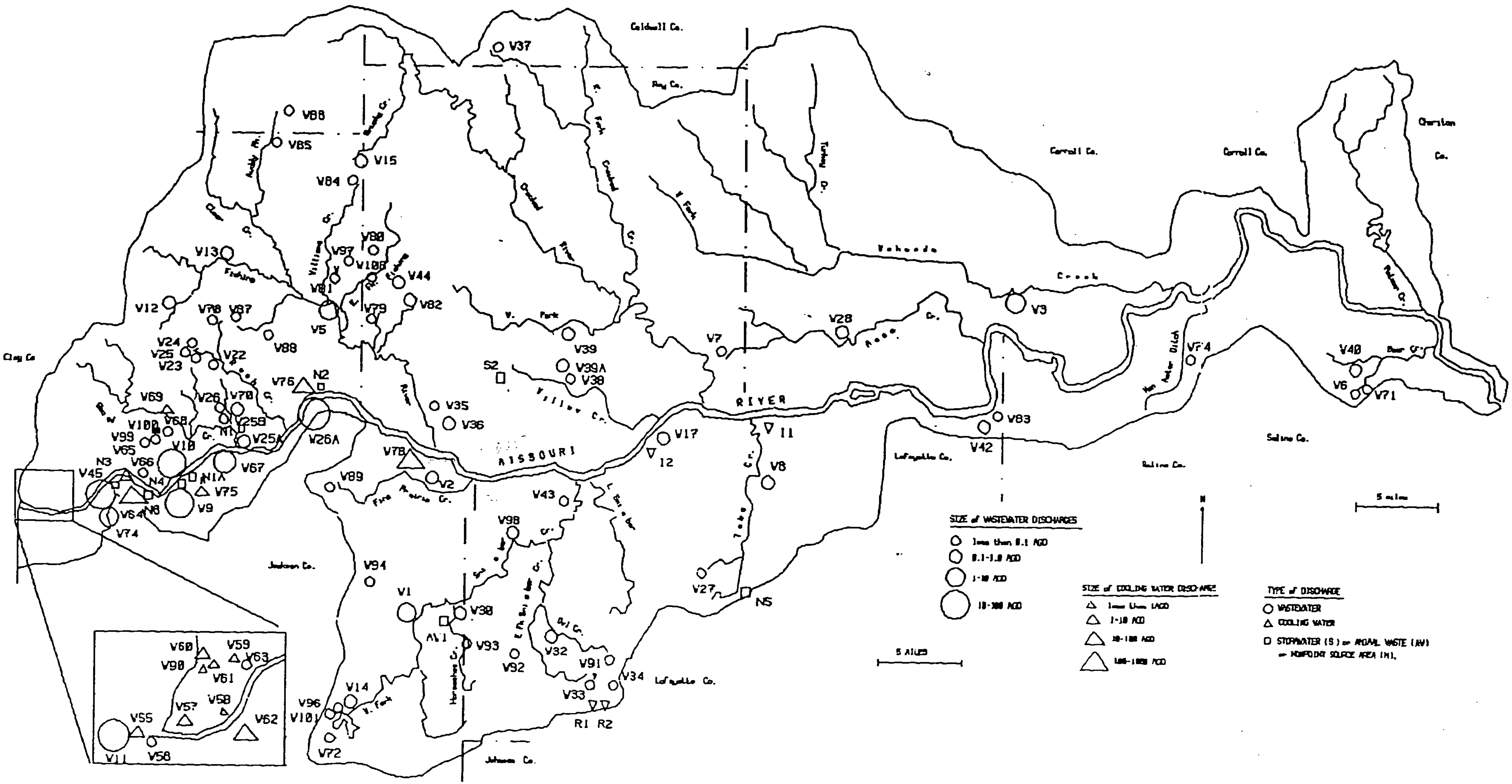
TABO
BEAR CR.
SLATER STP 0.2
MISSOURI RIVER

FIGURE 16-2

WEST CENTRAL TRIBS TO MISSOURI RIVER



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PA/SI Reference 12

United States
Department of
Agriculture

Economic
Research
Service

Forest
Service

Soil
Conservation
Service

in cooperation
with

State of
Missouri

State of
Iowa

The Land and Water of the Northern Missouri River Tributaries Basin — Iowa and Missouri

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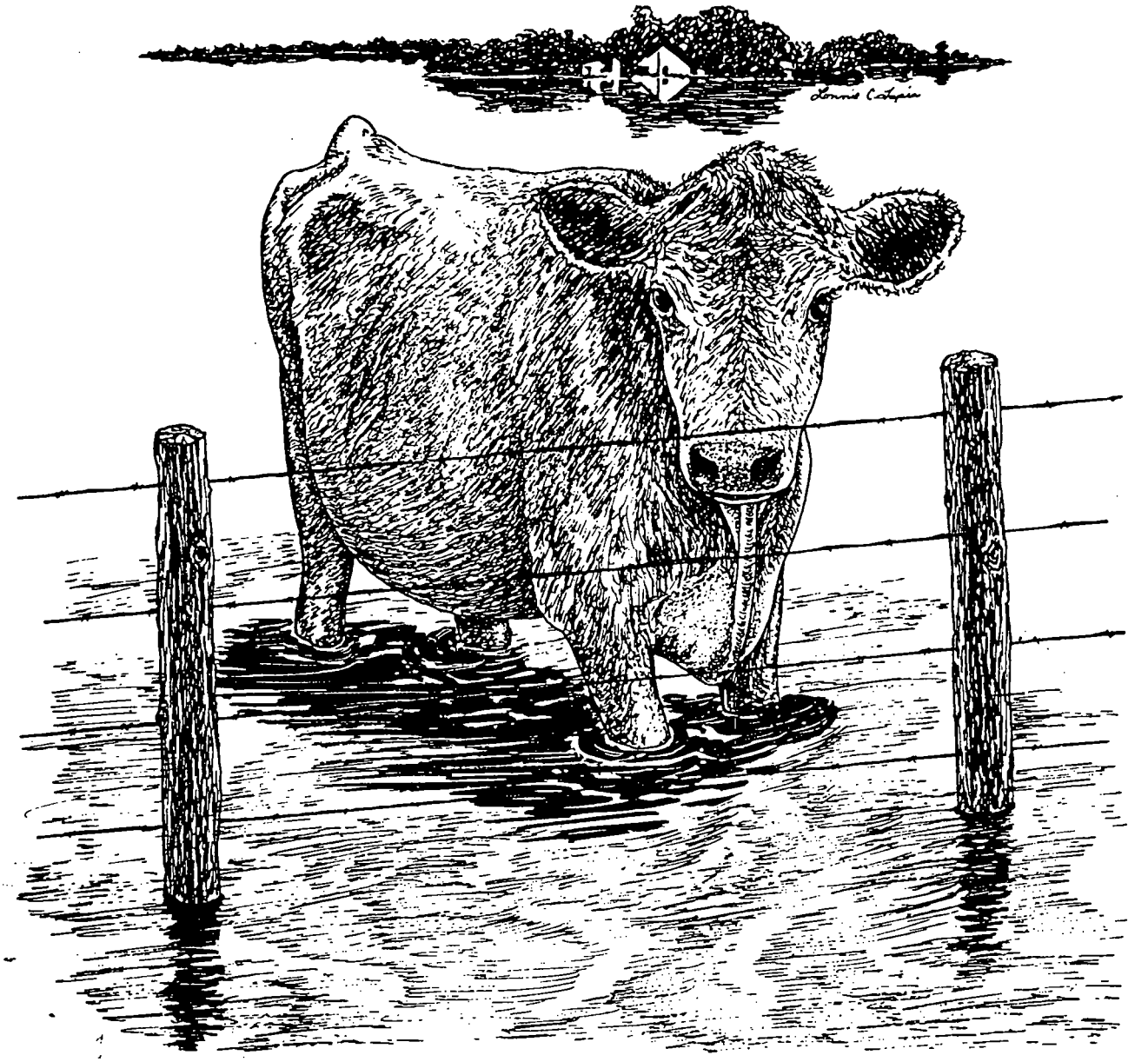
WASTE MANAGEMENT PROGRAM

An Inventory and Analysis Summary Report
April, 1982



CONTENTS

		Page
	PREFACE	ix
	Initiation	x
	Authority	x
	Objectives	x
	USDA and Sponsoring Participation	xi
	Acknowledgements	xi
	Inventory and Analysis Reports	xii
I.	BASIN RESOURCES	1
	Description	2
	Climate	4
	Land Resources	8
	Geology	8
	Soils and Geology	8
	Land Classification	12
	Present Land Use and Future Demands	14
	Prime Farmland	18
	Forest	20
	Water Resources	20
	Surface Water	20
	Ground Water	22
	Water Use	24
	Outdoor Recreation	27
	Fish and Wildlife	27
	Wetlands	32
	Archeological and Historical Resources	32
	Unique, Scenic, and Natural Areas	35
	Economic Base	37
	Population	37
	Employment and Income Base and Projections	42
	Transportion	43
II.	PROBLEMS AND CONCERNS	46
	Agricultural Land	47
	Production Capacity of the Basin	47
	Upland Problems	50
	Bottom Land Problems	50
	Forestry Problems	54
	Erosion	54
	Subbasin Erosion	57
	Stream Erosion	62
	Road and Other Erosion	62
	Status of Soil Depletion	66
	Sediment	69
	Overall Erosion and Sediment Evaluation	70

CONTENTS - Continued

	Page
Water Quality	75
Suspended Sediment	75
Base Flows	75
Excessive Aquatic Plant Growths	76
Water Temperatures	77
Acidic Waters	77
Pesticide Fish Kills	78
Pool Loss	79
Manganese	80
Fecal Coliform	80
Overall Stream Water Quality Evaluation	81
Energy	81
Wetlands and Streams	84
Wildlife	88
Water Supply	92
Flooding	92
Recreation	98
Irrigation	100
Missouri River Flood Plain Drainage Systems	102
III. CONCLUSIONS AND RECOMMENDATIONS	105
Land Use Conflicts	106
Erosion	110
Forestry	113
Stream Systems and Streambank Erosion	113
Water Quality	115
Surface Water	115
Ground Water	115
Water Supply	116
Flooding	116
Upland Wildlife	118
Wetlands	121
Recreation	121
Irrigation	121
Missouri River Flood Plain Drainage Systems	123
Inventory Report Conclusion	123
Appendix A	A-1
Tarkio River and Direct Tributaries to Missouri River	A-2
Nodaway River Subbasin	A-4
Platte River Subbasin	A-10
Upper Grand River Subbasin	A-14
Thompson River Subbasin	A-16
Lower Grand River Subbasin	A-21
Chariton River Subbasin	A-23
Direct Tributaries Subbasin	A-27
GLOSSARY	B-1

to hilly with some areas level to undulating. Hilly to steep ridge and valley slopes occur along major streams. Interstates 29 and 35, and U.S. 59, 71, 169, 69, 65 and 63 are north-south highways. Interstate 80 and U.S. 6, 24, 136 and 36 are east-west highways.

Table 2 -- Counties, Northern Missouri River Tributaries Basin, Iowa and Missouri

IOWA		MISSOURI	
County	Area in Basin Percent	County	Area in Basin Percent
Adair	68	Adair	53
Adams	100	Andrew	100
Appanoose	87	Atchison	87
Audubon	94	Buchanan	100
Cass	100	Caldwell	100
Clarke	31	Carroll	100
Davis	7	Chariton	100
Decatur	100	Clay	100
Fremont	72	Clinton	100
Guthrie	6	Daviess	100
Lucas	31	DeKalb	100
Madison	5	Gentry	100
Mills	59	Grundy	100
Monroe	2	Harrison	100
Montgomery	100	Holt	100
Page	100	Howard	10
Ringgold	100	Linn	100
Taylor	100	Livingston	100
Union	98	Macon	64
Wayne	100	Mercer	100
		Nodaway	100
		Platte	100
		Putnam	100
		Randolph	57
		Ray	100
		Schuyler	33
		Sullivan	100
		Worth	100

The basin can be characterized as a typical midwestern rural area with scattere small towns and a low population density. The largest city is St. Joseph, Missou with a population of 76,691 in 1980. The cities with populations of over 2,000 are usually the county seats. Kansas City, Missouri, lies just outside of the basin to the southwest. Spillover of residential and commercial development from Kansas City is occurring into the basin area.

B. Climate

Climatically, the area is characterized by warm, humid summers and cold Within a season, temperatures and precipitation may fluctuate widely. Cold

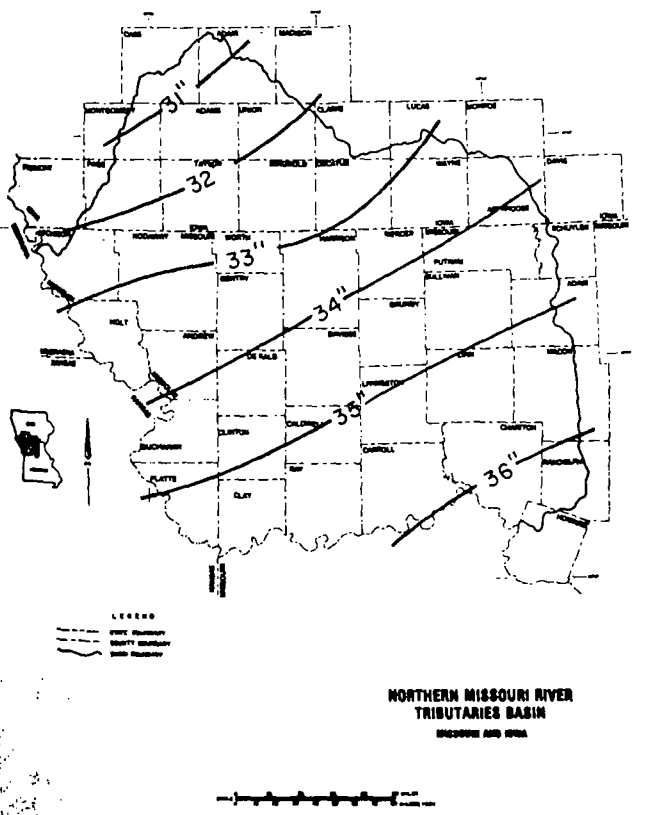
air moves into the basin from the north out of Canada; and warm, moist gulf air moves into the basin out of the Gulf of Mexico.

Summer weather is moderately warm and humid. July and August temperatures occasionally exceed 100 degrees Fahrenheit. Average annual temperatures range from 49 degrees Fahrenheit in the north to 55 degrees Fahrenheit in the south. The frost-free period extends from April through late October, ranging from an average of 190 frost-free days in the northwest to an average 214 frost-free days in the southeast.

Winter weather is cold, with several days of subzero temperatures. The average winter temperatures range from 23 degrees Fahrenheit in Iowa to 31 degrees Fahrenheit in Missouri. The regional average for January is 26.8 degrees Fahrenheit.

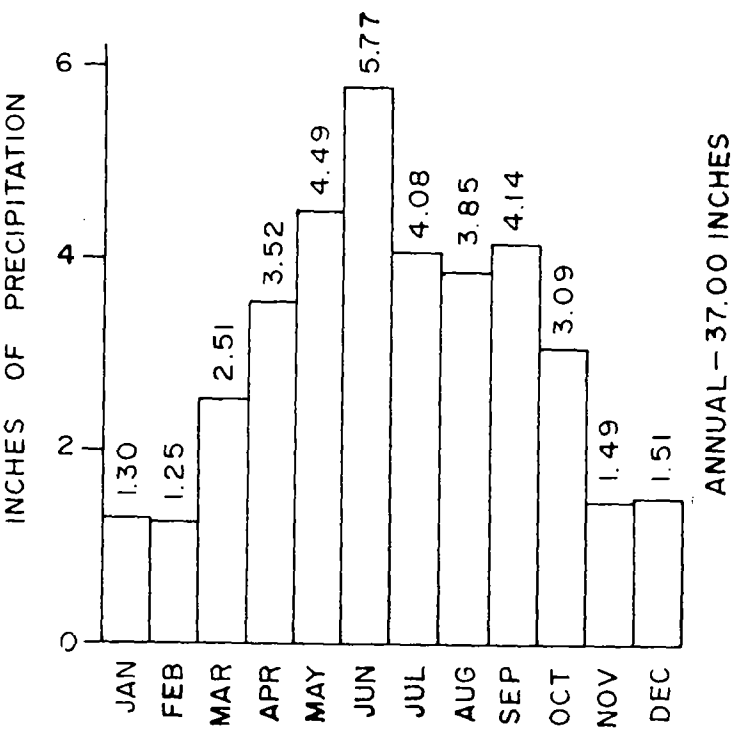
The average annual recorded precipitation measurements range from 31 inches in the northwest part of the basin, to 36 inches in the southeast part (Map 2). The average annual regional rainfall for the basin is 37 inches. The monthly regional distribution varies from 1.25 inches in February to 5.77 inches in June (Figure 1).

Map 2
Average Annual Rainfall



Average annual rainfall increases southeasterly across the basin.

Figure 1 -- Missouri Regional Average Monthly Rainfall Distribution



Maximum average rainfall occurs in June. November, December, January, and February are months of minimum rainfall.

Map 8

AVERAGE ANNUAL RUNOFF

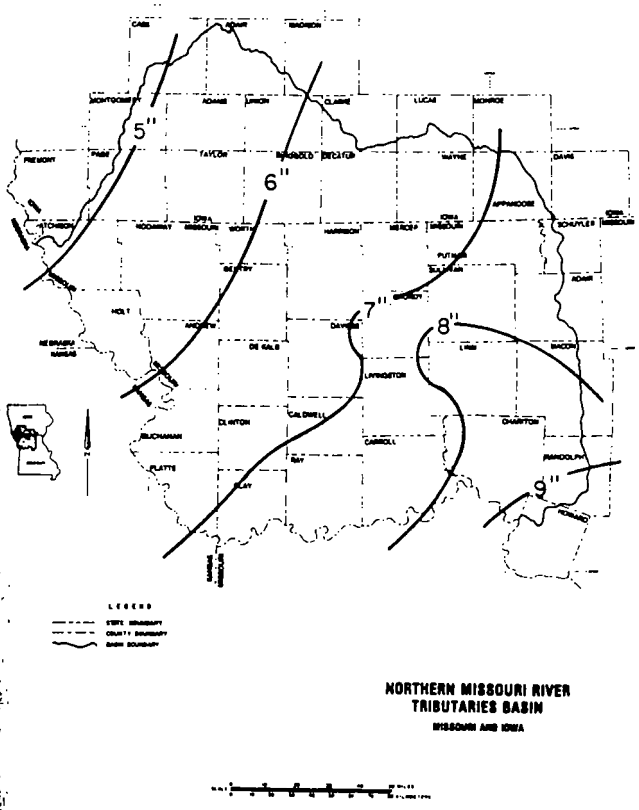
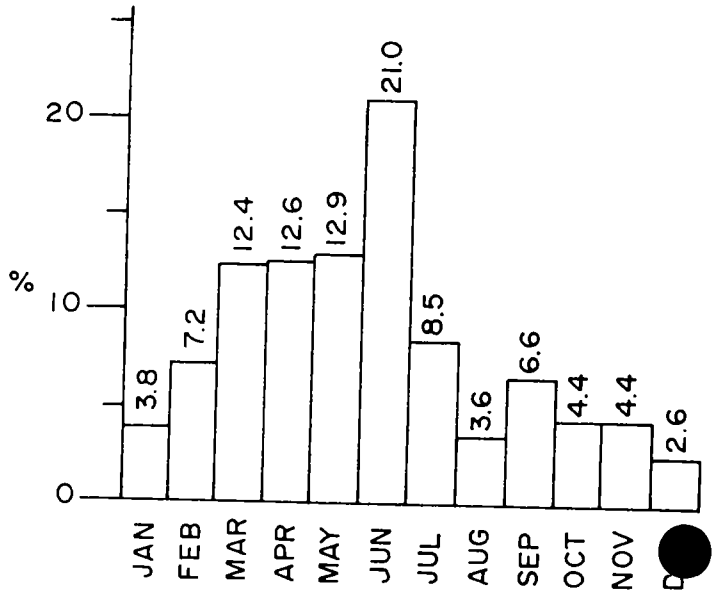


Figure 4 -- Average Annual Runoff by Months for the Grand River Gage at Gallatin, Missouri.



Average annual runoff increases southeasterly across the basin.

Average annual runoff measured at the Grand River Gage, Gallatin, Missouri is greatest during the month of June.

Ground Water (Missouri)

The volume of ground water stored in the basin is not known. Many ground water areas are poorly defined. The principal sources of ground water are alluvium, buried pleistocene valleys, glacial drift, and bedrock (Map 9).

Water in the Missouri River alluvium is characterized by high hardness, high iron content, and a wide range in dissolved solids. Water in stream alluvium, other than the Missouri River alluvium, is characterized by moderate hardness, moderate iron content, and a moderate range in dissolved solids. The chemical water quality of ground water in buried pleistocene valleys and glacial drift is variable and may be better or worse in quality than ground water in the Missouri River or stream alluviums. In general, the water from buried pleistocene valleys and glacial drift is high in total iron, total dissolved solids, and sulfates. The dissolved-solids content of water from bedrock aquifers ranges from less than 1,000 to 20,000 mg/l, and sodium chloride and sulfate are usually the principal constituents. The high dissolved-solids content of bedrock aquifers makes them unsuitable for most uses. Waters with totally dissolved solids in the range 1,000 to 2,000 mg/l may have adverse effects on many crops and require careful management practices. Waters with totally dissolved solids in the range 2,000 to 5,000 mg/l can be used for tolerant plants on permeable soils with careful management practices. Waters with totally dissolved solids in excess of 5,000 mg/l are not recommended for irrigation.

Ground water yields are the most dependable in the Missouri River alluvium where wells yield from 1,000 to 2,000 gallons per minute. The tributary alluvium wells yield from 10 to 175 gallons per minute but do not usually exceed 100 gallons per minute. The highest yields occur along the Grand, Chariton, Nodaway, and Lower Platte Rivers. Favorable areas in the glacial drift are indicated by presence of sand and gravel deposits which are free of silt and clay. The greater the thickness of the glacial drift the higher the potential yield. Glacial drift sands of 10 to 100 feet in thickness are capable of yields of 2 to 30 gallons per minute. A few areas having sand thickness greater than 100 feet are capable of yields of 30 to 500 gallons per minute and occasionally up to 1,000 gallons per minute. In addition to poor water quality, yields from bedrock aquifers are too low for most uses.

Water Use

The largest use of water in northwest Missouri is for cooling purposes by electric power plants. These plants pump water either from the Missouri River or from impoundments, such as Thomas Hill Reservoir. Most of the water is returned to the source after use.

Public supplies account for the second most important use of water in the area. The average per capita use of towns with greater than 1,000 population is about 100 gallons per day. The higher per capita use indicated for some towns reflects the use of water by industries. Other important uses include dilution of sewage wastes, livestock watering, farmstead consumption and use, and irrigation.

The source and available supply of water was inventoried for 120 water supply systems in the Missouri portion of the basin. Sources of systems identified in this inventory were streams, wells and lakes (Map 10).

Eisenberg Fill Site
(alias: Leo Eisenberg's Propety)
MOD985768175
PA/SI Reference 13

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES
MEMORANDUM

DATE: May 25, 1995

TO: Eisenberg Fill Superfund technical file

FROM: Julie A. Bloss, Environmental Specialist
Superfund Section, Hazardous Waste Program

SUBJECT: Site visit and sampling at the Eisenberg Fill site

On April 27, 1995 I accompanied Mr. Larry Alderson and Mr. Joe Boland of the Environmental Services Program (ESP) on the site inspection sampling effort at the Eisenberg Fill site. The day was partly cloudy, 50-60° Fahrenheit, with moderate winds from the northwest.

The Eisenberg Fill site is bounded to the north and west by I-35 and to the east and south by railroad tracks and Burlington Northern property. ConAgra and another flour milling company are located northeast of the property, facing Armour Road (see attached map).

Mo-Kan Container Service, located at the intersection of 16th Street and Railroad Avenue, leases approximately ten acres of the property. Mo-Kan's address is 1620 Railroad Avenue. I spoke with Mr. Tom Vodde, site manager. He said that Mo-Kan has four permanent employees who work on-site, but any trucking company can come on the property to rent containers. As many as 100 trucks may visit the site in a day.

The portion of the property leased by Mo-Kan is covered with truck/rail containers. The area behind the Mo-Kan portion is an open lot, partially covered by grasses and trees. I observed piles of gray fill across the site and a pile of corrugated pipe. I also found a small area with a fire extinguisher, caution tape and what appeared to be a gas mask. Numerous rabbits and birds inhabit the heavily vegetated areas of the site.

There are no residential areas within 200 feet of Eisenberg Fill property. The nearest residence is a condominium development to the northwest of the intersection of I-35 and Armour Road. The City of North Kansas City 19th Avenue pumping station is located slightly north and east of the property. This building used to house an animal shelter.

There is an intermittent drainage running along the western and southern edges of the property. We were unable to determine the direction of surface water flow along this drainage. There is also an artificially constructed drainage along the eastern side of Railroad Avenue.

We left the site at 1:50 pm, after Mr. Boland and Mr. Alderson had completed their sampling.

RECYCLED PAPER

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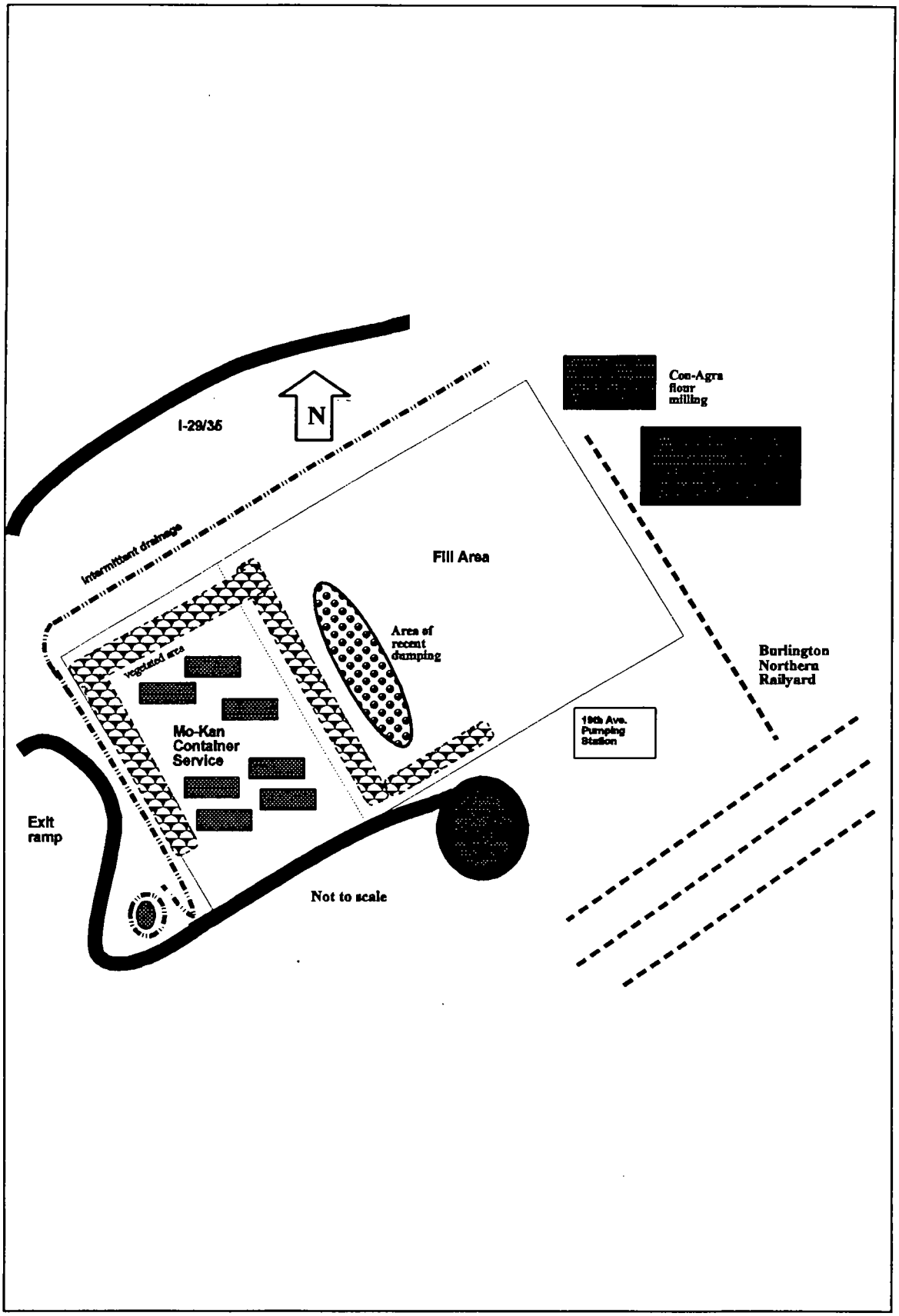


Eisenberg Fill site - April 27, 1995

Site map by Julie Bloss, MDNR

Figure 44B – LOWER MISSOURI-BLACKWATER-LAMINE RIVER BASIN

Karst area

K Local karst present

•12 Springs

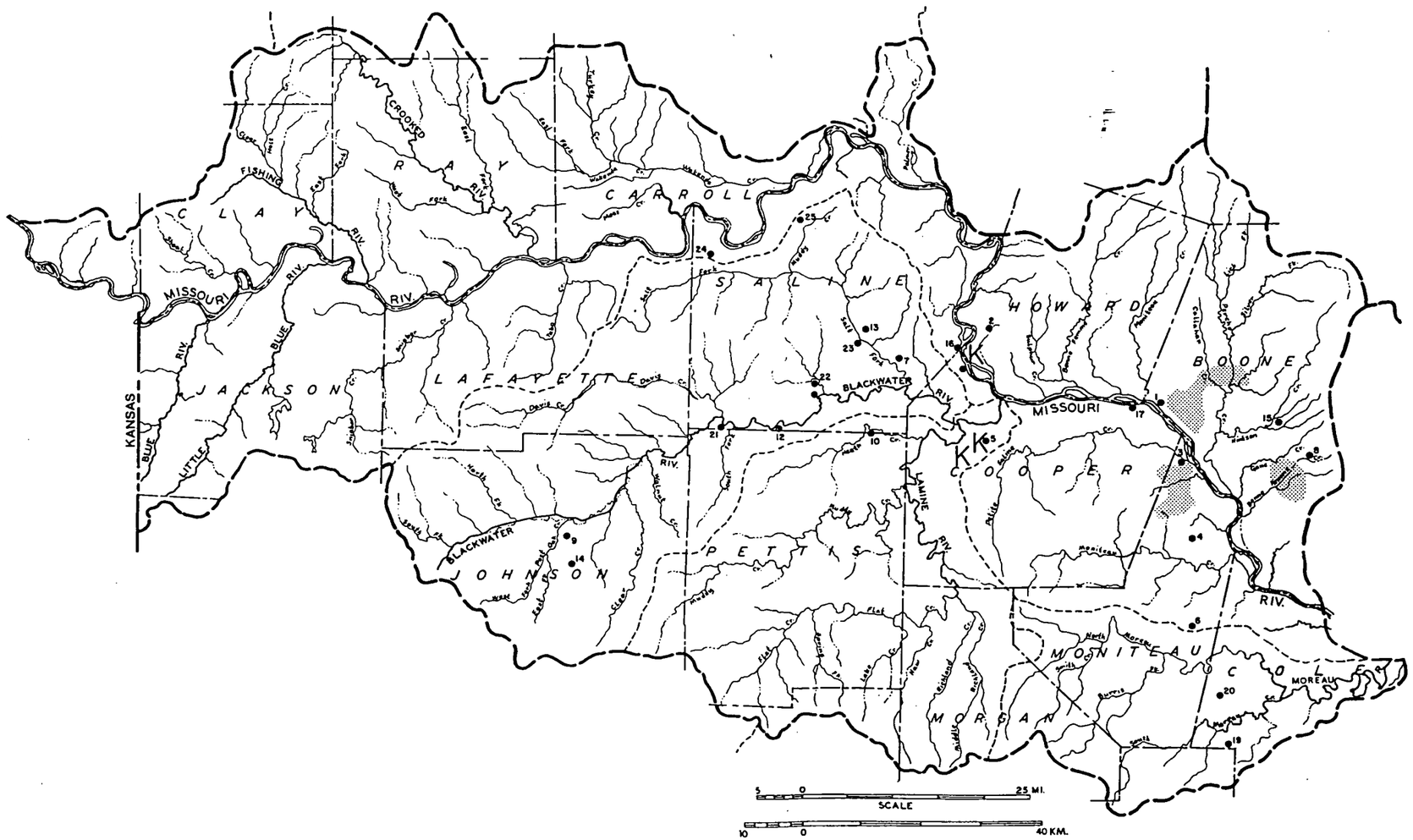


Table 8 – SPRINGS

Map B – Lower Missouri-Blackwater-Lamine River Basin

No.	Spring	County
1	Boone Cave	Boone
2	Booneslick	Howard
3	Bruce Cave	Moniteau
4	Cave	Moniteau
5	Chouteau	Cooper
6	Cook	Moniteau
7	Dennis	Saline
8	Devils Icebox	Boone
9	Electric	Johnson
10	Elk Lick	Saline
11	Blue Lick	Saline
12	McAllister	Saline
13	Napton	Saline
14	Pertle	Johnson
15	Rollins	Boone
16	Sante Fe	Saline
17	Schmidt	Cooper
18	Slough Creek	Cooper
19	Steenbargen	Cole
20	Strobel	Cole
21	Sweet	Saline
22	Upper Blue Lick	Saline
23	Wilton	Saline
24	Town	Saline
25	Van Meter	Saline

II. Drainage Systems

MISSOURI IN THE MISSISSIPPI RIVER SYSTEM

As shown in figure 9, Missouri occupies a central position in the Mississippi River drainage system. According to national terminology, that portion of the state drained by the Mississippi, above the Ohio River, is considered to be in the Upper Mississippi River Basin. This includes that part of the state between the Des Moines River and the Ohio River. Along Missouri's border, two major tributaries, the Ohio River and the Illinois River, enter the Mississippi from the east.

That portion of the state drained directly by the Mississippi River and lying below the Ohio River junction is considered to be in the Lower Mississippi River Basin.

The southwestern and south-central portions of Missouri are part of the Arkansas-White-Red River Basin. Missouri streams in this area contribute to the White and Arkansas Rivers, both of which drain into the Mississippi River.

The Missouri River flows through the center of the state from west to east and enters the Mississippi River above St. Louis. The Missouri River Basin is the largest of the major river basins in Missouri.

The central position of Missouri in the nation's drainage system has greatly influenced the settlement and economic development of the state. These rivers continue to be important as water resources and in providing connections with other parts of the United States and with the world.

For further information, contact the Missouri Department of Natural Resources, Water Resources Program, Jefferson City.

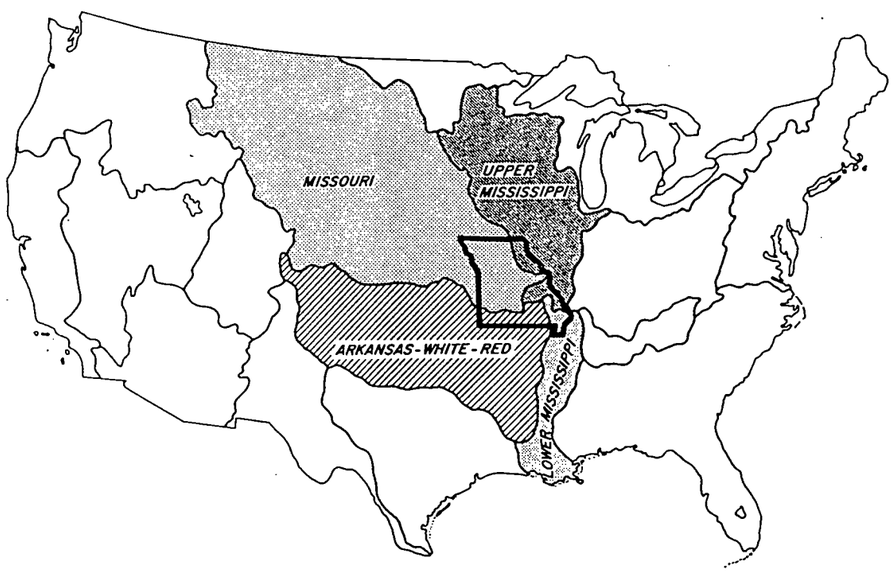
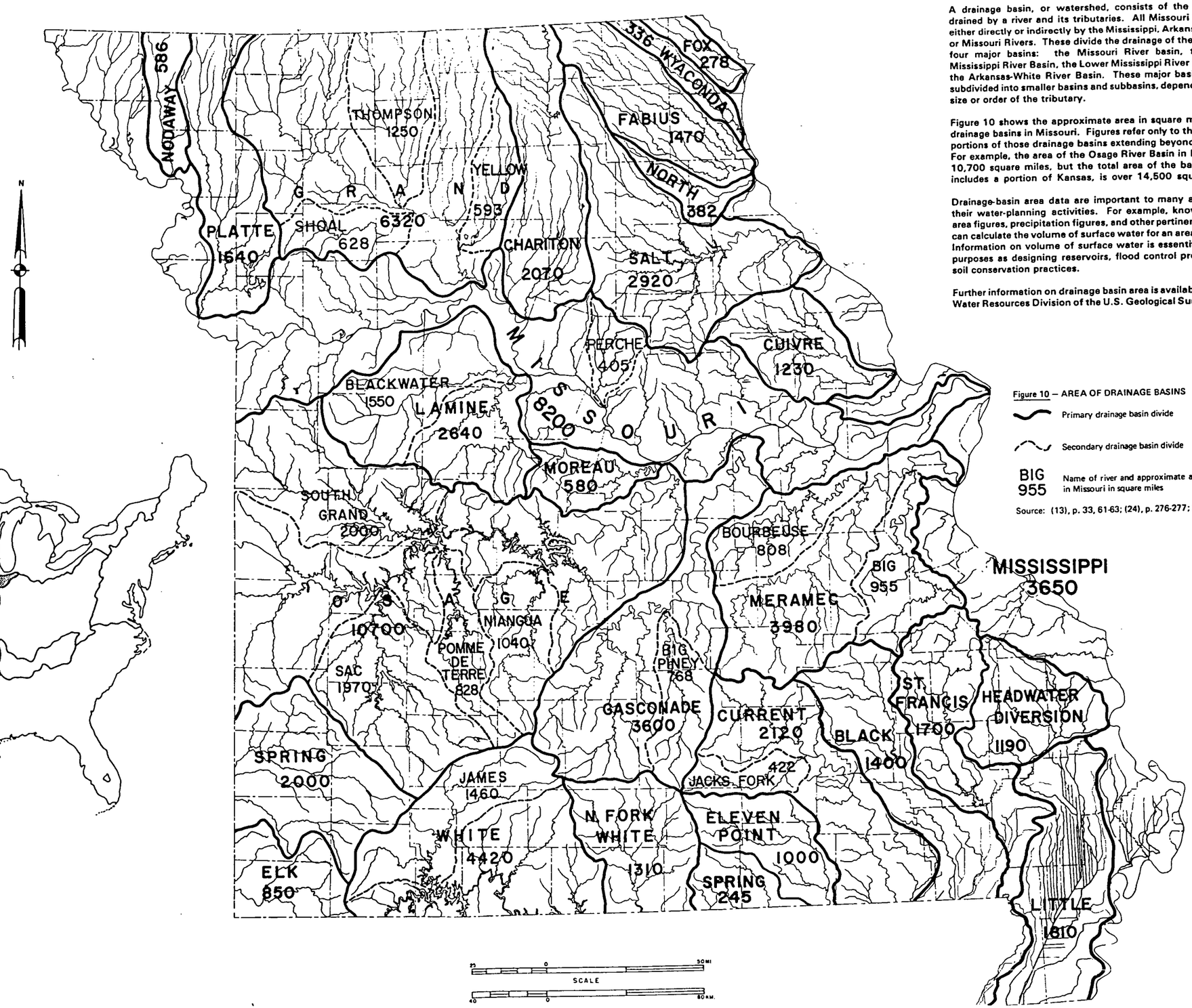


Figure 9 – MISSOURI IN THE MISSISSIPPI RIVER SYSTEM

Major River Basins

- Missouri River Basin
- Upper Mississippi River Basin
- Lower Mississippi River Basin
- Arkansas-White-Red River Basin

Source: (44), p. 126-127



AREA OF DRAINAGE BASINS

A drainage basin, or watershed, consists of the land area drained by a river and its tributaries. All Missouri is drained either directly or indirectly by the Mississippi, Arkansas-White, or Missouri Rivers. These divide the drainage of the state into four major basins: the Missouri River basin, the Upper Mississippi River Basin, the Lower Mississippi River Basin, and the Arkansas-White River Basin. These major basins can be subdivided into smaller basins and subbasins, depending on the size or order of the tributary.

Figure 10 shows the approximate area in square miles of 38 drainage basins in Missouri. Figures refer only to the Missouri portions of those drainage basins extending beyond Missouri. For example, the area of the Osage River Basin in Missouri is 10,700 square miles, but the total area of the basin, which includes a portion of Kansas, is over 14,500 square miles.

Drainage-basin area data are important to many agencies in their water-planning activities. For example, knowing basin area figures, precipitation figures, and other pertinent data, one can calculate the volume of surface water for an area or region. Information on volume of surface water is essential for such purposes as designing reservoirs, flood control projects, and soil conservation practices.

Further information on drainage basin area is available from the Water Resources Division of the U.S. Geological Survey, Rolla.

Figure 10 – AREA OF DRAINAGE BASINS

- Primary drainage basin divide
- Secondary drainage basin divide
- BIG 955 — Name of river and approximate area of drainage in Missouri in square miles

Source: (13), p. 33, 61-63; (24), p. 276-277; (36), p. 29

Figure 5 – MODERN SOIL SURVEYS, 1984

- No published soil survey
- Soil survey published prior to 1940 (copies not available for distribution)
- Modern soil survey being conducted with an estimated date for completion
- Modern soil survey completed – to be published
- Modern published soil survey
- Partial survey of county (U.S. Forest Service areas)
- Partial survey of county (U.S. Forest Service areas) completed – to be published

Source: (61)

MODERN SOIL SURVEYS

A soil survey report is one of the most valuable resource inventories for any land area. Surveys are generally prepared on a county basis and include detailed maps showing the location and areal extent of different soil-mapping units. Surveys contain information on the physical and chemical characteristics of soil-mapping units. In the modern soil survey report, different soil characteristics are interpreted for various uses, including agricultural yield, soil erodibility, engineering properties, transportation planning and design, suitability for septic tanks, and many others. This information is also useful for determining suitability for hazardous-waste disposal sites, rates of fertilizer and herbicide application, and to delineate prime farmland soils. Status of soil surveys by county is shown in figure 5.

The U.S. Soil Conservation Service, U.S. Forest Service, Missouri Department of Natural Resources, and the University of Missouri—Columbia Agricultural Experiment Station cooperate in the National Cooperative Soil Survey Program in Missouri. Further information may be obtained from any of these agencies.

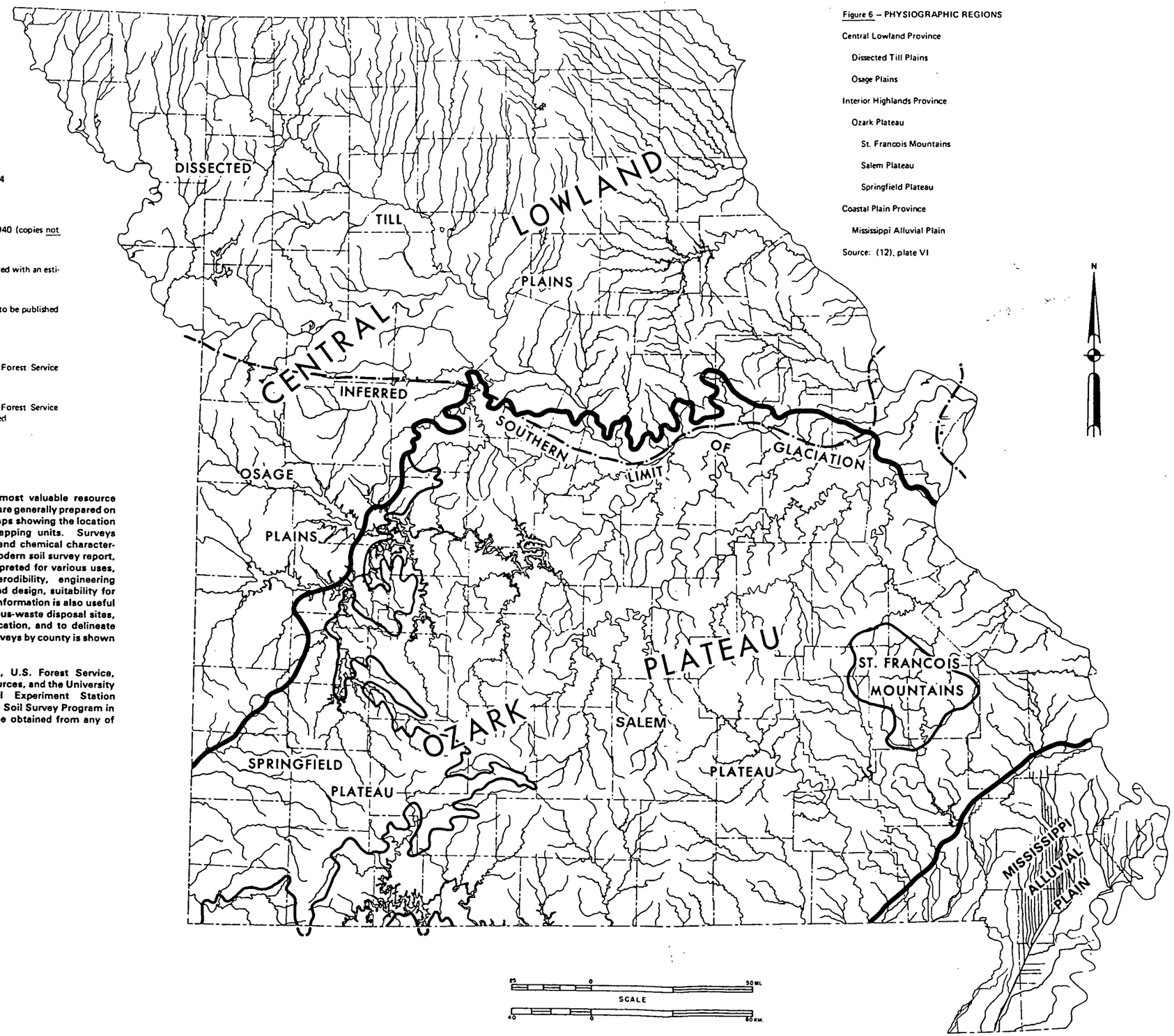


Figure 6 – PHYSIOGRAPHIC REGIONS

- Central Lowland Province
  - Dissected Till Plains
  - Osage Plains
- Interior Highlands Province
  - Ozark Plateau
    - St. Francois Mountains
    - Salem Plateau
    - Springfield Plateau
- Coastal Plain Province
  - Mississippi Alluvial Plain

Source: (12), plate VI

PHYSIOGRAPHIC REGIONS

The state of Missouri includes parts of three major landform or physiographic provinces of the United States: the Central Lowland, the Interior Highlands, and the Coastal Plain.

Northern and western Missouri are part of the vast Central Lowland or Interior Plain, which extends from the Rocky Mountains to the Appalachians. Subdivisions of the Central Lowland in Missouri are the Dissected Till Plains, north of the southern limit of glaciation, and the unglaciated Osage Plains of west-central Missouri. These regions in Missouri are shown in figure 6.

The Dissected Till Plains are chiefly developed on glacial material deposited on sedimentary rocks, mostly of Pennsylvanian age. This is a region of mixed hills and plains. Smooth plains are most conspicuous in Audrain and adjacent counties and in the lower Grand River region and in Saline County. Open low hills with steeper slopes occur in the Chariton River Basin, along the Iowa state line, and along the Missouri River in northwestern Missouri. Surface deposits of loess (wind-deposited silt) are found throughout the Dissected Till Plains, but reach particularly great thicknesses in northwestern Missouri and on the bluffs along the Missouri River. Elevations range from about 600 feet in St. Charles County to over 1100 feet in northwestern Missouri, but local relief is usually 50 to 200 feet.

The Osage Plains are smooth to rolling plains of low relief formed on Pennsylvanian sedimentary rocks. These plains are smoothest in a belt extending from Pettis County southwestward through Barton County. Isolated low mounds and low, east-facing escarpments occur locally. Relative relief is usually 50 to 150 feet.

The Interior Highlands province is represented in Missouri by the Ozark Plateau, which continues southward into Arkansas and Oklahoma. The northern boundary of the Ozark Plateau is often marked for convenience at the Missouri River, but Ozark-type rocks, topography, and streams extend into the glaciated river hills on the north side of the river, from Boone County to St. Charles County. The western boundary of the Ozark Plateau is not topographically distinct and is traditionally defined as the contact between Mississippian and Pennsylanian rocks. The southeastern boundary with the Mississippi Alluvial Plain is the prominent Ozark escarpment. The Ozark Plateau is traditionally subdivided into three regions in Missouri: the St. Francois Mountains, the Salem Plateau, and the Springfield Plateau or Plain.

The St. Francois Mountains are high hills with as much as 700 feet of local relief. They are mostly separate knobs with rounded summits, formed on Precambrian igneous rocks and projecting slightly above the sedimentary plateau surface. Taum Sauk Mountain, at 1772 feet above sea level, is the highest point in the state.

The Salem Plateau, a dissected plateau largely on Cambrian and Ordovician carbonate rocks, encircles the St. Francois Mountains, but it is more extensive to the west and southwest. Streams have dissected it to varying degrees. Along the drainage divides between major river systems, the plateau has been best preserved as a rolling upland surface with a local relief of 100 to 200 feet. Elsewhere, streams have cut narrow valleys 200 to 500 feet deep, creating major tracts of rugged hills. Much of the upland part of the Salem Plateau lies between 1000 and 1400 feet above sea level. Karst features are locally prominent in the Salem Plateau.

The Springfield Plateau, or Plain, is underlain by Mississippian limestones. It is a region of lower relief than the Salem Plateau. Nearer the conspicuous east-facing Eureka Springs (Burlington) escarpment, which separates the Springfield and Salem Plateaus in southwestern Missouri, stream dissection accounts for a relative relief of as much as 400 feet. Elevations on the Springfield Plateau range from 1700 feet at its easternmost point, to about 1000 feet on the Kansas border. Karst features are locally prominent.

The Mississippi Alluvial Plain in southeastern Missouri extends southward to the Gulf of Mexico and is considered part of the larger Coastal Plain province of the United States. In Missouri it is mostly a flat plain sloping southward at an average of 1.5 feet per mile. Rising above it are the low, linear hills of Crowleys Ridge and others, underlain by Cretaceous and Tertiary rocks and mantled with loess. These hills and minor alluvial terraces separate the alluvial plain into distinct natural basins for purposes of ditching and draining. The Little River drainage ditches leave Missouri at about 230 feet, the lowest elevation in the state.

For more information, contact the Missouri Department of Natural Resources, Division of Geology and Land Survey, Rolla.

Source: (12), p. 85-90, 588-613, 631-655; (15), p. 11-19 and map supplement

CONTENTS

Page No.

INTRODUCTION iv

I. BACKGROUND
Location 1
Figure 1 — Location 1
Table 1 — Population of Counties and Cities with over 15,000 Population, 1970 and 1980 1
Hydrography 2
Figure 2 — Hydrography 2
Geology 3
Figure 3 — Geology 3
Soils 4
Figure 4 — Soils 4
Modern Soil Survey 5
Figure 5 — Modern Soil Survey, 1984 5
Physiographic Regions 5
Figure 6 — Physiographic Regions 5
Regional Planning Commissions 6
Figure 7 — Regional Planning Commissions 6
County Planning and Zoning 6
Figure 8 — County Planning and Zoning 6

II. DRAINAGE SYSTEMS
Missouri in the Mississippi River System 7
Figure 9 — Missouri in the Mississippi River System 7
Area of Drainage Basins 7
Figure 10 — Area of Drainage Basins 7
U.S. Army Corps of Engineers Districts and Divisions 8
Figure 11 — U.S. Army Corps of Engineers Districts and Divisions 8
Watersheds Defined by the Soil Conservation Service 8
Figure 12 — Watersheds Defined by the Soil Conservation Service 8
Table 2 — Concordance of Watersheds, Defined by the Soil Conservation Service, and Hydrologic Units of the U.S. Geological Survey 9
Hydrologic Units of the U.S. Geological Survey 9
Figure 13 — Hydrologic Units of the U.S. Geological Survey 9
Basin Series Used in Atlas 10
Figure 14 — Basin Series Used in Atlas 10

III. THE HYDROLOGIC CYCLE
The Hydrologic Cycle 11
Figure 15 — The Hydrologic Cycle 11
Precipitation and Runoff 11
Figure 16 — Average Annual Precipitation 11
Figure 17 — Average Spring Precipitation — March, April, and May 12
Figure 18 — Average Summer Precipitation — June, July, and August 12
Figure 19 — Average Autumn Precipitation — September, October, and November 12
Figure 20 — Average Winter Precipitation — December, January, and February 12
Figure 21 — Average Monthly Precipitation 13
Figure 22 — Average Annual Snowfall 13
Figure 23 — Average Annual Runoff 13
Average Annual Evaporation 13
Figure 24 — Average Annual Evaporation 13
Maximum Expected Precipitation 14
Figure 25 — Maximum Expected Precipitation 14
Figure 26 — Maximum Expected Precipitation 14
Figure 27 — Maximum Expected Precipitation 14
Figure 28 — Maximum Expected Precipitation 15
Figure 29 — Maximum Expected Precipitation 15
Figure 30 — Maximum Expected Precipitation 15

IV. WATER QUANTITY
Hydrologic-Data Stations 16
Figure 31 — Hydrologic-Data Stations 16
Table 3 — Hydrologic-Data Stations 16
Dams and Lakes 17
Figure 32 — Dams and Lakes 17
Table 4 — Distribution of Dams by County 17
Stream Discharge 18
Figure 33 — Average Annual Discharge of Principal Streams 18
Figure 34 — Maximum Recorded Discharge of Principal Streams 19
Figure 35 — Minimum Recorded Discharge of Principal Streams 20
Table 5 — Minimum, Average, and Maximum Recorded Stream Discharges 20
Monthly Variation in Stream Discharge 21
Figures 36 A-C — Monthly Variation in Stream Discharge 21
Ratio of Basin Area to Length of "Permanent Stream" 22
Table 6 — Ratio of Basin Area to Length of "Permanent Stream" 22
Permanent and Intermittent-Flow Streams Defined for Aquatic-Resource Management 22
Figure 37 — Permanent and Intermittent-Flow Streams Defined for Aquatic-Resource Management 22
Permanent and Intermittent-Flow Streams Defined for Aquatic-Resource Management, by Basin 23
Figures 37 A-K — Permanent and Intermittent-Flow Streams Defined for Aquatic-Resource Management, by Basin
Figure 37A — Lower Missouri-Grand-Chariton River Basin 23
Figure 37B — Lower Missouri-Blackwater-Lamine River Basin 24
Figure 37C — Osage River Basin 25
Figure 37D — Spring-Elk River Basin 26
Figure 37E — Upper Mississippi-Salt River Basin 26
Figure 37F — East Lower Missouri River Basin 27
Figure 37G — White River Basin 27
Figure 37H — Gasconade River Basin 28
Figure 37I — Meramec River Basin 28
Figure 37J — Upper Mississippi River Basin below St. Louis 29
Figure 37K — Lower Mississippi-Black River Basin 29
Number of Stream Miles per Square Mile of Area 30
Figure 38 — Number of Stream Miles per Square Mile of Area 30
Alterations of Major Stream Channels 30
Figure 39 — Alterations of Major Stream Channels 30
Table 7 — Alterations of Major Stream Channels 30
Groundwater Surveys 31
Figure 40 — Groundwater Surveys 31
Fresh Groundwater Yields from Bedrock 31
Figure 41 — Fresh Groundwater Yields from Bedrock 31
Glacial Drift and Preglacial Drainage in Northwestern Missouri 32
Figure 42 — Sand and Gravel Deposits in Alluvium and Glacial Drift in Northwestern Missouri 32
Figure 43 — Preglacial Drainage in Northwestern Missouri 32
Karst Topography, Springs, and Losing Streams 32
Figures 44 A-K — Karst Topography, Springs, and Losing Streams
Figure 44A — Lower Missouri-Grand-Chariton River 33
Table 8 — Springs 33
Figure 44B — Lower Missouri-Blackwater-Lamine River Basin 34
Table 8 — Springs 34
Figure 44C — Osage River Basin 35
Table 8 — Springs 35
Table 9 — Losing Streams 35
Figure 44D — Spring-Elk River Basin 36
Table 8 — Springs 36
Table 9 — Losing Streams 36
Figure 44E — Upper Mississippi-Salt River Basin 36
Figure 44F — East Lower Missouri River Basin 37
Table 8 — Springs 37
Table 9 — Losing Streams 37
Figure 44G — White River Basin 37
Figure 44H — Gasconade River Basin 38
Table 8 — Springs 38
Table 9 — Losing Streams 38
Figure 44I — Meramec River Basin 38
Figure 44J — Upper Mississippi River Basin Below St. Louis 39
Table 8 — Springs 39
Table 9 — Losing Streams 39
Figure 44K — Lower Mississippi-Black River Basin 39
Caves 40
Figure 45 — Caves 40
Table 10 — Number of Caves per County 40

V. WATER QUALITY
Areas of Coal Deposits and Major Coal Fields; Coal-Mining Areas and Streams Affected by Acid Mine Drainage 41
Figure 46 — Areas of Coal Deposits and Major Coal Fields 41
Table 11 — Streams Affected by Acid Mine Drainage, 1982 41
Figures 47 A-F — Coal-Mining Areas and Streams Affected by Acid Mine Drainage
Figure 47A — Lower Missouri-Grand-Chariton River 42
Figure 47B — Lower Missouri-Blackwater-Lamine River Basin 43
Figure 47C — Osage River Basin 44
(Maps D and E are not affected by acid mine drainage)
Figure 47F — East Lower Missouri River Basin 45
Reported Fish Kills, 1982 and 1983 45
Figure 48 — Reported Fish Kills, 1982 45
Figure 49 — Reported Fish Kills, 1983 45
Stream Classification by Water Use 46
Figure 50 — Streams Supporting Whole-Body Contact Recreation 46
Table 12 — Streams Designated for Cold-Water Sport Fishery 46
Table 13 — Streams Supporting Whole-Body Contact Recreation 46
Table 14 — Streams Designated for Drinking Water Supply 47
Figure 51 — Drinking Water Supply 47
Table 15 — Protected Streams 47
Figure 52 — Protected Streams (St. Louis) 47
Figure 53 — Protected Streams (Kansas City) 47
Point-Source Discharges 48
Figure 54 — Publicly Owned Point-Source Discharges 48
Table 16 — Point-Source Discharges, 1982 49
Figure 55 — Industrial and Mining Point-Source Discharges 49
Figure 56 — Privately Owned Point-Source Discharges 50
Figure 57 — Water Treatment Plants with Wastewater Point-Source Discharges 51
Groundwater Quality 52
Figure 58 — Groundwater Quality 52

VI. WATER USE
Water Use 53
Figure 59 — State Water Use, 1984 53
Figure 60 — All Other Water Uses, Except Electric Generation, 1984 53
Figure 61 — Total Water Use, 1984 53
Table 17 — Water Withdrawals by Major Water Uses, 1969-1978 53
Figure 62 — Municipal Water Use, 1984 54
Figure 63 — Industrial Water Use, 1984 54
Figure 64 — Domestic/Self-Supplied, 1984 54
Figure 65 — Power Water Use, 1984 54
Figure 66 — Fish and Wildlife Water Use, 1984 55
Figure 67 — Irrigation Water Use, 1984 55
Irrigation 55
Figure 68 — Total Acres Irrigated, 1982 55
Figure 69 — Surface Water Use Versus Groundwater Use, 1984 56
Figure 70 — Surface Water Use Versus Groundwater Use Excluding Electric Generation, 1984 56
Artificially Drained Land 56
Figure 71 — Artificially Drained Land, 1969 57
Figure 72 — Artificially Drained Land, 1974 57
Figure 73 — Artificially Drained Land as Percent of all Farmland, 1969 57
Figure 74 — Artificially Drained Land as Percent of all Farmland, 1974 57
Drainage Changes in Southeastern Missouri 58
Figure 75 — Southeastern Missouri Drainage, 1903 58
Figure 76 — Southeastern Missouri Drainage, 1974 58
Public Law 566 Watershed Projects 59
Figures 77 A-K — Public Law 566 Water-Shed Projects
Figure 77A — Lower Missouri-Grand-Chariton River Basin 59
Table 18 — Public Law 566 Watershed Projects 59
Figure 77B — Lower Missouri-Blackwater-Lamine River Basin 60
Table 18 — Public Law 566 Watershed Projects 60
Figure 77C — Osage River Basin 61
Table 18 — Public Law 566 Watershed Projects 61
Figure 77D — Spring-Elk River Basin 62
Table 18 — Public Law 566 Watershed Projects 62
Figure 77E — Upper Mississippi-Salt River Basin 62
Table 77F — East Lower Missouri River Basin 63
Table 18 — Public Law 566 Watershed Projects 63
Figure 77G — White River Basin 63
(Maps H and I do not illustrate any projects relevant to Public Law 566)
Figure 77J — Upper Mississippi River Basin Below St. Louis 64
Table 18 — Public Law 566 Watershed Projects 64
Figure 77K — Lower Mississippi-Black River Basin 64
Navigable Streams 65
Figure 78 — Navigable Streams 65
Port Authorities 66
Figure 79 — Port Authorities 66
National Flood Insurance Program 66
Figure 80 — County Participation in the National Flood Insurance Program 66
Figures 81 A-K — Community Participation in the National Flood Insurance Program
Figure 81A — Lower Missouri-Grand-Chariton River Basin 67
Table 19 — Community Participation in the National Flood Insurance Program 67
Figure 81B — Lower Missouri-Blackwater-Lamine River Basin 68
Table 19 — Community Participation in the National Flood Insurance Program 68
Figure 81C — Osage River Basin 69
Table 19 — Community Participation in the National Flood Insurance Program 69
Figure 81D — Spring-Elk River Basin 70
Table 19 — Community Participation in the National Flood Insurance Program 70
Figure 81E — Upper Mississippi-Salt River Basin 70
Figure 81F — East Lower Missouri River Basin 71
Table 19 — Community Participation in the National Flood Insurance Program 71
Figure 81G — White River Basin 71
Figure 81H — Gasconade River Basin 72
Table 19 — Community Participation in the National Flood Insurance Program 72
Figure 81I — Meramec River Basin 72
Figure 81J — Upper Mississippi River Basin Below St. Louis 73
Table 19 — Community Participation in the National Flood Insurance Program 73
Figure 81K — Lower Mississippi-Black River Basin 73
Municipal Public Water Supplies 74
Figure 82 — Municipal Public Water Supplies 74
Figures 82 A-K — Municipal Public Water Supplies by Basin
Figure 82A — Lower Missouri-Grand-Chariton River Basin 75
Table 20 — Municipal Water-Supply Facilities 75
Figure 82B — Lower Missouri-Blackwater-Lamine River Basin 76
Table 20 — Municipal Water-Supply Facilities 76
Figure 82C — Osage River Basin 77
Table 20 — Municipal Water-Supply Facilities 77
Figure 82D — Spring-Elk River Basin 78
Table 20 — Municipal Water-Supply Facilities 78
Figure 82E — Upper Mississippi-Salt River Basin 78
Figure 82F — East Lower Missouri River Basin 79
Table 20 — Municipal Water-Supply Facilities 79
Figure 82G — White River Basin 79
Figure 82H — Gasconade River Basin 80
Figure 82I — Meramec River Basin 80
Table 20 — Municipal Water-Supply Facilities 80
Figure 82J — Upper Mississippi River Basin Below St. Louis 80
Figure 82K — Lower Mississippi-Black River Basin 81
Table 20 — Municipal Water-Supply Facilities 81
Incorporated Places not Served by a Public Water Supply 82
Figure 83 — Incorporated Places not Served by a Public Water Supply 82
Table 21 — Incorporated Places not Served by a Public Water Supply 82
Public Water-Supply Districts (Rural Water Districts) 83
Figure 84 — Public Water-Supply Districts (Rural Water Districts), 1980 83
Table 22 — Public Water-Supply Districts 83
Public Water-Supply Surface-Water Intakes 84
Figure 85 — Public Water-Supply Surface-Water Intakes 84
Table 23 — Locations of Public Water-Supply-Lake Dams 85
Table 24 — Public Water-Supply Intake-Stream Locations 85
Fluoridated Public Water Supplies 86
Figure 86 — Fluoridated Public Water Supplies 86
Table 25 — Water Supplies with Adjusted Fluorides 86
Figure 87 — Levels of Naturally Occurring Fluorides in Public Water Supplies 87
Hydroelectric Power Generation (Installed Capacity) 88
Figure 88 — Hydroelectric Power Generation (Installed Capacity) 88
Major Reservoirs 88
Figure 89 — Major Reservoirs 88
Table 26 — Major Reservoirs 88
Water-Related Public Recreational Places 89
Figures 90 A-K — Water-Related Public Recreational Places
Figure 90A — Lower Missouri-Grand-Chariton River Basin 89
Figure 90B — Lower Missouri-Blackwater-Lamine River Basin 90
Table 27 — State Park and Historic Site Acreage 90
Figure 90C — Osage River Basin 91
Figure 90D — Spring-Elk River Basin 92
Figure 90E — Upper Mississippi-Salt River Basin 92
Figure 90F — East Lower Missouri River Basin 93
Figure 90G — White River Basin 93
Figure 90H — Gasconade River Basin 94
Figure 90I — Meramec River Basin 94
Figure 90J — Upper Mississippi River Basin Below St. Louis 94
Figure 90K — Lower Mississippi-Black River Basin 95

REFERENCES CITED 96

APPENDIX
State, Federal, and Other Offices and Agencies 97

Eisenberg Fill Site
(alias: Leo Eisenberg's Property)
MOD985768175
PA/SI Reference 14

MISSOURI WATER ATLAS

1986

Missouri Department of Natural Resources

Division of Geology and Land Survey

North Kansas City
1010580
4 wells
Clay County

Eisenberg Fill Site
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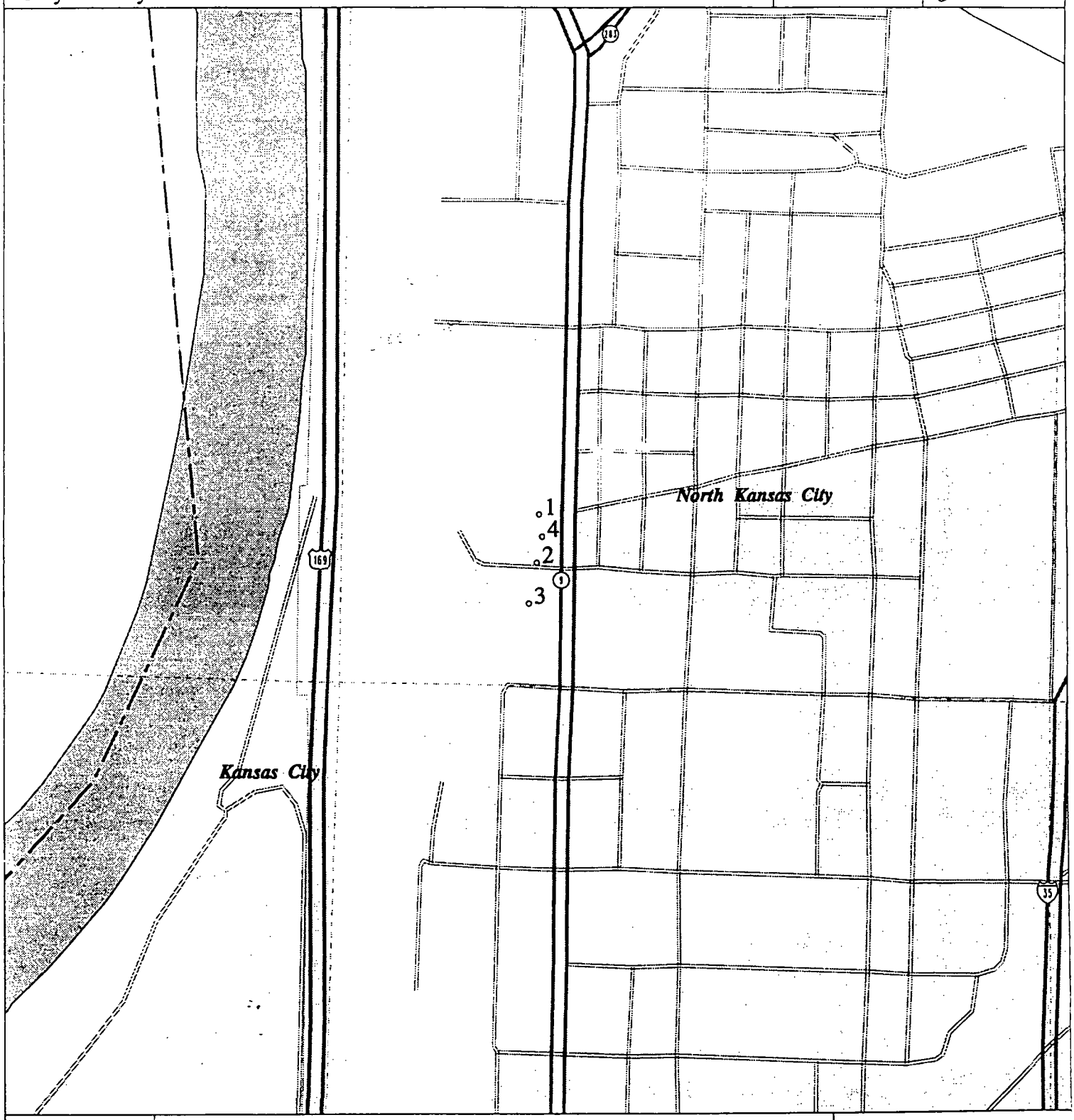
MOD985768175
PA/SI Reference 15



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CARES
University of

Wellhead
Water Body
Incorporated Area
Highway
Street or Road
Stream
U.S. Land Survey
County Boundary

This map is subject to change as additional information is aquired.
Production Date:

0 2000

N

Missouri Department of Natural Resources
Division of Environmental Quality

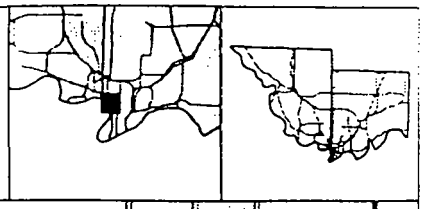
North Kansas City
1010580
4 wells

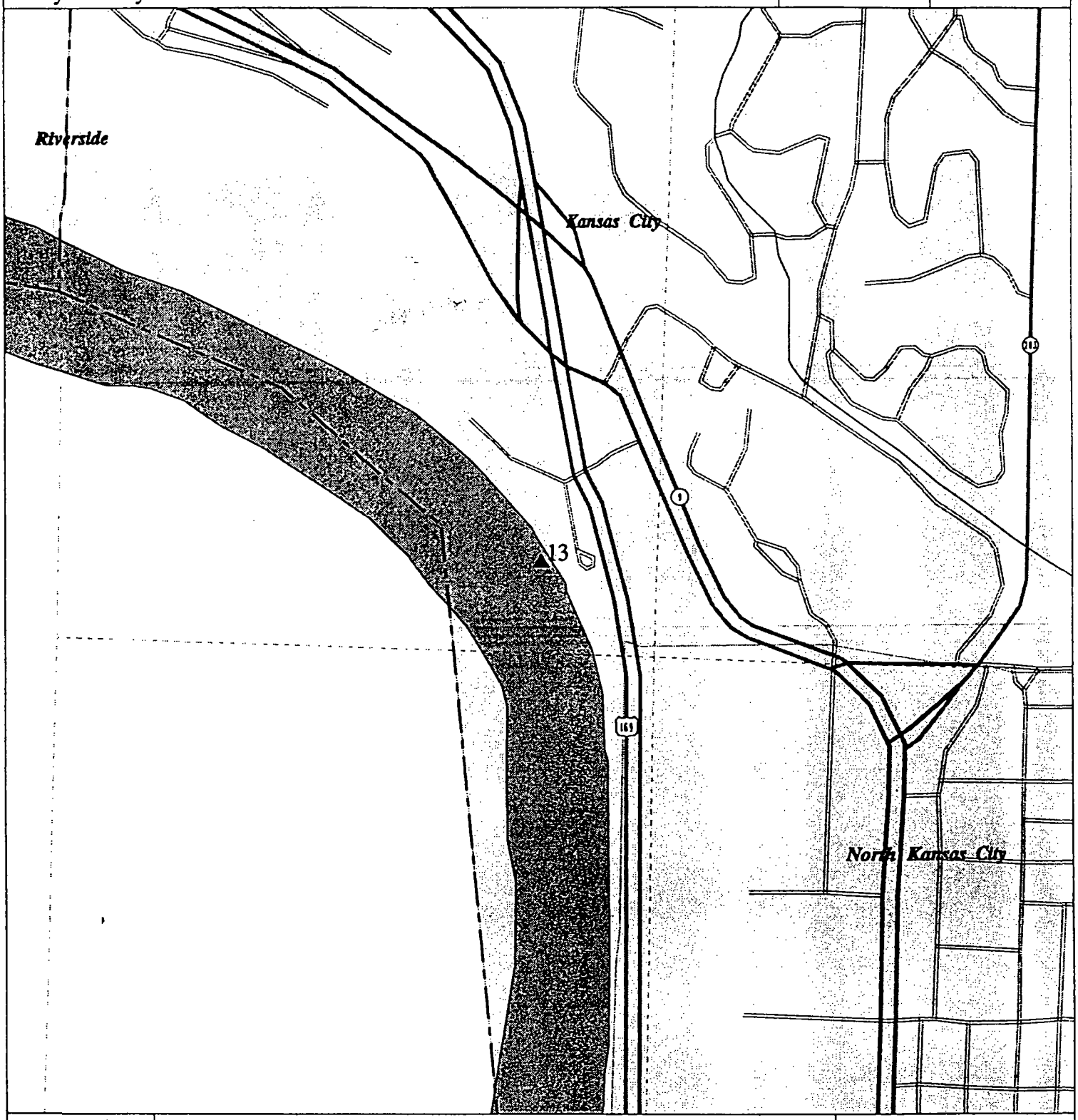
The information below represents the data currently associated with the water supply layers. The well/intake number corrisponds to the well/intake numbers depicted on the accompanying map. Blanks indicate missing data. This table is subject to change as additional information is aquired. Source: Missouri Department of Natural Resources, Public Drinking Water Program. Production Date: February 24, 1994

* Temporary DGLS well number. The correct well number is requested.

Well Number	1	2	3	4
Extended PWS #	1010580001	1010580002	1010580003	1010580004
Local Well Name				
DGLS Well #	40188*	40189*	40190*	40191*
Latitude	39 8 29.0 N	39 8 25.5 N	39 8 22.5 N	39 8 27.4 N
Longitude	94 34 51.3 W	94 34 51.5 W	94 34 52.2 W	94 34 51.0 W
County	Clay	Clay	Clay	Clay
DNR Region	Kansas City	Kansas City	Kansas City	Kansas City
Date Drilled				
Material (C/U)	C	C	C	Gravel Wall
Total Depth (ft)	150	150	150	135
Casing Depth (ft)	110	110	130	90
Casing Size (in)	12	12	10	12
Casing Type	S	S	S	S
Screen Length (ft)				
Screen Size (in)				
Static Water Level (ft)	17	17	17	28
Well Yield (gpm)	1000	1600		1600
Head (ft)				
Draw Down Level	5 to 12	5 to 12	5 to 12	5 to 12
Determination Date				
Yielding Strata	Gravel	Gravel	Gravel	Gravel
Pump Type	Turbine	Turbine	Centrifugal	Turbine
Pump Level (gpm)				
Capacity (gpm)	1000	1500	1000	1500
Pump Meter (Y/N)				
Standby Power (Y/N)				
Date Abandoned				
Date Plugged				
VOC detections (Y/N)	N	N	N	N
Nitrate– N Level (mg/l)				
Chlorination (Y/N)	Y	Y	Y	Y
Filtration (Y/N)	Y	Y	Y	Y
GWUDISW (Y/N)				

Kansas City
1010415
1 intake
Clay County





Prepared by CARES

■	Impoundment Intake	▬	Highway	─	Stream
▲	River Intake	═	Street or Road	- - - -	U.S. Land Survey
▒	Water Body	▭	Incorporated Area	─ ·	County Boundary

This map is subject to change as additional information is acquired.

0 2000

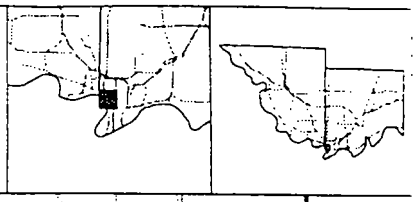
Missouri Department of Natural Resources

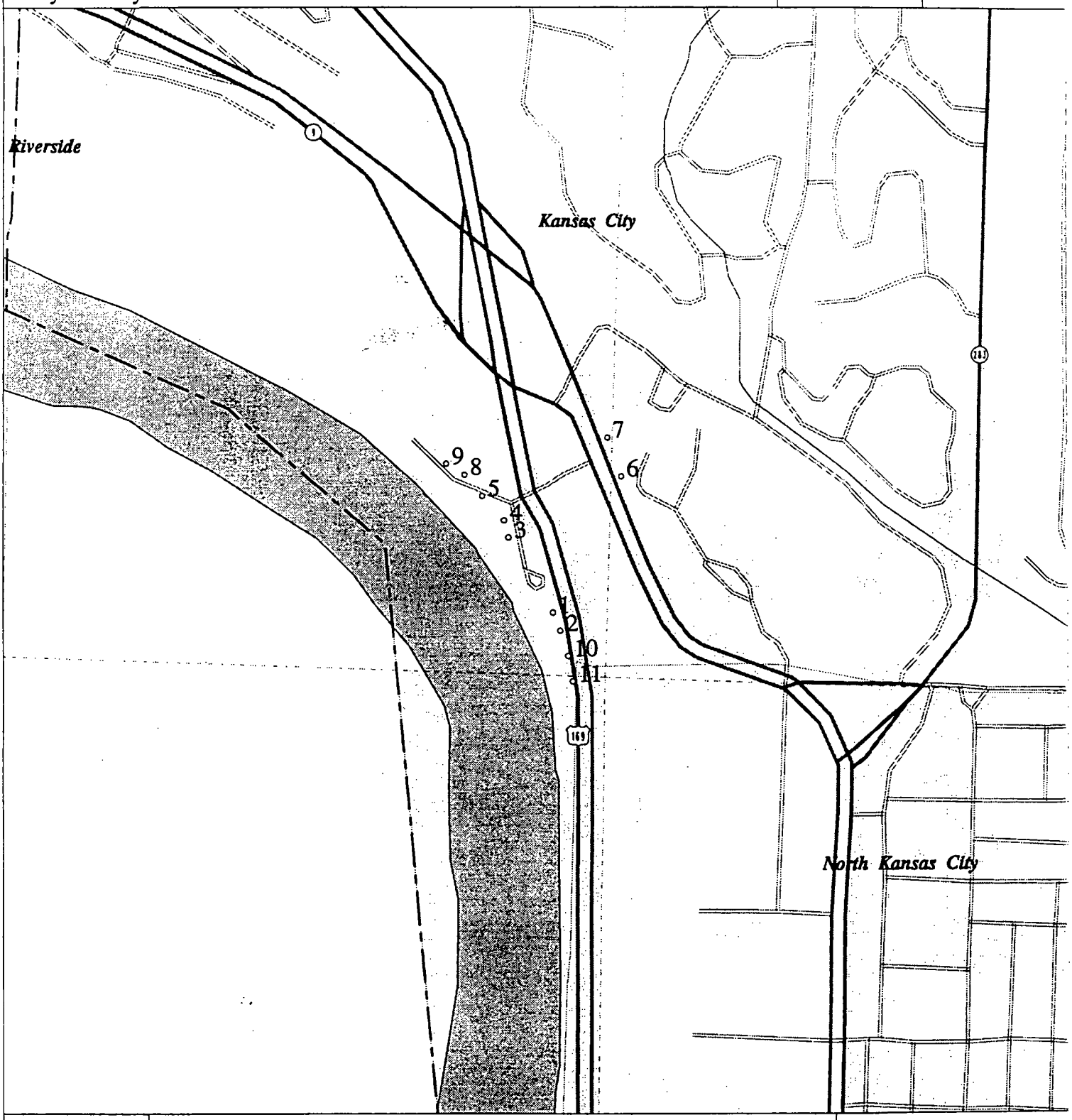
Kansas City
1010415
1 intake

The information below represents the data currently associated with the water supply layers. The well/intake number corrisponds to the well/intake numbers depicted on the accompanying map. Blanks indicate missing data. This table is subject to change as additional information is aquired.
Source: Missouri Department of Natural Resources, Public Drinking Water Program.
Production Date: February 27, 1994

Intake Number	13
Extended PWS #	1010415201
Intake Type	River
Latitude	39 9 15.5 N
Longitude	94 35 20.9 W
County	Clay
DNR Region	Kansas City
River Information	
River Name	Missouri River
River Mile	370.5

Kansas City
1010415
11 wells
Clay County





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University of

- Wellhead
- Water Body
- Incorporated Area
- Highway
- Street or Road
- Stream
- U.S. Land Survey
- County Boundary

This map is subject to change as additional information is aquired.
Production Date:

0 2000

N

Missouri Department of Natural Resources

Division of Environmental Quality

Kansas City
1010415
11 wells

The information below represents the data currently associated with the water supply layers. The well/intake number corrisponds to the well/intake numbers depicted on the accompanying map. Blanks indicate missing data. This table is subject to change as additional information is aquired. Source: Missouri Department of Natural Resources, Public Drinking Water Program. Production Date: February 24, 1994

*Temporary DGLS well number. The correct well number is requested.

Well Number	1	2	3	4	5
Extended PWS #	1010415001	1010415002	1010415003	1010415004	1010415005
Local Well Name					
DGLS Well #	40172*	40173*	40180*	40170*	40171*
Latitude	39 9 13.2 N	39 9 11.9 N	39 9 18.6 N	39 9 19.9 N	39 9 21.7 N
Longitude	94 35 14.7 W	94 35 14.0 W	94 35 18.8 W	94 35 19.2 W	94 35 21.2 W
County	Clay	Clay	Clay	Clay	Clay
DNR Region	Kansas City	Kansas City	Kansas City	Kansas City	Kansas City
Date Drilled					
Material (C/U)					
Total Depth (ft)					
Casing Depth (ft)					
Casing Size (in)					
Casing Type					
Screen Length (ft)					
Screen Size (in)					
Static Water Level (ft)					
Well Yield (gpm)					
Head (ft)					
Draw Down Level					
Determination Date					
Yielding Strata					
Pump Type					
Pump Level (gpm)					
Capacity (gpm)					
Pump Meter (Y/N)					
Standby Power (Y/N)					
Date Abandoned					
Date Plugged					
VOC detections (Y/N)	N	N	N	N	N
Nitrate– N Level (mg/l)					
Chlorination (Y/N)	Y	Y	Y	Y	Y
Filtration (Y/N)	Y	Y	Y	Y	Y
GWUDISW (Y/N)					

Kansas City
1010415
11 wells

*Temporary DGLS well number. The correct well number is requested.

The information below represents the data currently associated with the water supply layers. The well/intake number corrisponds to the well/intake numbers depicted on the accompanying map. Blanks indicate missing data. This table is subject to change as additional information is aquired. Source: Missouri Department of Natural Resources, Public Drinking Water Program. Production Date: February 24, 1994

Well Number	6	7	8	9	10
Extended PWS #	1010415006	1010415007	1010415008	1010415009	1010415010
Local Well Name					
DGLS Well #	40176*	40177*	40178*	40179*	40174*
Latitude	39 9 23.3 N	39 9 26.1 N	39 9 23.2 N	39 9 24.0 N	39 9 10.1 N
Longitude	94 35 8.6 W	94 35 9.9 W	94 35 22.9 W	94 35 24.6 W	94 35 13.2 W
County	Clay	Clay	Clay	Clay	Clay
DNR Region	Kansas City	Kansas City	Kansas City	Kansas City	Kansas City
Date Drilled					
Material (C/U)					
Total Depth (ft)					
Casing Depth (ft)					
Casing Size (in)					
Casing Type					
Screen Length (ft)					
Screen Size (in)					
Static Water Level (ft)					
Well Yield (gpm)					
Head (ft)					
Draw Down Level					
Determination Date					
Yielding Strata					
Pump Type					
Pump Level (gpm)					
Capacity (gpm)					
Pump Meter (Y/N)					
Standby Power (Y/N)					
Date Abandoned					
Date Plugged					
VOC detections (Y/N)	N	N	N	N	N
Nitrate– N Level (mg/l)					
Chlorination (Y/N)	Y	Y	Y	Y	Y
Filtration (Y/N)	Y	Y	Y	Y	Y
GWUDISW (Y/N)					

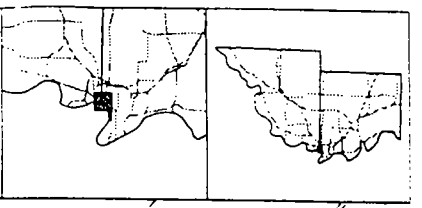
Kansas City
1010415
11 wells

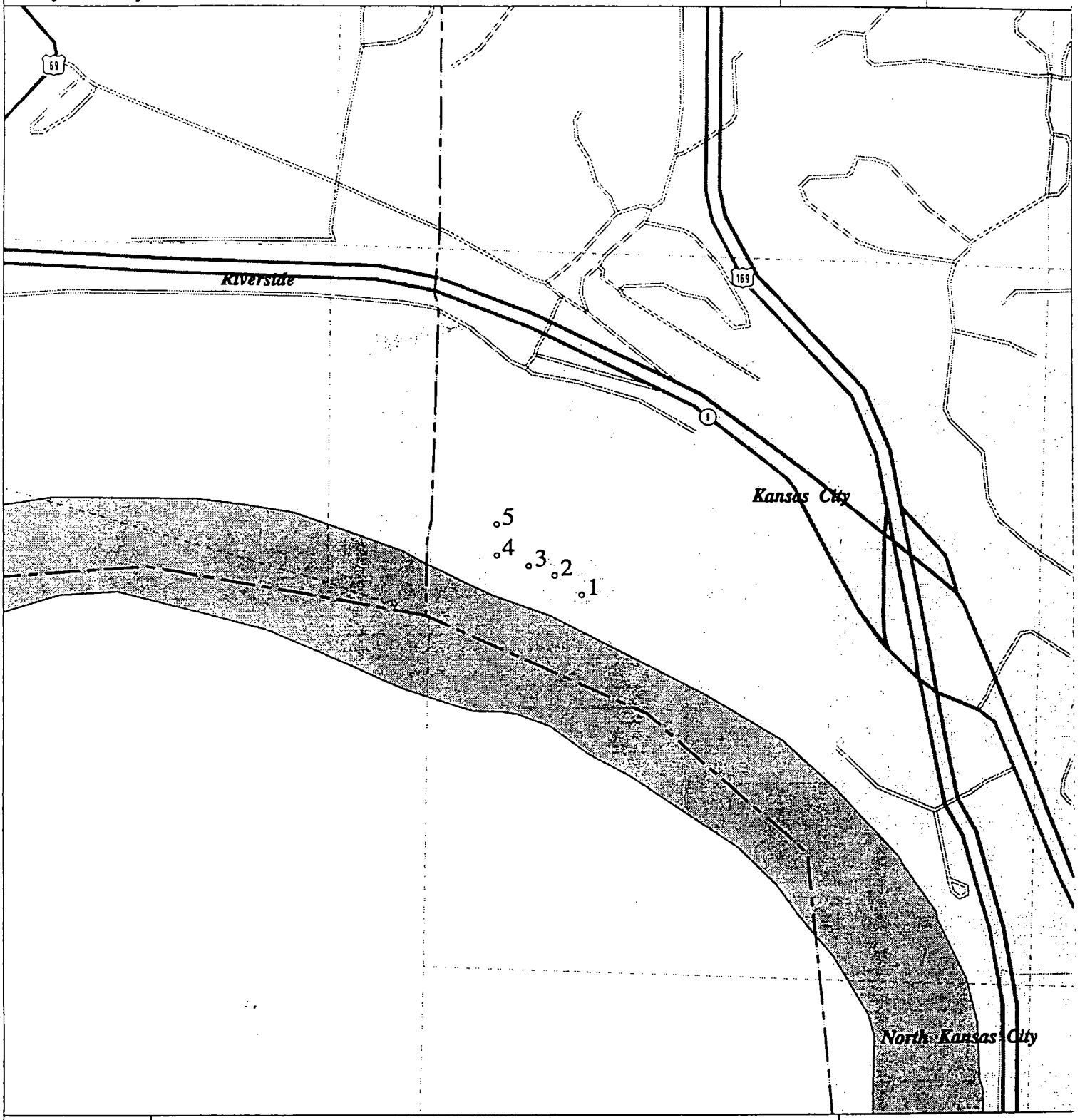
The information below represents the data currently associated with the water supply layers. The well/intake number corrisponds to the well/intake numbers depicted on the accompanying map. Blanks indicate missing data. This table is subject to change as additional information is aquired. Source: Missouri Department of Natural Resources, Public Drinking Water Program. Production Date: February 24, 1994

* Temporary DGLS well number. The correct well number is requested.

Well Number	11
Extended PWS #	1010415011
Local Well Name	
DGLS Well #	40175*
Latitude	39 9 8.3 N
Longitude	94 35 12.8 W
County	Clay
DNR Region	Kansas City
Date Drilled	
Material (C/U)	
Total Depth (ft)	
Casing Depth (ft)	
Casing Size (in)	
Casing Type	
Screen Length (ft)	
Screen Size (in)	
Static Water Level (ft)	
Well Yield (gpm)	
Head (ft)	
Draw Down Level	
Determination Date	
Yielding Strata	
Pump Type	
Pump Level (gpm)	
Capacity (gpm)	
Pump Meter (Y/N)	
Standby Power (Y/N)	
Date Abandoned	
Date Plugged	
VOC detections (Y/N)	N
Nitrate– N Level (mg/l)	
Chlorination (Y/N)	Y
Filtration (Y/N)	Y
GWUDISW (Y/N)	

Gladstone
1010307
5 wells
Clay County





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CARES
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Wellhead
Water Body
Incorporated Area
Highway
Street or Road
Stream
U.S. Land Survey
County Boundary

This map is subject to change as additional information is aquired.
Production Date:

0 2000

N

Missouri Department of Natural Resources

Division of Environmental Quality

Gladstone
1010307
5 wells

*Temporary DGLS well number. The correct well number is requested.

The information below represents the data currently associated with the water supply layers. The well/intake number corrisponds to the well/intake numbers depicted on the accompanying map. Blanks indicate missing data. This table is subject to change as additional information is aquired.
Source: Missouri Department of Natural Resources, Public Drinking Water Program.
Production Date: February 23, 1994

Well Number	1	2	3	4	5
Extended PWS #	1010307001	1010307002	1010307003	1010307004	1010307005
Local Well Name	#1	#2			
DGLS Well #	40217*	40218*	40219*	40220*	40221*
Latitude	39 9 36.2 N	39 9 37.6 N	39 9 38.3 N	39 9 39.0 N	39 9 41.3 N
Longitude	94 35 51.2 W	94 35 53.7 W	94 35 56.0 W	94 35 59.0 W	94 35 59.0 W
County	Clay	Clay	Clay	Clay	Clay
DNR Region	Kansas City	Kansas City	Kansas City	Kansas City	Kansas City
Date Drilled	67	67			
Material (C/U)	Gravel Wall	Gravel Wall			
Total Depth (ft)	95	95			
Casing Depth (ft)					
Casing Size (in)					
Casing Type	S	S			
Screen Length (ft)	no	no			
Screen Size (in)	no	no			
Static Water Level (ft)					
Well Yield (gpm)	1400	1400			
Head (ft)					
Draw Down Level					
Determination Date					
Yielding Strata					
Pump Type	Turbine	Turbine			
Pump Level (gpm)					
Capacity (gpm)	1550				
Pump Meter (Y/N)	Y				
Standby Power (Y/N)	Y				
Date Abandoned					
Date Plugged					
VOC detections (Y/N)	N	N	N	N	N
Nitrate– N Level (mg/l)					
Chlorination (Y/N)	Y	Y	Y	Y	Y
Filtration (Y/N)	Y	Y	Y	Y	Y
GWUDISW (Y/N)					

Eisenberg Fill Site
(alias: Leo Eisenberg's Propety)
MOD985768175
PA/SI Reference 16

Census of Missouri Public Water Systems 1991

Missouri Department of Natural Resources
Division of Environmental Quality

TABLE OF CONTENTS

Introduction		1
I.	Key Section	2
	Key	3
II.	Census Section	4
	City Water Supplies	5
	Public Water Supply Districts	55
	Subdivision, Mobile Home Park, Institution and Miscellaneous Water Supplies	67
	Public Water Supplies That Provide Water to Other Public Water Supplies	91
	Public Water Supplies That Obtain Water from Other Public Water Supplies	97
	Public Water Supplies That Serve Other Communities	103
	Communities Served by Public Water Supplies	111
	List of Incorporated Towns Not Served by a Public Water Supply	119
III.	Chemical Water Quality Section	121
	City Water Supplies	122
	Public Water Supply Districts	135
	Subdivision, Mobile Home Park, Institution and Miscellaneous Water Supplies	139
IV.	Fluoridated Water Supplies Section	156
	Water Supplies Containing Optimum Amounts of Natural Fluoride	157
	Water Supplies With Adjusted Fluoride	161
V.	Surface Water Source Information Section	164
	Location of Public Water Supply Lake Dams	165
	Public Water Supply Intake Locations	170
	Major Flood Crest Elevations of the Mississippi River	173
	Major Flood Crest Elevations of the Missouri River	178

CITY WATER SUPPLY FACILITIES

PUBLIC WATER SUPPLY	LVL	YEAR BEGAN	OWN	PEOPLE SERVED	SERVICE CONNECTIONS	SOURCE OF SUPPLY	SUPPLY CAPACITY M. G. D.	AVE. DLY. CONSUMP M. G. D.	WATER TREATMENT	FINISHED WATER STORAGE
APPLETON CITY	E	1956	M	1,100	750	HENRY CO PWSD #2		.1000	SEE HENRY CO PWSD 2	.1000
AQUILLA						STODDARD CO PWSD #5			SEE BLOOMFIELD	
ARBOR TERRACE						ST LOUIS CO WATER CO			SEE ST LOUIS CO WATER COMPANY	
ARBYRD	E	1962	M	704	325	ONE WELL (U)	.4250	.0679	NONE	.0500
ARCADIA	D	1931	M	690	270	THREE WELLS (C)	.1580	.0750	P-3C	.1240
ARCHIE	C	1957	M	725	376	SO GRAND RIVER TO TWO RESERVOIRS	.2880	.0750	C-9P 2A 2S 6P 3C 4R 4A 4S 3C	.2250
ARCOLA	X	1966	M	137	50	ONE WELL (C)	.1440	.0060	NONE	.0050
ARGENTVILLE						LINCOLN CO PWSD #1			SEE LINCOLN CO PWSD -1	
ARGYLE						OSAGE CO PWSD #4			SEE OSAGE CO PWSD 4	
ARKOE						NODAWAY CO PWSD #1			SEE MARYVILLE	
ARLEY						CLAY CO PWSD #6			SEE KANSAS CITY	
ARMSTRONG	C	1964	M	360	160	ONE LAKE	.1000	.0250	P-2A 2C 3C 6P 9B 9U 4R 4S 3C 3F	.0635
ARNOLD						JEFFERSON CO PWSD # 1			SEE ST LOUIS CO WATER COMPANY	
ARROW ROCK	E	1968	M	82	62	SALINE CO PWSD #2	.0200	.0052	SEE SLATER	.0170
ASBURY	E	1954	M	210	104	ONE WELL (C)	.1800	.0160	NONE	.0038
ASH GROVE	D	1954	M	1,128	600	THREE WELLS (C)	1.0800	.2000	PS-3C 3H 5C	.0500
ASHLAND	D	1955	M	1,200	490	THREE WELLS (C)	.6500	.1000	3H	.0530
ATLANTA	C	1967	M	411	185	MACON	.0300	.0200	3C 2A 2S 6X 9U 9V 4R 4S 3C 3F	.0476
AUGUSTA						ST CHARLES CO PWSD #2-WEST			SEE ST CHARLES CO PWSD 02-WEST	
AURORA-VERONA	D	1889	I	8,090	3,336	FOUR WELLS (C)	2.1700	1.1670	NONE	.8000
AUXVASSE	D	1913	M	1,000	400	FOUR WELLS (C) THREE IN USE	.6000	.1000	W-3H	.2000
AVA	E	1930	M	2,761	1,500	THREE WELLS (C)	1.1660	.0450	NONE	.5250

CITY WATER SUPPLY FACILITIES

PUBLIC WATER SUPPLY	LVL	YEAR BEGAN	OWN	PEOPLE SERVED	SERVICE CONNECTIONS	SOURCE OF SUPPLY	SUPPLY CAPACITY M. G. D.	AVE. DLY. CONSUMP M. G. D.	WATER TREATMENT	FINISHED WATER STORAGE
BELL CITY	D	1962	M	539	215	ONE WELL (U)	.1900	.0458	P-3C	.0584
BELLA VILLA						ST LOUIS CO WATER CO			SEE ST LOUIS CO WATER COMPANY	
BELLE	E	1937	M	1,233	610	THREE WELLS (C)	.6500	.1500	NONE	.3500
BELLE CENTER						JASPER CO PWSD #1			SEE JOPLIN	
BELLEFONTAINE NEIGHBORS						ST LOUIS CO WATER CO			SEE ST LOUIS CO WATER COMPANY	
BELLERIVE						ST LOUIS CO WATER CO			SEE ST LOUIS CO WATER COMPANY	
BELLFLOWER	E	1964	M	400	142	ONE WELL (C)	.0790	.0260	NONE	.0190
BELTON	D	1930	M	18,000	5,000	KANSAS CITY	2.3750	1.0000	SEE KANSAS CITY	3.8000
BENTON	E	1903	M	660	288	ONE WELL (C)	.1200	.0500	NONE	.0750
BENTON CITY						AUDRAIN CO PWSD #1			SEE MEXICO	
BERGER	E	1957	M	240	80	ONE WELL (C)	.0270	.0180	NONE	.0400
BERKELEY						ST LOUIS CO WATER CO			SEE ST LOUIS CO WATER COMPANY	
BERNIE	D	1940	M	1,975	937	SEVEN WELLS (U) ONE IN USE & ONE ON STANDBY	.5760	.3210	FI-1T 3C 9C 12T 4A 4P 4S	.3250
BERTRAND	D	1966	M	700	270	ONE WELL (U)	.1440	.0490	I-1M 3C 9U 4P 4S	.0500
BETHANY	B	1937	M	3,100	1,801	TWO IMPOUNDMENTS	1.4000	.5000	FP-C 2A 2C 2P 3C 6T 6P 9V 2A 2C 2P 3C 6T 6P 9V 3C 4R 4M 12T 3C	.5870
BEVERLY HILLS						ST LOUIS CO WATER CO			SEE ST LOUIS CO WATER COMPANY	
BEVIER	E	1959	M	840	393	MACON	.0700	.0557	SEE MACON	.0500
BILLINGS	E	1942	M	1,000	420	TWO WELLS (C)	.5620	.1000	NONE	.2500
BIRCH TREE	D	1943	M	622	325	THREE DRILLED WELLS (C)	.3600	.0900	P-3C	.1000
BIRMINGHAM VILLAGE OF	E	1977	M	209	75	KANS[illegible]TY		.0120	SEE KANSAS CITY	

CITY WATER SUPPLY FACILITIES

PUBLIC WATER SUPPLY	LVL	YEAR BEGAN	OWN	PEOPLE SERVED	SERVICE CONNECTIONS	SOURCE OF SUPPLY	SUPPLY CAPACITY M. G. D.	AVE. DLY. CONSUMP M. G. D.	WATER TREATMENT	FINISHED WATER STORAGE
GIDEON	E	1932	M	1,200	520	TWO WELLS (U)	2.0800	.1880	NONE	.1500
GILLIAM	E	1958	M	227	122	SLATER		.0167	SEE SLATER	
GILMAN CITY	E	1968	M	520	210	COFFEY	.0550	.0270	SEE COFFEY	.0550
GLADSTONE	A	1960	M	25,000	7,680	THREE WELLS (U)	3.0000	2.0200	P-1M 2A 2C 3C 6T 9V 2A 2C 3C 6T 9V 8C 4R 4A 3C	2.6000
GLASGOW	C	1940	M	1,336	570	MISSOURI RIVER	.5760	.1702	FP-2A 2C 3C 6P 9B 9U 2A 2C 3C 12T 6P 9C 4R 4S 3C 3F	.2480
GLEN ECHO PARK						ST LOUIS CO WATER CO			SEE ST LOUIS CO WATER COMPANY	
GLENAIRE						CLAY CO PWSD #2			SEE KANSAS CITY	
GLENDALE						ST LOUIS CO WATER CO			SEE ST LOUIS CO WATER COMPANY	
GLENWOOD	E	1968	M	218	100	LANCASTER		.0133	SEE LANCASTER	.0300
GOLDEN CITY	E	1937	M	895	450	TWO WELLS (C)	.5040	.0700	NONE	.0700
GOODFELLOW TERRACE						ST LOUIS CO WATER CO			SEE ST LOUIS CO WATER COMPANY	
GOODMAN	D	1942	M	1,125	450	TWO WELLS (C)	.9280	.1000	P-3H	.1250
GORDONVILLE						CAPE GIRARDEAU CO PWSD #4			SEE CAPE GIRARDEAU CO PWSD 4	
GORIN						SCOTLAND CO CONS PWSD #1-EAST			SEE SCOTLAND CO PWSD -1	
GOWER	C	1954	M	1,267	452	DEKALB CO PWSD #1	.0750	.0900	SEE ST JOSEPH	.0750
GRAHAM	D	1964	M	220	102	ONE WELL (U)	.0430	.0250	I-1T 2S 3H 9C	.0560
GRAIN VALLEY	E	1962	M	1,850	610	INDEPENDENCE	.5710	.1350	SEE INDEPENDENCE	.5710
GRANBY	E	1912	M	1,945	853	TWO WELLS (C)	.7270	.2490	NONE	.1750
GRANDIN	E	1965	M	260	112	ONE WELL (C)	.1700	.0330	NONE	.0500
GRANDVIEW						JACKSON CO PWSD #1			SEE KANSAS CITY	
GRANT CITY	C	1930	M	1,190	550	FOUR WELLS (U)	.2160	.1010	FIH-1M 3C 2A 2C 6T 9V 12T 4R 4S 3C	

CITY WATER SUPPLY FACILITIES

PUBLIC WATER SUPPLY	LVL	YEAR BEGAN	OWN	PEOPLE SERVED	SERVICE CONNECTIONS	SOURCE OF SUPPLY	SUPPLY CAPACITY M. G. D.	AVE. DLY. CONSUMP M. G. D.	WATER TREATMENT	FINISHED WATER STORAGE
LEADINGTON						FLAT RIVER			SEE FLAT RIVER	
LEADWOOD	D	1971	M	1,430	496	TWO WELLS (C)	.6480	.1320	P-3C	.4000
LEASBURG	E	1957	M	304	140	ONE WELL (C)	.1300	.0300	NONE	.0880
LEAWOOD						JOPLIN			SEE JOPLIN	
LEBANON	D	1889	M	9,507	4,138	FIVE WELLS (C)	4.0750	1.7000	P-3C	2.4200
LEES SUMMIT	C	1916	M	43,000	14,542	KANSAS CITY INDEPENDENCE	12.5000	6.8180	SEE KANSAS CITY AND INDEPENDENCE	17.1000
LEETON	D	1950	M	804	268	TWO WELLS (C)	.2880	.1000	PW-3C	.0750
LEONARD						MACON CO PWSD #1			SEE MACON CO PWSD 1	
LEOPOLD	D	1948	M	139	61	ONE WELL (C)	.0270	.0100	P-3F	.0150
LESLIE						FRANKLIN CO PWSD #4			SEE FRANKLIN CO PWSD 4	
LESTERVILLE						REYNOLDS CO PWSD #1			SEE REYNOLDS CO PWSD -1	
LEVASY	E	1972	M	276	92	BUCKNER		.0227	SEE INDEPENDENCE	
LEWIS AND CLARK VILLAGE						BUCHANAN			SEE ST JOSEPH	
LEWISTOWN	C	1966	M	502	294	ONE LAKE	.1580	.0502	P-3C 2A 2C 6P 9V 9U 4R 4A 3C 3F	.0711
LEXINGTON	B	1884	I	5,356	2,197	MISSOURI RIVER	1.2000	.5230	HP-9P 2C 3C 9U 2F 9U 4R 4S 3C	.2500
LIBERAL	D	1937	M	700	346	TWO WELLS (C)	.6480	.1000	P-1T 3C	.0600
LIBERTY	B	1962	M	18,000	4,800	SIX WELLS	2.5000	2.1800	H-1T 2C 3C 6T 9V 9M 6T 9V 9M 12A 4R 4S 3C	5.0000
LICKING	E		M	1,280	608	TWO WELLS (C)	.5330	.1510	NONE	.2500
LILBOURN	D	1946	M	1,500	600	TWO WELLS (U)	.6690	.1550	FI-3C 5P 6V 4A 4P 4S 3C 5P 6V 4A 4P 4S 12T	.1000
LINCOLN	E	1950	M	850	450	TWO WELLS (C)	1.1000	.0800	NONE	.0500
LINN	E	1937	M	1,220	601	FOUR WELLS (C)	.9300	.1250	NONE	.3000

CITY WATER SUPPLY FACILITIES

PUBLIC WATER SUPPLY	LVL	YEAR BEGAN	OWN	PEOPLE SERVED	SERVICE CONNECTIONS	SOURCE OF SUPPLY	SUPPLY CAPACITY M.G.D.	AVE. DLY. CONSUMP M.G.D.	WATER TREATMENT	FINISHED WATER STORAGE
NOEL	D	1937	I	1,300	585	SIX WELLS (C)	2.0000	.9130	NONE	.3580
NORBORNE	C	1930	M	930	455	TWO WELLS (U)	.3600	.0940	IH-1M 2A 2C 2S 3C 6T 6P 9V 9M 9U 8C 4R 4S 3C 3F	.0960
NORMANDY						ST LOUIS CO WATER CO			SEE ST LOUIS CO WATER COMPANY	
NORTH KANSAS CITY	A	1912	M	5,000	1,800	FOUR WELLS (U)	7.0000	3.5000	CIHPW-1T 2A 2C 6X 3C 9V 2S 4R 4S 3C	2.0000
NORTH LILBOURN	E	1965	M	259	50	LILBOURN		.0180	SEE LILBOURN	
NORTH WARDELL						WARDELL			SEE WARDELL	
NORTHMOOR	E	1982	M	560	140	KANSAS CITY	.3850	.0360	SEE KANSAS CITY	
NORTHWOODS						ST LOUIS CO WATER CO			SEE ST LOUIS CO WATER COMPANY	
NORTHWYE						PHELPS CO PWSD #2-NORTH			SEE PHELPS CO PWSD 2	
NORWOOD	E	1954	M	500	198	TWO WELLS (C)	.3740	.0685	NONE	.0790
NORWOOD COURT						ST LOUIS CO WATER CO			SEE ST LOUIS CO WATER COMPANY	
NOVINGER	D	1960	M	620	265	TWO GRAVEL WALL WELLS (U)	.0864	.0337	IP-1M 3C 2C 9C 4P 4A 3F	.0500
O'FALLON	B	1940	M	5,500	4,375	FOUR WELLS	3.1680	1.3000	HPT-1T 3C 9C 4P 4Z	2.1000
OAK GROVE	E	1936	M	4,065	1,500	INDEPENDENCE	1.7780	.4000	SEE INDEPENDENCE	1.7700
OAK GROVE VILLAGE	E	1964	M	350	125	ONE WELL (C)	.1410	.0270	NONE	.0100
OAK RIDGE						CAPE-PERRY CO PWSD #1-SOUTH			SEE CAPE PERRY CO PWSD 1 SOUTH	
OAKLAND						ST LOUIS CO WATER CO			SEE ST LOUIS CO WATER COMPANY	
OAKLAND PARK						JOPLIN			SEE JOPLIN	
OAKS						KANSAS CITY			SEE KANSAS CITY	
OAKTON						BARTON CO CONS PWSD #1			SEE BARTON CO CONS PWSD 1	

CITY WATER SUPPLY FACILITIES

PUBLIC WATER SUPPLY	LVL	YEAR BEGAN	OWN	PEOPLE SERVED	SERVICE CONNECTIONS	SOURCE OF SUPPLY	SUPPLY CAPACITY M.G.D.	AVE. DLY. CONSUMP M.G.D.	WATER TREATMENT	FINISHED WATER STORAGE
QUITMAN						NODAWAY CO PWSD #1			SEE MARYVILLE	
QULIN	E	1965	M	662	253	ONE WELL (C)	.4030	.0400	NONE	.0500
RANDLES						STODDARD CO PWSD #2			SEE STODDARD CO PWSD -2	
RANDOLPH						KANSAS CITY			SEE KANSAS CITY	
RAVENWOOD	D	1962	M	323	180	ONE WELL (U)	.0720	.0420	H-1P 1T 3C 2S 9C 4P 4S	.0500
RAYMONDVILLE	E	1957	M	410	190	TWO WELLS (C)	.2660	.0330	NONE	.0370
RAYMORE	E	1963	M	5,569	1,800	KANSAS CITY	.6400	.4800	SEE KANSAS CITY	1.0100
RAYTOWN WATER COMPANY	D	1942	I	25,000	6,500	KANSAS CITY		.5000	SEE KANSAS CITY	.5750
RAYVILLE						RAY CO PWSD #2			SEE RAY CO PWSD -2	
REA						ANDREW COUNTY PWSD #4			SEE BOLCKOW AND ROSENDALE	
REDINGS MILL	D	1930	I	210	46	ONE WELL (C)	.2280	.0150	P-3H	.0430
REEDS SPRING	E	1951	M	600	250	TWO WELLS (C)	.3600	.0600	NONE	.1300
REGER						SULLIVAN CO PWSD 1-B			SEE MILAN	
RENICK						THOMAS HILL PWSD #1-HUNTSVILLE			SEE MOBERLY	
REPUBLIC	D	1926	M	7,000	2,300	THREE WELLS (C)	2.4840	.8000	F-12T	.6750
RICH HILL	D	1913	M	1,450	900	TWO WELLS (C)	.7000	.5000	I-1M 3C	.2250
RICHLAND	D	1930	M	2,600	900	THREE WELLS (C)	1.0000	.2500	F-12T	.3750
RICHMOND	B	1898	M	6,500	2,500	THREE GRAVEL WALLED WELLS (U)	1.0800	.6500	IP-1M 2A 2C 3C 6T 9V 8C 4R 4S 4A 3C	1.8000
RICHMOND HEIGHTS						ST LOUIS CO WATER CO			SEE ST LOUIS CO WATER COMPANY	
RIDGELEY						PLATTE CO PWSD #7			SEE WESTON	
RIDGEWAY	C	1926	M	530	219	ONE RESERVOIR	.1000	.0290	P-1P 2A 2C 3C 6P 9U 4R 4S 3C	.0500
RISCO	E	1956	M	446	185	TWO WELLS (U)	.5620	.0583	NONE	.0500

CITY WATER SUPPLY FACILITIES

PUBLIC WATER SUPPLY	LVL	YEAR BEGAN	OWN	PEOPLE SERVED	SERVICE CONNECTIONS	SOURCE OF SUPPLY	SUPPLY CAPACITY M. G. D.	AVE. DLY. CONSUMP M. G. D.	WATER TREATMENT	FINISHED WATER STORAGE
VILLAGE OF ARROW POINT			M	32	24	FOUR WELLS (C)	.7500	.0024	NONE	.0109
VINITA PARK						ST LOUIS CO WATER CO			SEE ST LOUIS CO WATER COMPANY	
VINITA TERRACE						ST LOUIS CO WATER CO			SEE ST LOUIS CO WATER COMPANY	
WAKENDA						CARROLL CO PWSD #1-W'DA-DEWITT			SEE CARROLLTON	
WALDRON						PLATTE CO CONS PWSD #1 (5)			SEE PLATTE CO CONS PWSD 1 5	
WALKER	D	1965	M	325	127	ONE WELL (C)	.1700	.0320	P-1M 3C 9C	.0500
WALNUT GROVE	E	1939	M	400	250	ONE WELL (C)	.4320	.0600	NONE	.0500
WARDELL	D	1962	M	600	290	ONE WELL (U)	.2880	.0720	P-3C	.0500
WARDSVILLE	E	1967	M	500	140	ONE WELL (C)	.1300	.0450	NONE	.0470
WARRENSBURG	C	1894	I	26,000	3,973	FOUR WELLS (C)	2.7000	1.4350	W-1T 3C 9C 5C	.5000
WARRENTON	E	1937	M	3,219	1,500	FOUR WELLS (C)	1.0830	.4700	NONE	.3000
WARSAW	D	1931	M	1,650	750	TWO WELLS (C)	1.2000	.2550	FS-5C 5G 12T	.5750
WARSON WOODS						ST LOUIS CO WATER CO			SEE ST LOUIS CO WATER COMPANY	
WASHBURN	E	1964	M	320	150	ONE WELL (C)	.1660	.0200	NONE	.0500
WASHINGTON	D	1888	M	10,000	4,500	FIVE WELLS (C)	3.6000	1.5000	NONE	3.2500
WAVERLY	C	1941	M	462	165	FOUR WELLS (U)	.1300	.0770	IH-1T 2A 2C 2P 3C 6T 9V 4R 4S 3C	.0870
WAYLAND	E	1978	M	498	130	KAHOKA		.0181	SEE KAHOKA	
WAYNESVILLE	D	1942	M	3,300	1,200	FOUR WELLS (C)	1.3000	.5000	FP-3C	1.0200
WEATHERBY						DAVIESS CO PWSD #1			SEE PATTONSBURG	
WEATHERBY LAKE	E	1966	M	1,500	618	KANSAS CITY		.1600	SEE PARKVILLE	
WEAUBLEAU	E	1966	M	468	231	ONE WELL (C)	.2880	.0470	NONE	.0500
WEBB CITY	C	1890	M	7,875	3,150	TWELVE WELLS (C) ONLY SEVEN IN USE	1.9000	.9000	P-1T 3C	1.0000

PUBLIC WATER SUPPLY DISTRICT FACILITIES

PUBLIC WATER SUPPLY	LVL	YEAR BEGAN	OWN	PEOPLE SERVED	SERVICE CONNECTIONS	SOURCE OF SUPPLY	SUPPLY CAPACITY M. G. D.	AVE. DLY. CONSUMP M. G. D.	WATER TREATMENT	FINISHED WATER STORAGE
CASS CO PWSD #2	E	1972	D	2,613	871	BELTON		.2690	SEE KANSAS CITY	
CASS CO PWSD #3	E	1972	D	900	492	LEES SUMMIT	.0500	.9400	SEE KANSAS CITY AND INDEPENDENCE	.0500
CASS CO PWSD #4	E	1976	D	1,550	510	HARRISONVILLE	.0590	.1000	SEE HARRISONVILLE	.0590
CASS CO PWSD #5	E	1975	D	650	215	PLEASANT HILL	.0650	.1000	SEE INDEPENDENCE AND KANSAS CITY	.0650
CASS CO PWSD #6	E	1978	D	2,000	550	LEES SUMMIT	.3150	.1170	SEE KANSAS CITY AND INDEPENDENCE	.3150
CASS CO PWSD #9	E	1977	D	2,650	1,325	HARRISONVILLE	.3420	.3100	SEE HARRISONVILLE	.1377
CEDAR CO PWSD #1	E	1970	D	1,287	515	EL DORADO SPRINGS		.0960	SEE ELDORADO SPGS	.0470
CHARITON CO PWSD #2-EAST	E	1974	D	465	155	BRUNSWICK	.0648	.0192	SEE BRUNSWICK	.0784
CHARITON CO PWSD #2-NE	X	1984	D	366	122	BRUNSWICK	.1080	.0151	SEE BRUNSWICK	.0426
CHARITON CO PWSD #2-NW	X	1984	D	414	138	BRUNSWICK		.0170	SEE BRUNSWICK	.0568
CHARITON-LINN CO PWSD #3-		1988	D	591	197	MARCELINE	2000	.0146	SEE MARCELINE	.0413
CHARITON-LINN CO PWSD #3-	E	1976	D	1,929	643	BROOKFIELD	.5000	.1189	SEE BROOKFIELD	.1060
CHRISTIAN CO PWSD #1	E	1964	D	270	115	ONE WELL (C)	.2090	.0200	NONE	.0100
CHRISTIAN CO PWSD #2	E	1972	D	1,000	343	ONE WELL (C)	.5000	.0580	NONE	.0650
CLARK CO PWSD #1-KAHOKA-W	E	1980	D	2,898	966	KAHOKA	.1667	.0962	SEE KAHOKA	.1339
CLARK CO PWSD #1-WILLIAMS	X	1980	D	1,902	634	LEWIS CO PWSD #1	.2000	.0641	SEE LEWIS CO PWSD #1	.0500
CLAY CO PWSD #2	E	1939	D	3,050	1,150	KANSAS CITY	1.0000	.3810	SEE KANSAS CITY	1.0000
CLAY CO PWSD #3	C	1966	D	2,610	900	THREE WELLS (U)	.3920	.3000	P-1T 2C 3C 6X 9U 9U 4R 4S 3C	.4820
CLAY CO PWSD #4	E	1966	D	1,000	390	LIBERTY	.0700	.1670	SEE LIBERTY	.0800
CLAY CO PWSD #5	E	1966	D	1,000	324	LIBERTY		.0800	SEE LIBERTY	.0220
CLAY CO PWSD #6	E	1967	D	2,400	800	KANSAS CITY	.2730	2080	SEE KANSAS CITY	.0114
CLAY CO PWSD #7	E	1970	D	160	82	CLAY CO PWSD #4	.0130	.0160	SEE LIBERTY	
CLAY CO PWSD #8	D	1975	D	2,000	650	TWO GRAVEL WALL WELLS (U)	.1940	.2000	IP-1T 2A 2C 3C 6X 9B 4R 4S 4A 3C	.1940

PUBLIC WATER SUPPLY DISTRICT FACILITIES

PUBLIC WATER SUPPLY	LVL	YEAR BEGAN	OWN	PEOPLE SERVED	SERVICE CONNECTIONS	SOURCE OF SUPPLY	SUPPLY CAPACITY M. G. D	AVE. DLY. CONSUMP M. G. D.	WATER TREATMENT	FINISHED WATER STORAGE
CLAY CO PWSD #9	E	1980	D	1,200	410	KANSAS CITY		.0060	SEE KANSAS CITY	
CLINTON CO PWSD #1	B	1967	D	335	196	CITY OF PLATTSBURG AND ONE WELL (U)	.0580	.0339	IP-SEE PLATTSBURG	.0580
CLINTON CO PWSD #2	E	1974	D	408	204	PLATTSBURG	.0330	.0335	SEE PLATTSBURG	.0330
CLINTON CO PWSD #3	E	1979	D	2,190	730	CAMERON		.1460	SEE CAMERON	
CLINTON COUNTY PWSD #4	E	1985	D	1,660	830	PLATTSBURG	.1300	.0100	SEE PLATTSBURG	.1300
COLE CO PWSD #2	E	1966	D	8,000	2,300	JEFFERSON CITY AND THREE WELLS	3.3000	.9300	SEE JEFFERSON CITY	2.2500
COLE CO PWSD #3	D	1967	D	700	270	TWO WELLS (C)	.2300	.0620	P-5C	.0530
COLE CO PWSD #4	D	1968	D	2,100	750	TWO WELLS	.3850	.1500	12 T	.3050
COLE CO PWSD #5	E	1969	D	300	100	ONE WELL (C)	.1200	.0250	NONE	.0042
COLE CO. PWSD #1	D	1966	D	10,000	2,742	FOUR WELLS (C) 3 IN USE	2.3000	.7500	12T	1.2000
COOPER CO PWSD #1	E	1969	D	450	150	TWO WELLS (C)	.2300	.0400	NONE	.0360
COOPER CO PWSD #2	E	1974	D	900	325	BOONVILLE		.0700	SEE BOONVILLE	
DAVIESS CO PWSD #1	E	1972	D	1,800	600	PATTONSBURG	.2280	.1000	SEE PATTONSBURG	.2280
DEKALB CO PWSD #1	E	1977	D	3,600	1,063	ANDREW COUNTY #2	.1570	.4920	SEE ST JOSEPH	.1570
DENT CO PWSD #1	D	1971	D	1,200	303	ONE WELL (C) AUXILARY SALEM	.2800	.1990	P-3C	.0210
DUNKLIN CO PWSD #1	E	1969	D	3,000	1,006	ONE WELL (C)	.7560	.2790	NONE	.2125
DUNKLIN CO PWSD #2	E	1975	D	1,800	635	ONE WELL (U) SENATH AND CARDWELL	.1440	.1220	NONE AND SEE CARDWELL AND SENATH	
DUNKLIN CO PWSD #3-NORTH	X	1988	D	126	36	HOLCOMB			SEE HOLCOMB	
DUNKLIN CO PWSD #3-SOUTH	E	1988	D	1,400	400	ONE WELL (U)			NONE	
FRANKLIN CO PWSD #1	E	1967	D	2,140	562	THREE WELLS (C)	6730	.1150	NONE	.1000
FRANKLIN CO PWSD #3	E	1971	D	4,200	1,426	THREE WELLS (C)	1.7350	.0220	NONE	.3500
FRANKLIN CO PWSD #4	E	1970	D	700	195	ONE WELL (C)		.0450	NONE	.0500
GENTRY CO PWSD #1	E	1971	D	1,005	335	ALBANY	.0780	.0660	SEE ALBANY	.1200

PUBLIC WATER SUPPLY DISTRICT FACILITIES

PUBLIC WATER SUPPLY	LVL	YEAR BEGAN	OWN	PEOPLE SERVED	SERVICE CONNECTIONS	SOURCE OF SUPPLY	SUPPLY CAPACITY M. G. D.	AVE. DLY. CONSUMP M. G. D.	WATER TREATMENT	FINISHED WATER STORAGE
GREENE CO PWSD #1	E	1965	D	2,750	1,100	TWO WELLS (C)	1.0000	.0240	NONE	.3500
GREENE CO PWSD #5	E	1967	D	775	340	TWO DRILLED WELLS	.5000	.0720	NONE	.0550
GREENE CO PWSD #6	E	1969	D	400	146	ONE WELL (C)	.1800	.0200	NONE	.0750
GRUNDY CO PWSD #1-DUNLAP	X	1980	D	891	297	TRENTON	.1940	.0620	SEE TRENTON	.0700
GRUNDY CO PWSD #1-EDINBUR	E	1971	D	1,563	521	TRENTON	.2160	.1040	SEE TRENTON	.0640
GRUNDY CO PWSD #1-SPICKAR	X	1980	D	1,221	407	TRENTON	.1872	.0400	SEE TRENTON	.0700
HARRISON CO PWSD #1	C	1967	D	660	332	ONE LAKE	.1008	.1010	FP-2A 2C 3C 6P 9U 12T 4R 4S 3C	.1130
HARRISON CO. PWSD #2	D	1988	D	1,500	570	TWO WELLS (C)			FP-2A 2C 3C 6P 9U 12T 4R 4S 3C	
HENRY CO PWSD #2	B	1986	D	1,380	460	HARRY S TRUMAN LAKE	1.0000	0400	CF-PF 1N 2A 2C 2P 3C 6T 9V 2A 2C 3C 6T 9V 12A 4G 4S 3C	.8500
HICKORY CO PWSD #1	D		D	200	83	ONE WELL (C)	.1730	.0150	I-5C	.0100
HOWARD CO CONS PWSD #1 (1	D	1971	D	1,299	433	TWO WELLS (U)	.2880	.1050	I-1T 3C 2S 9C 4P 4S 3F	.1346
HOWARD CO CONS PWSD #1 (3	X	1976	D	180	60	FAYETTE	.0120	.0149	SEE FAYETTE	
HOWARD CO PWSD #2	E	1973	D	850	399	GLASGOW	.1152	.0640	SEE GLASGOW	.0993
HOWELL CO PWSD #1	E	1967	D	500	182	ONE WELL (C)	2380	.0365	NONE	.0500
HOWELL-OREGON CO PWSD #2-	E		D	120	4	ONE WELL (C)	.0720	.0090	NONE	.0050
HOWELL-OREGON PWSD #2-NOR	X	1986	D	546	187	ONE WELL (C)	.2660	.0370	NONE	.0410
JACKSON CO PWSD #1	D	1938	D	22,368	7,456	KANSAS CITY	8.7500	2.3419	SEE KANSAS CITY	8.7500
JACKSON CO PWSD #12	D	1953	D	1,680	560	LEES SUMMIT		3.9000	SEE INDEPENDENCE AND KANSAS CITY	
JACKSON CO PWSD #13	E	1974	D	3,000	939	LEES SUMMIT JACKSON CO PWSD #15	4.6000	.2460	SEE INDEPENDENCE AND KANSAS CITY	.1000
JACKSON CO PWSD #14	E	1965	D	430	140	LEES SUMMIT			SEE KANSAS CITY & INDEPENDENCE	
JACKSON CO PWSD #15	E		D	3,500	1,800	INDEPENDENCE	.4000	.5400	SEE INDEPENDENCE	.5000
JACKSON CO PWSD #17	E	1976	D	1,600	585	JACKSON CO PWSD #15		.1300	SEE INDEPENDENCE	.1220

MO DNR--PUBLIC DRINKING WATER PROGRAM
PUBLIC WATER SUPPLIES WHICH PROVIDE WATER TO OTHER PUBLIC WATER SUPPLIES

SUPPLIES WHICH PROVIDE WATER	SUPPLIES WHICH OBTAIN WATER
CITY	
HANNIBAL	RALLS CO PWSD #1
HARRISONVILLE	CASS CO PWSD #10
	CASS CO PWSD #4
	CASS CO PWSD #9
HAYTI	HAYTI HEIGHTS
HIGBEE	THOMAS HILL PWSD #1-HIGBEE
HIGGINSVILLE	ALMA
	CORDER
	MAYVIEW
	LAFAYETTE CO PWSD #2
HOLCOMB	DUNKLIN CO PWSD #3-NORTH
INDEPENDENCE	BLUE SPRINGS
	BUCKNER
	GRAIN VALLEY
	LAKE TAPAWINGO
	LEES SUMMIT
	OAK GROVE
	SUGAR CREEK
	JACKSON CO PWSD #15
	JACKSON CO PWSD #2
	LAFAYETTE CO PWSD #1
JEFFERSON CITY	COLE CO PWSD #2
JOPLIN	JASPER CO PWSD #1
KAHOKA	WAYLAND
	CLARK CO PWSD #1-KAHOKA-W
KANSAS CITY	BELTON
	BIRMINGHAM VILLAGE OF
	LEES SUMMIT
	NORTHMOOR
	PARKVILLE
	RAYMORE
	RAYTOWN WATER COMPANY
	WEATHERBY LAKE
	CLAY CO PWSD #2
	CLAY CO PWSD #6
	CLAY CO PWSD #9
	JACKSON CO PWSD #1
KIRKSVILLE	ADAIR CO PWSD #1
LANCASTER	GLENWOOD
LAWSON	RAY CO PWSD #1
LEBANON	LACLEDE CO PWSD #1
LEES SUMMIT	LAKE WINNEBAGO
	PLEASANT HILL
	UNITY VILLAGE
	CASS CO PWSD #3
	CASS CO PWSD #6
	JACKSON CO PWSD #12
	JACKSON CO PWSD #13
	JACKSON CO PWSD #14
LIBERAL	BARTON CO CONS PWSD #1
LIBERTY	CLAY CO PWSD #4

Eisenberg Fill Site
(alias: Leo Eisenberg's Property)
MOD985768175
PA/SI Reference 17

JOHN ASHCROFT
Governor

G. TRACY MEHAN III
Director

STATE OF MISSOURI

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

RECEIVED

DEPARTMENT OF NATURAL RESOURCES

MEMORANDUM

JAN 0 8 1990

KCRO

DATE: January 4, 1990

TO: Jim Armes, Kansas City Regional Office, DEQ

FROM: Jim B. Fels, Engineering/Environmental Geology, DGLS

SUBJECT: Eisenberg Fill PA/SI Site

LOCATION: SW 1/4, Sec. 13, T. 50 N., R. 33 W., Clay County

The Eisenberg fill site is located on the Missouri River floodplain in Clay County, near the Kansas state border. This demolition fill is estimated to be 5-15 feet thick and visibly contains concrete, bricks, iron and other bulky solid waste. The cover soil on the fill is approximately 0-2 feet thick and has a relatively good vegetative cover. The entire floodplain, including the fill area, has a flat to gently undulating topography, sloping 0-2% to the south. This part of the floodplain is highly industrialized with much of the natural surface being covered with pavement.

The aquifer of concern is the Missouri River alluvium which lies directly beneath the site. These fluvially deposited materials are stratified to some extent and average 100 feet in thickness. The thickness can vary depending on the underlying bedrocks erosional surface. Generally, there is gravel at the base of the alluvium which is the highest water producing zone within the strata. Above this gravel, there is usually a gradational fining upward sequence of sand, silt and clay. Yields of up to 2000 g.p.m. can come from this aquifer but wells generally produce between 500 and 1000 g.p.m. to minimize drawdown. The water table is expected to be 20-30 feet below the surface in this area. Groundwater flow in the alluvium is to the southeast and discharges into the river during normal conditions, but excessively high or low river stages can effect both the water table and the direction of flow. During flooding or exceptionally high river stages, the river can recharge the aquifer and change the flow to an eastward direction. Likewise during prolonged low river stages, the river will drain the aquifer and create a southerly flow. The areas closest to the river will notice the most change.

Bedrock beneath the alluvium is Pennsylvanian age and probably the Pleasanton group which consists of shale, limestone and sandstone. The Pleasanton is estimated to be 30-80 feet thick in this area. The Pennsylvanian aquifer is confined due to the low permeability of shale, has low yields and highly mineralized water.

Native soil at this site is a silty clay loam derived from flooding events. Topsoil is a dark brown silty clay loam (CL) approximately 2 feet

thick with moderate to low permeability. Subsoil consists of a brown clayey silt (ML-CL) which may contain local layers of fine sand. The subsoil is estimated to be 2-3 feet thick before a gradational contact with the sandy alluvium is encountered. It is important to note that this is a profile of native soils as seen nearby the site. The depth of cut, if any, and origin of the cover soil is not known. The bulky, porous fill material has a potentially high permeability so as to allow a perched water table to be present at the base of the fill.

Surface water at this site is limited due to the nature of the industrialized area. Two drainage ditches that carry stormwater runoff are located on the site. Although these ditches may pond water, flow is encountered only after precipitation events. These ditches each flow approximately 1 1/2 miles and gain flow from downslope runoff before entering the Missouri River.

PAGE 1

Location: SW 1/4, SW 1/4, NE 1/4, SW 1/4; W 1/2, NW 1/4, SE 1/4, SW 1/4; E 1/2, NE 1/4, and E 1/2, SE 1/4, SW 1/4, SW 1/4, Sec. 13, T. 50 N., R. 33 W.
39° 8' 21.25" N, 94° 33' 47.33" W
Kansas City Quadrangle, Clay County

PAGE 2

Name/description of aquifer(s) of concern:

The Missouri River alluvium is the aquifer of concern and the major water producing aquifer of this area. Alluvial materials are somewhat stratified and approximately 100 feet thick. Ideally, there is a zone of gravel near the base prograding into sand, silt and finally clay near the surface. The more porous gravel layers are the highest yielding zones within the alluvium. Yields up to 2000 g.p.m. of potable water are possible from this aquifer. Bedrock below the alluvium is Pennsylvanian age and probably the Pleasanton group of shale, limestone and sandstone. The low permeability of the shale restricts vertical movement of water, thus separating the potable alluvial aquifer from the highly mineralized Pennsylvanian and deeper aquifers. References 1, 2, 4, 8

Depth(s) from the ground surface to the highest seasonal level of the saturated zone [water table(s)] of the aquifer of concern:

The average depth to groundwater in the alluvium is between 20 and 30 feet below the surface. However during prolonged high river stages, the Missouri River can recharge the alluvial aquifer and increase the water level to an estimated 15 feet below the surface. This increase would be most noticeable in areas closest to the river. A perched water table may also be present at the base of the fill during wet seasons approximately 5-15 feet below the surface. References 2, 3, 4, 7, 8

PAGE 3

Soil type in unsaturated zone:

The origin of the soil used for cover material and the depth of cut, if any, into the native soil is unknown but a profile of the native soil would be as follows: Approximately 2 feet of dark brown silty clay loam underlain by 2 to 3 feet of light brown clayey silt containing local layers of fine sand. This subsoil will have a gradational contact with the underlying sandy alluvium. References 3, 7

Permeability associated with soil type:

silty clay loam - 10^{-5} - 10^{-7} cm/sec.
clayey silt - 10^{-4} - 10^{-6} cm/sec.
fine sand - 10^{-3} - 10^{-5} cm/sec. References 6, 7, 9, 10

DO NOT HAVE PAGES 4, 5

RNF 10/10/90

Page 3

PAGE 6

Average slope of facility in percent:
The fill is relatively flat with 0-1% slope. The only relief is a small depression in the middle of the fill area and drainage ditches on the northeast and west sides of the fill. Reference 5, 7

Name/description of nearest downslope surface water:
There are two drainage ditches located on this site. One flows to the northeast, the other flows to the south. Both of these flow through heavily industrialized areas where most of the ground surface is covered with pavement so they gain runoff flow before reaching the Missouri River. These ditches may pond water but are expected to flow only after a rainfall event. References 5, 7

Average slope of terrain between facility and above-cited surface water body in percent:
The drainage ditches are both on site and flow across the floodplain which is typically flat to gently undulating with 0-2% slopes. References 5, 7

Is the facility located either totally or partially in surface water?
Only partially during storm events when the drainage ditches may flow water and flooding events may totally submerge the site. But under normal conditions, pools in drainage ditches will be the only surface water on site. Reference 5, 7

PAGE 7

Is the facility completely surrounded by areas of higher elevation?
No, there are hills to the north but the floodplain extends west and east of the site with the river to the south. References 5, 7

Distance to nearest downslope surface water:
The drainage ditches are on site and flow approximately 1 1/2 mile before entering the Missouri River. References 5, 7

REFERENCES

1 "Stratigraphic Succession in Missouri", Missouri Geological Survey and Water Resources, Vol. XL, 1961

2 "Reconnaissance of the Groundwater Resources of the Missouri River alluvium between Miami and Kansas City, Missouri", Emmett, L.F. and Jeffery, H.G., USGS Atlas HA-344, 1970

3 "Soil Survey of Clay and Ray Counties, Missouri", USDA-SCS, 1982

4 Well logs on file at DGLS

5 North Kansas City Quadrangle, USGS 7 1/2', 1:24,000, photorevised 1970 and 1975

6 "Hazardous Waste Ranking System - A Users Manual", the MITRE Company

7 Site visit on 12/14/89 by J.B. Fels

8 "Water Resources of the Kansas City Area, Missouri and Kansas", USGS Circ. 273, 1953

9 "Applied Hydrogeology", Fetter, C.W., Merrill Publishing Company, 1988

10 "Groundwater", Freeze, R.A. and Cherry, J.A., Prentice Hall, 1979

Eisenberg Fill Site
(alias: Leo Eisenberg's Property)
MOD985768175
PA/SI Reference 18

SUPERFUND SECTION
INVESTIGATIVE REPORT
ENFORCEMENT SENSITIVE

INVESTIGATOR: Al Waller

DATE: June 21, 1993

CASE NAME: Eisenberg Property

CASE NUMBER: SFINV9304

DATE ASSIGNED: April 5, 1993

STATUS: Open

BACKGROUND INFORMATION

On April 5, 1993, Mr. Jim Kavanaugh, Chief of the Site Evaluation Unit, requested an investigation of this site to determine if further action is necessary. This site is already listed in CERCLIS as a state-lead.

On April 6, 1988, the Emergency Planning and Response Branch (EP&R), U.S. Environmental Protection Agency (EPA), received a call on the emergency spill line from Mr. Terry Williams, North Kansas City Fire Department. Mr. Williams reported several black-colored, liquid puddles located at a fill area near the intersection of 16th Street and Interstate 35, North Kansas City.

Mr. Bruce Morrison, EP&R, met Mr. Williams at the site on April 6, 1988. The property is approximately five acres of low-lying land being used as a construction debris fill area. There were three large puddles of a black-stained water at the base of the northeast corner of the fill area. Samples were collected and analyzed for metals and organic pollutants. The analytic data indicated the presence of high levels of Vanadium (100 parts per million) and Arsenic (4.4 parts per million).

A site investigation sampling plan was submitted by Mr. Larry Alderson, Environmental Emergency Specialist, Environmental Services Program (ESP), Missouri Department of Natural Resources (MDNR), on June 22, 1989. The plan was commented on by Mr. John Madras, Environmental Specialist, Waste Management Program, MDNR, on July 6, 1989. Mr. Madras was concerned about the exact location of the puddles of water and drainage from the area. He also recommended that samples be taken from the buried material and/or downgradient from the buried material.

On January 4, 1990, Mr. Jim B. Fels, Engineering/Environmental Geology, Division of Geology and Land Survey, MDNR, submitted a memorandum to Mr. Jim Armes, Kansas City Regional Office, MDNR. He estimated the fill material to be five to fifteen feet thick and visibly contains concrete, bricks, iron, and other bulky solid waste.

Mr. Fels said the aquifer of concern is the Missouri River alluvium, which lies directly beneath the site. Groundwater flow in the alluvium is to the southeast and discharges into the river during normal conditions. He also states that two drainage ditches that carry stormwater runoff are located on the site. Although these ditches may be pond water, flow is encountered only after

precipitation events. These ditches each flow approximately 1.5 miles and gain flow from downslope runoff before entering the Missouri River.

The site investigation sampling report from the ESP is dated January 24, 1990. The report states that only two small shallow pools, approximately six feet in diameter and five or six inches deep, were found at the site during the investigation. Both pools contained a chocolate, brown- colored water. Several midge or mosquito larva were observed swimming in the pool from which the water sample was collected. A sediment sample was collected from the pool area. A background or upgradient sediment sample was also collected approximately 50 feet south of the pools.

The site investigation report prepared by Mr. Peter Fulweiler, Environmental Engineer, Kansas City Regional Office, MDNR, was received on October 16, 1990. The report contained the same basic information that has already been mentioned except for: 1) MDNR Lab results, and (2) Mr. Fulweiler's conclusions and recommendations. Please see the following:

1. The MDNR collected samples of soil and pooled liquid on July 25, 1989. Analysis of these indicated a concentration of Vanadium, 85,000 ug/kg in the soil and 1900 ug/kg in the pooled liquid. <u>The samples were not analyzed for arsenic</u>.

2. Mr. Fulweiler's conclusions and recommendations were:

   a. Where is the exact location of the site?
   b. Where exactly on the site is the contamination?
   c. What was the source of the contamination?
   d. What is the extent of the contamination at the site?
   e. If more is to be done, find out the exact location the sampling took place. Do more sampling with testing for metals and arsenic.

On January 7, 1991, Mr. John Madras submitted a memorandum to file on this. The subject of the memo was "Comments on Site Inspection Report." Mr. Madras states, "Further investigation is warranted to determine the exact location of the site, the extent of contamination, and whether the contamination extends into the groundwater."

<u>INVESTIGATION</u>

On June 3, 1993, I went to the Clay County Recorder of Deeds Office in Liberty, Missouri. The two deeds for the property involved have a total of 81 pages. The Special Warranty Deed in Book 1649, page 768 states:

> SUBJECT TO: (a) the rights of parties in possession of the premises, or parts thereof, under written leases or pursuant to month to month tenancies; (b) taxes and assessments,

> general and special, not now due and payable; (c) easements, restriction, reservations, declarations, and other matters of record; (d) the rights of the public in, and to parts thereof, in streets, roads, or alleys; (e) easements or claims of easements now shown by the public record and encroachments, overlaps, boundary line disputes, and any other matters which would be disclosed by an accurate survey and inspection of the premises; and (f) deeds of trust, mortgages, liens, and all other matters of record.

The other Special Warranty Deed in Book 1649, page 494 states:

> SUBJECT TO: "Permitted Encumbrances," as defined in that certain Purchase Contract dated November 25, 1985, as thereafter amended, between the party of the first part and the party of the second part.

All of the "SUBJECT TO" information on each deed is an attachment. To obtain a copy of a certified warranty deed, you purchase all attachments. The County of Clay will not certify only a portion of the document.

The property is located north of the east end of 16th Street, which ends just east of Interstate 35 and Interstate 29. There is a large railroad yard located east of where the street ends.

I went to the site and checked to see if I could find any black-stained water. I was unable to locate any ponds or puddles of water as described in the Preliminary Assessment/Site Inspection. This is a low-lying area and there was a lot of standing water which looked normal to me. I was able to determine the general area where sampling was done. The city has an animal shelter across a private road from the sampling location. I talked with the animal warden at the shelter. She said a lot of hauling to the site had been done during the past couple of years. She had observed many truckloads come, and they all contained what would be considered normal fill.

On June 4, 1993, I went to the city hall at North Kansas City and met with Mr. Carl W. Elshire, Director of Public Works. He was familiar with the site location. He said there were complaints from the elevator owner about water displacement when it rained, causing water to come into the large silos which are located just north of the Eisenberg property. A map of the area is attached as Exhibit A. Mr. Elshire was very cooperative and offered assistance, if needed.

On June 4, 1993, I met with North Kansas City Fire Inspector Mr. Terry Williams. Mr. Williams was the fireman who made the original complaint to the EPA. We went to the site, and he pointed out the approximate location of the puddles of water. The area where the puddles were located is now under three to four feet of fill. If more sampling is requested, I will show our lab personnel the area Mr. Williams pointed out. I marked the approximate locations on Exhibit A.

Attached as Exhibit B is a copy of the sample location sketch submitted by the lab dated July 25, 1989. The sample locations shown are in error. The site is located on the east side of I-29, north of 16th Street.

SUMMARY

The owner of record on this site is: NORTHTOWN DEVCO, a Missouri General Partnership of the County of Jackson, State of Missouri. The mailing address is: c/o Leo Eisenberg & Co., Inc., 1101 Walnut, Suite 800, Kansas City, Missouri 64106.

The EPA and the MDNR Labs have both identified hazardous substance at the site. At present, the sampling locations are under fill that has been hauled in since the sampling was done.

The sampling location has been identified by the original complainant, Mr. Terry Williams of the North Kansas City Fire Department. He physically pointed out the approximate location to this investigator. (See Exhibit A.)

Most of the fill hauled to the location is from construction sites. The city has an animal shelter across from the sampling area. The animal control warden states she has observed a lot of hauling to the location, and it appeared to be just normal fill materials (no drums, etc.).

If further investigation is warranted, more sampling will be needed. It should not be difficult to ascertain where the fill came from. Apparently, fill is still being hauled to the site.

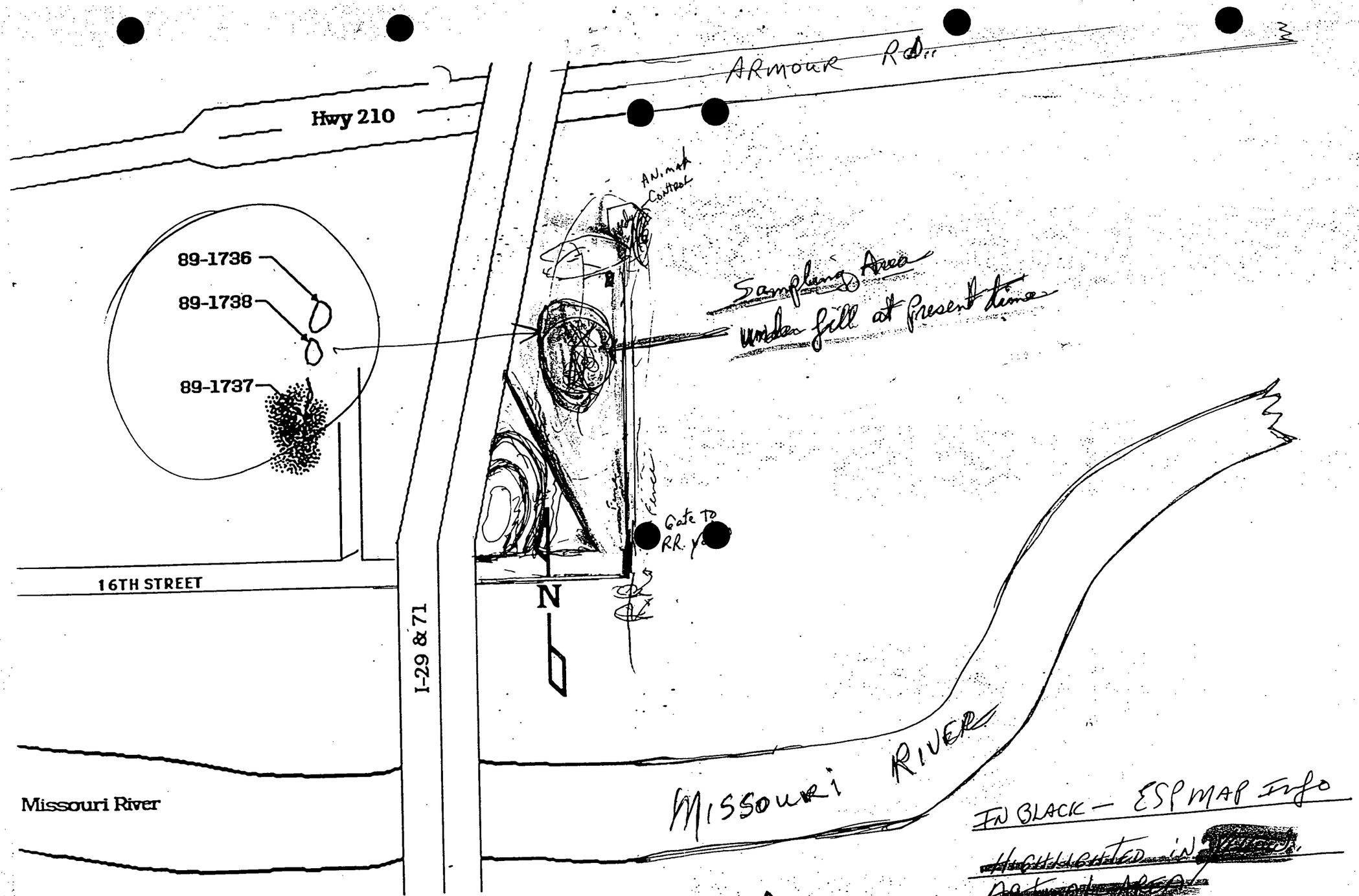
More interviews would be conducted involving owner(s) of the property, haulers of the fill, and any other potentially responsible parties.

Please advise if more assistance is needed.

AEW:ah

c: Jim Kavanaugh, Superfund Section
Kristine Davidson, Superfund Section

EXHIBIT B



Leo Eisenberg's Property

Sample location sketch
July 25, 1989

not to scale

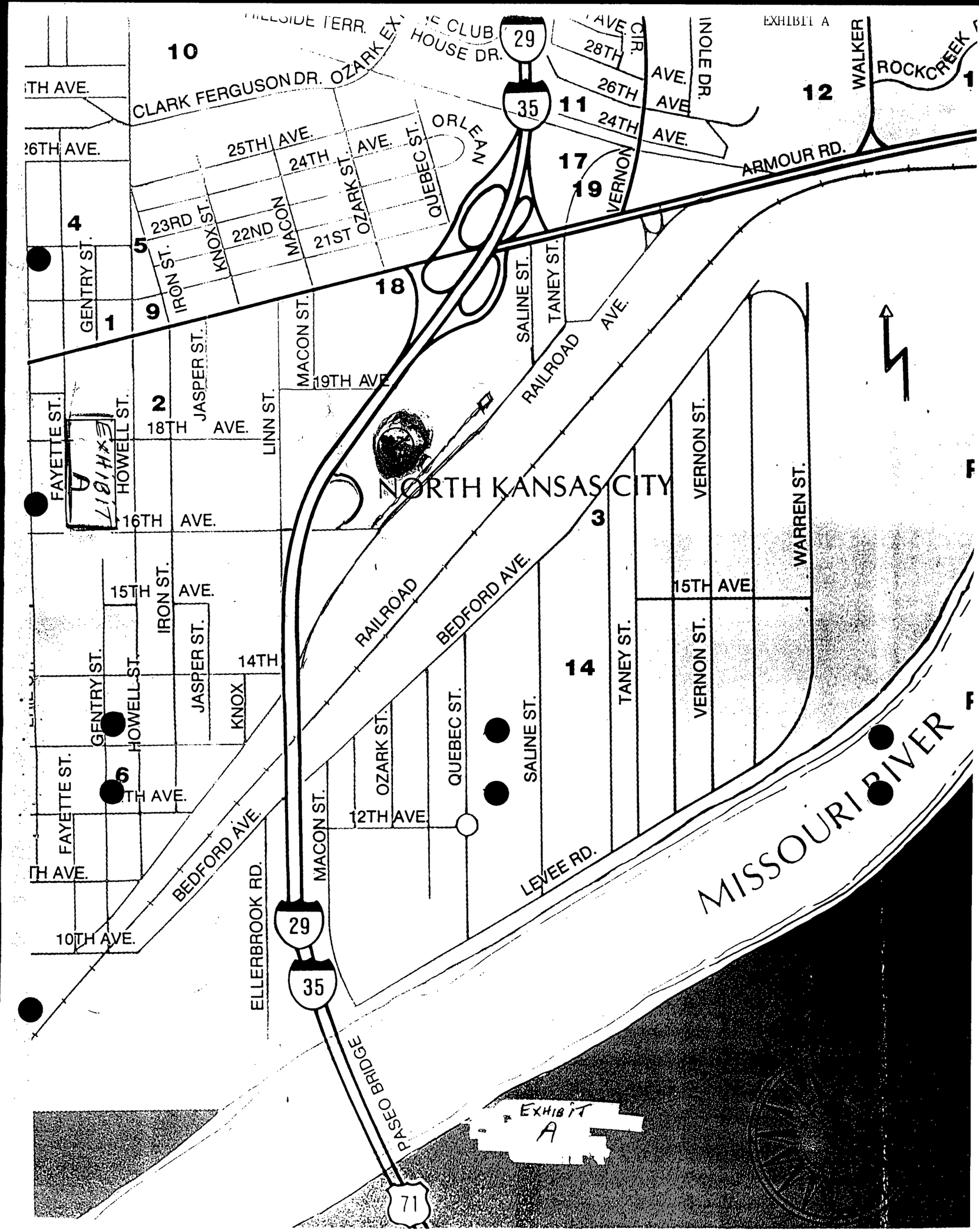


EXHIBIT A
CLARK FERGUSON DR.
OZARK EX
HOUSE DR.
29
35
10
11
12
17
19
18
4
5
9
1
2
3
14
6
ORLEAN
25TH AVE.
24TH AVE.
23RD
22ND
21ST
26TH AVE.
28TH AVE.
26TH AVE.
24TH AVE.
ARMOUR RD.
WALKER
ROCKCREEK
VERNON
GENTRY ST.
IRON ST.
KNOX ST.
MACON
OZARK ST.
QUEBEC ST.
SALINE ST.
TANEY ST.
RAILROAD AVE.
JASPER ST.
MACON ST.
19TH AVE.
18TH AVE.
LINN ST.
FAYETTE ST.
HOWELL ST.
16TH AVE.
NORTH KANSAS CITY
VERNON ST.
WARREN ST.
15TH AVE.
IRON ST.
RAILROAD
BEDFORD AVE.
14TH
KNOX
OZARK ST.
QUEBEC ST.
SALINE ST.
TANEY ST.
VERNON ST.
12TH AVE.
MACON ST.
LEVEE RD.
MISSOURI RIVER
BEDFORD AVE.
ELLERBROOK RD.
10TH AVE.
PASEO BRIDGE
71
EXHIBIT A

Eisenberg Fill Site
(alias: Leo Eisenberg's Propety)
MOD985768175
PA/SI Reference 19

Toxicological Profile for

VANADIUM

U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry

TP-91/29

Federal Recycling Program Printed on Recycled Paper

TOXICOLOGICAL PROFILE FOR VANADIUM AND COMPOUNDS

Prepared by:

Clement International Corporation
Under Contract No. 205-88-0608

Prepared for:

Agency for Toxic Substances and Disease Registry
U.S. Public Health Service

July 1992

CONTENTS

FOREWORD iii

LIST OF FIGURES ix

LIST OF TABLES xi

1. PUBLIC HEALTH STATEMENT 1
   1.1 WHAT IS VANADIUM? 1
   1.2 HOW MIGHT I BE EXPOSED TO VANADIUM? 2
   1.3 HOW CAN VANADIUM ENTER AND LEAVE MY BODY? 2
   1.4 HOW CAN VANADIUM AFFECT MY HEALTH? 2
   1.5 IS THERE A MEDICAL TEST TO DETERMINE WHETHER I HAVE BEEN EXPOSED TO VANADIUM? 3
   1.6 WHAT RECOMMENDATIONS HAS THE FEDERAL GOVERNMENT MADE TO PROTECT HUMAN HEALTH? 3
   1.7 WHERE CAN I GET MORE INFORMATION? 3

2. HEALTH EFFECTS 5
   2.1 INTRODUCTION 5
   2.2 DISCUSSION OF HEALTH EFFECTS BY ROUTE OF EXPOSURE 5
      2.2.1 Inhalation Exposure 6
         2.2.1.1 Death 6
         2.2.1.2 Systemic Effects 6
         2.2.1.3 Immunological Effects 11
         2.2.1.4 Neurological Effects 11
         2.2.1.5 Developmental Effects 11
         2.2.1.6 Reproductive Effects 11
         2.2.1.7 Genotoxic Effects 11
         2.2.1.8 Cancer 11
      2.2.2 Oral Exposure 12
         2.2.2.1 Death 12
         2.2.2.2 Systemic Effects 12
         2.2.2.3 Immunological Effects 17
         2.2.2.4 Neurological Effects 17
         2.2.2.5 Developmental Effects 17
         2.2.2.6 Reproductive Effects 17
         2.2.2.7 Genotoxic Effects 18
         2.2.2.8 Cancer 18
      2.2.3 Dermal Exposure 18
         2.2.3.1 Death 18
         2.2.3.2 Systemic Effects 18
         2.2.3.3 Immunological Effects 18
         2.2.3.4 Neurological Effects 18
         2.2.3.5 Developmental Effects 18
         2.2.3.6 Reproductive Effects 18
         2.2.3.7 Genotoxic Effects 18
         2.2.3.8 Cancer 18

2.3 TOXICOKINETICS 19
2.3.1 Absorption 19
2.3.1.1 Inhalation Exposure 19
2.3.1.2 Oral Exposure 19
2.3.1.3 Dermal Exposure 20
2.3.2 Distribution 20
2.3.2.1 Inhalation Exposure 20
2.3.2.2 Oral Exposure 21
2.3.2.3 Dermal Exposure 22
2.3.2.4 Other Routes of Exposure 22
2.3.3 Metabolism 22
2.3.4 Excretion 23
2.3.4.1 Inhalation Exposure 23
2.3.4.2 Oral Exposure 24
2.3.4.3 Dermal Exposure 24
2.4 RELEVANCE TO PUBLIC HEALTH 24
2.5 BIOMARKERS OF EXPOSURE AND EFFECT 30
2.5.1 Biomarkers Used to Identify and/or Quantify Exposure to Vanadium 31
2.5.2 Biomarkers Used to Characterize Effects Caused by Vanadium 31
2.6 INTERACTIONS WITH OTHER CHEMICALS 31
2.7 POPULATIONS THAT ARE UNUSUALLY SUSCEPTIBLE 32
2.8 MITIGATION OF EFFECTS 32
2.9 ADEQUACY OF THE DATABASE 33
2.9.1 Existing Information on Health Effects of Vanadium . . . 33
2.9.2 Data Needs 35
2.9.3 On-going Studies 39

3. CHEMICAL AND PHYSICAL INFORMATION 41
3.1 CHEMICAL IDENTITY 41
3.2 PHYSICAL AND CHEMICAL PROPERTIES 41

4. PRODUCTION, IMPORT, USE, AND DISPOSAL 47
4.1 PRODUCTION 47
4.2 IMPORT/EXPORT 50
4.3 USE 50
4.4 DISPOSAL 51

5. POTENTIAL FOR HUMAN EXPOSURE 53
5.1 OVERVIEW 53
5.2 RELEASES TO THE ENVIRONMENT 54
5.2.1 Air 54
5.2.2 Water 54
5.2.3 Soil 58
5.3 ENVIRONMENTAL FATE 59
5.3.1 Transport and Partitioning 59
5.3.2 Transformation and Degradation 61
5.3.2.1 Air 61
5.3.2.2 Water 61
5.3.2.3 Soil 62

5.4 LEVELS MONITORED OR ESTIMATED IN THE ENVIRONMENT 62
5.4.1 Air 62
5.4.2 Water 63
5.4.3 Soil 63
5.4.4 Other Environmental Media 63
5.5 GENERAL POPULATION AND OCCUPATIONAL EXPOSURE 64
5.6 POPULATIONS WITH POTENTIALLY HIGH EXPOSURES 65
5.7 ADEQUACY OF THE DATABASE 66
5.7.1 Data Needs 66
5.7.2 On-going Studies 68

6. ANALYTICAL METHODS 69
6.1 BIOLOGICAL MATERIALS 69
6.2 ENVIRONMENTAL SAMPLES 71
6.3 ADEQUACY OF THE DATABASE 73
6.3.1 Data Needs 74
6.3.2 On-going Studies 75

7. REGULATIONS AND ADVISORIES 77

8. REFERENCES 81

9. GLOSSARY 103

APPENDICES

A. USER'S GUIDE A-1

B. ACRONYMS, ABBREVIATIONS, AND SYMBOLS B-1

C. PEER REVIEW C-1

1. PUBLIC HEALTH STATEMENT

This Statement was prepared to give you information about vanadium and to emphasize the human health effects that may result from exposure to it. The Environmental Protection Agency (EPA) has identified 1,177 sites on its National Priorities List (NPL). Vanadium has been found at 23 of these sites. However, we do not know how many of the 1,177 NPL sites have been evaluated for vanadium. As EPA evaluates more sites, the number of sites at which vanadium is found may change. The information is important for you because vanadium may cause harmful health effects and because these sites are potential or actual sources of human exposure to vanadium.

When a chemical is released from a large area, such as an industrial plant, or from a container, such as a drum or bottle, it enters the environment as a chemical emission. This emission, which is also called a release, does not always lead to exposure. You can be exposed to a chemical only when you come into contact with the chemical. You may be exposed to it in the environment by breathing, eating, or drinking substances containing the chemical or from skin contact with it.

If you are exposed to a hazardous substance such as vanadium, several factors will determine whether harmful health effects will occur and what the type and severity of those health effects will be. These factors include the dose (how much), the duration (how long), the route or pathway by which you are exposed (breathing, eating, drinking, or skin contact), the other chemicals to which you are exposed, and your individual characteristics such as age, sex, nutritional status, family traits, life style, and state of health.

1.1 WHAT IS VANADIUM?

Vanadium is a natural element in the earth. It is a white to gray metal, often found as crystals. It has no particular odor. Vanadium occurs naturally in fuel oils and coal. In the environment it is usually combined with other elements such as oxygen, sodium, sulfur, or chloride. The forms of vanadium most likely to be found at waste sites are not well known. One man-made form, vanadium oxide (vanadium bound to oxygen), is most often used by industry, mostly in making steel. Vanadium oxide can be a yellow-orange powder, dark-grey flakes, or yellow crystals. Much smaller amounts are used in making rubber, plastics, ceramics, and certain other chemicals. The most likely way for the chemical to get into the air is when fuel oil is burned. When rocks and soil containing vanadium are broken down into dusts by wind and rain, vanadium can get into the air, groundwater, surface water, or soil. It does not dissolve well in water, but it can be carried by the water, much as particles of sand might be carried. For more information on its forms and uses, see Chapters 3 and 4.

1. PUBLIC HEALTH STATEMENT

1.2 HOW MIGHT I BE EXPOSED TO VANADIUM?

Most people are exposed daily to very low levels of vanadium in food, drinking water, and air. Most of your intake is from food, and you eat about 10-20 micrograms daily. The vanadium in these sources is at least partially due to naturally occurring vanadium in rocks and soil. Vanadium is naturally found in soil and rocks at about 150 parts of vanadium per million parts of soil (150 ppm) in the earth's crust. Vanadium combined with oxygen (vanadium oxide) gets into the air when people burn fuel oil or coal. You can be exposed to vanadium if you breathe in this air. Vanadium pentoxide is in dusts in some factories that use it for making steel. Ash from burning fuel oil or the leftover products from processing vanadium-containing ore can be put into landfills following proper treatment procedures. If these products are crushed, it is possible that you might breathe in some dusts containing vanadium. Also, the action of rain and wind may cause some vanadium to move out of a landfill and onto nearby soil, food crops, and water supplies. Some foods contain either naturally occurring vanadium or vanadium from man-made sources; you can be exposed to vanadium when you eat these foods. Vanadium has been found in groundwater and at hazardous waste sites throughout the United States. The exposure routes most likely at hazardous waste sites are not well known. For more information on how you might be exposed to vanadium, see Chapter 5.

1.3 HOW CAN VANADIUM ENTER AND LEAVE MY BODY?

If vanadium is in the air, you can breathe it into your lungs. Most of it leaves your body in the air you breathe out, but some stays in your lungs. The part that isn't breathed out can go through your lungs and get into your bloodstream. You may eat or drink small amounts of vanadium in food and water. Most of this does not enter your bloodstream, but leaves your body in your feces. However, small amounts that you swallow can enter your bloodstream. Most of the vanadium that enters your bloodstream leaves your body quickly in the urine. If you get vanadium on your skin, it is unlikely that it will enter your body by passing through your skin. For more information about how vanadium enters and leaves your body, see Chapter 2.

1.4 HOW CAN VANADIUM AFFECT MY HEALTH?

If you breathe large amounts of vanadium dusts for short or long periods, you will have lung irritation that can make you cough, and you can also have a sore throat and red irritated eyes. These effects stop soon after you stop breathing it. People who breathed 0.1 milligram (mg) of vanadium per cubic meter (m^3) of air for 8 hours coughed for about 1 week and had irritated eyes. No studies designed to look for cancer in laboratory animals exposed to vanadium were found. In studies that looked for health effects other than cancer, rats and mice that drank water containing vanadium or breathed in air containing vanadium throughout their lives did not have more tumors than animals that were not exposed to vanadium. Some minor birth defects (such as

slightly smaller offspring, offspring with broken blood vessels on parts of their bodies or chemical changes in their lungs) occurred when female rats drank vanadium in water when they were pregnant. We do not know if vanadium would cause birth defects in people because these effects may occur only in animals. Monkeys and rats that breathed the dusts of vanadium compounds had changes in the cells in the lungs. Rats that drank sodium metavanadate in the water had minor kidney damage. Rabbits that breathed large amounts of vanadium dust died, as did rats and mice that drank large amounts. For more information on health effects in people and animals after breathing, eating, or touching vanadium, see Chapter 2.

1.5 IS THERE A MEDICAL TEST TO DETERMINE WHETHER I HAVE BEEN EXPOSED TO VANADIUM?

Since vanadium is a natural element in the earth, we all have a small amounts in our bodies. There are some tests to show whether you have been exposed to larger than normal amounts of vanadium. Vanadium can be measured in the urine and blood. People exposed to larger than normal amounts will show larger than normal amounts in their urine and blood for a few days. Some workers who have been exposed to large amounts of vanadium may have a green color on the tongue. None of these tests can tell if you will become sick from the vanadium but they are specific for vanadium exposure. For more information on ways to tell whether you have been exposed to vanadium see Chapters 2 and 6.

1.6 WHAT RECOMMENDATIONS HAS THE FEDERAL GOVERNMENT MADE TO PROTECT HUMAN HEALTH?

Releases to the environment of more than 1,000 pounds of vanadium pentoxide must be reported to the National Response Center. EPA has decided that if you eat less than 9 micrograms (μg) of vanadium pentoxide per kilogram (kg) of your body weight, your health is protected. The Occupational Safety and Health Administration (OSHA) has set a legal limit of 0.05 mg of vanadium pentoxide respirable dust per m^3 of air (0.05 mg/m^3) for workers who are exposed to vanadium in workroom air during an 8-hour shift for a 40-hour workweek. Respirable dust is dust small enough to enter the lungs when breathed in. For more information on regulations and guidelines, see Chapter 7.

1.7 WHERE CAN I GET MORE INFORMATION?

If you have any more questions or concerns not covered here, please contact your state health or environmental department or:

4. PRODUCTION, IMPORT, USE, AND DISPOSAL

The major facilities within the United States that manufacture or process vanadium and vanadium-containing compounds are listed in Table 4-1.

4.2 IMPORT/EXPORT

The import of vanadium by the United States can be split into three different products: vanadium-containing materials such as ores, slags, and residues from which the vanadium must still be recovered; ferrovanadium; and manufactured vanadium compounds (principally vanadium pentoxide). Due to shortages of domestic ore and petroleum residues, imports of the former increased substantially from 1983 to 1987, rising from 58 to 2,264 tons. On the other hand, imports of ferrovanadium have declined from 1,461 tons in 1984 to 422 tons in 1987. Imports of vanadium pentoxide were approximately 400 tons in both 1984 and 1987, despite falling to as low as 63 tons in 1985. In 1986, the top four exporters of vanadium to the United States were Austria, Canada, the Federal Republic of Germany, and the Republic of South Africa (Hilliard 1987).

Despite being a net importer of raw vanadium materials, the United States has remained an exporter of processed vanadium products. The United States exports vanadium principally in the form of vanadium pentoxide, which is the primary source for the production of chemicals, catalysts, alloys, and other vanadium compounds. Vanadium pentoxide and catalysts containing vanadium pentoxide have accounted for between 61% (1987) and 82% (1984) of all domestic exports. In 1984, the United States exported a total of 4,498 tons of vanadium. Since then, exports have declined, reaching a level of 2,486 tons in 1986 and remaining fairly constant through 1987. The major importers of vanadium from the United States are Canada, the Federal Republic of Germany, Japan, and Mexico. These are followed by Taiwan and the Republic of Korea (Hilliard 1987).

4.3 USE

Vanadium and its compounds are currently used for a wide variety of purposes. The annual consumption of vanadium within the United States increased from 3,277 tons in 1983 to 4,883 tons by 1985 and remained around this level through 1987. Approximately 83% of the vanadium consumed in the United States is utilized as an alloying agent in the steel industry (Hilliard 1987). These steels are used in a variety of products, such as automobile parts, springs, and ball bearings. Fourteen percent of domestic vanadium consumption is used in the production of ferrovanadium alloys. These are invaluable in the manufacture of jet aircraft engines. Likewise, the nonferrous titanium alloys are essential in the manufacture of supersonic aircrafts. Despite accounting for around 0.3% of domestic consumption, vanadium compounds also have an important role as industrial catalysts. Vanadium-containing catalysts are used in several oxidation reactions such as the manufacture of phthalic anhydride and sulfuric acid, as well as in the

30% of 2,783 Superfund hazardous waste sites that have had samples of all media analyzed by the CLP. The geometric mean concentration of vanadium for all sites testing positive is 18 ppm and 31 ppm for surface water and groundwater, respectively (CLPSD 1989). Note that the CLPSD includes data from NPL sites only.

Natural sources of vanadium release to water include wet and dry deposition, soil erosion, and leaching from rocks and soils. The largest amount of vanadium release occurs naturally through water erosion of land surfaces. It has been estimated that approximately 32,300 tons of vanadium are dissolved and transported to the oceans by water, and an additional 308,650 tons are thought to be transported in the form of particulate and suspended sediment (Van Zinderen Bakker and Jaworski 1980).

Anthropogenic releases to water and sediments are far smaller than natural sources (Van Zinderen Bakker and Jaworski 1980). Such sources of vanadium in water may include leaching from the residue of ores and clays, vanadium-enriched slags, urban sewage sludge, and certain fertilizers, all of which are subjected to rain and groundwater drainage, as well as leachate from ash ponds and coal preparation wastes (Byerrum et al. 1974; Van Zinderen Bakker and Jaworski 1980). Leaching may potentially occur from landfills and from the airborne particulate matter that is deposited in areas with high residual fuel oil combustion, although neither of these release sources is documented.

According to TRI87, an estimated total of 1,092 pounds of vanadium were released to surface water from manufacturing and processing facilities in the United States in 1987 (TRI 1989). However, as detailed in Section 5.2, this estimate must be viewed with caution.

5.2.3 Soil

The CLPSD indicates that vanadium has been detected in the soil at 48% of 2,783 Superfund hazardous waste sites that have had samples of all media analyzed by the CLP. The geometric mean concentration of vanadium for all sites testing positive is 21 ppm (CLPSD 1989). Note that the CLPSD includes data from NPL sites only.

Natural releases of vanadium to soil result from weathering of rock-bearing vanadium minerals, precipitation of vanadium particulate from the atmosphere, deposition of suspended particulate from water, and plant and animal wastes. The largest amount of vanadium released to soil occurs through the natural weathering of geological formations (Byerrum et al. 1974; Van Zinderen Bakker and Jaworski 1980).

Anthropogenic releases of vanadium to soil are less widespread than natural releases and occur on a smaller scale. These include the use of certain fertilizers containing materials with a high vanadium content such as

5.4.2 Water

Levels of vanadium in fresh water illustrate geographic variations produced by differences in effluents and leachates, from both anthropogenic and natural sources, entering the water table. Measurements of vanadium in such natural fresh waters as the Animas, Colorado, Green, Sacramento, San Joaquin, and San Juan Rivers, as well as some fresh water supplies in Wyoming, range from 0.3 to 200 μg vanadium/L (Byerrum et al. 1974; Van Zinderen Bakker and Jaworski 1980). The presence of naturally occurring uranium ores resulted in rivers in the Colorado Plateau containing vanadium levels of up to 70 μg/L, and in Wyoming levels were found to range from 30 to 220 μg/L (Byerrum et al. 1974). Some municipal waters have been found to contain levels of between 1 and 6 μg vanadium/L (Van Zinderen Bakker and Jaworski 1980), although levels of 19 μg vanadium/L have been reported in nine New Mexico municipalities (Byerrum et al. 1974).

Levels in sea water are considerably lower than those in freshwater because much of the vanadium is precipitated (Byerrum et al. 1974; Van Zinderen Bakker and Jaworski 1980). The concentrations measured usually average 1-3 μg vanadium/L (Van Zinderen Bakker and Jaworski 1980) although levels as high as 29 μg/L have been reported (Byerrum et al. 1974). The total content of vanadium in sea water has been estimated to be 7.5×10^{12} kg (7.5×10^{9} metric tons) (Byerrum et al. 1974).

5.4.3 Soil

Vanadium is found throughout the earth's crust at an average level of 150 mg/kg. The level of vanadium measured in soil is closely related to the parent rock type (Van Zinderen Bakker and Jaworski 1980; Waters 1977). A range of 3-310 mg/kg has been observed, with tundra podsols and clays exhibiting the highest concentration, 100 mg/kg and 300 mg/kg, respectively (Byerrum et al. 1974). The average vanadium content of soils in the United States is 200 mg/kg (Byerrum et al. 1974) and seems to be most abundant in the western United States, especially the Colorado Plateau (Cannon 1963; Grayson 1983).

5.4.4 Other Environmental Media

The majority of foods have naturally occurring low concentrations of vanadium, many of them 1 ng/g or less (Byrne and Kosta 1978). Food items containing the highest levels of vanadium include ground parsley (1,800 ng/g dry weight), freeze-dried spinach (533-840 ng/g), wild mushrooms (50-2,000 ng/g dry weight), and oysters (455 ng/g wet weight) (Byrne and Kosta 1978). Intermediate levels are found in food types such as certain cereals (ranging from 0.7 ng/g in maize to 30 ng/g in Macedonian rice), fish (ranging from 3.5 ng/g in mackerel to 28 ng/g in freeze-dried tuna), and liver (ranging from 7.3 ng/g in beef to 38 ng/g in chicken) (Byrne and Kosta 1978). In

Eisenberg Fill Site
(alias: Leo Eisenberg's Property)
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Toxic Profile for

ARSENIC

U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry

TP-92/02

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TOXICOLOGICAL PROFILE FOR ARSENIC

Prepared by:

Life Systems, Inc.
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April 1993

CONTENTS

FOREWORD v

CONTRIBUTORS vii

LIST OF FIGURES xiii

LIST OF TABLES xv

1. PUBLIC HEALTH STATEMENT 1
   1.1 WHAT IS ARSENIC? 1
   1.2 WHAT HAPPENS TO ARSENIC WHEN IT ENTERS THE ENVIRONMENT? 2
   1.3 HOW MIGHT I BE EXPOSED TO ARSENIC? 2
   1.4 HOW CAN ARSENIC ENTER AND LEAVE MY BODY? 3
   1.5 HOW CAN ARSENIC AFFECT MY HEALTH? 4
   1.6 IS THERE A MEDICAL TEST TO DETERMINE WHETHER I HAVE BEEN EXPOSED TO ARSENIC? 5
   1.7 WHAT RECOMMENDATIONS HAS THE FEDERAL GOVERNMENT MADE TO PROTECT HUMAN HEALTH? 6
   1.8 WHERE CAN I GET MORE INFORMATION? 6

2. HEALTH EFFECTS 7
   2.1 INTRODUCTION 7
   2.2 DISCUSSION OF HEALTH EFFECTS BY ROUTE OF EXPOSURE 7
      2.2.1 Inhalation Exposure 9
         2.2.1.1 Death 9
         2.2.1.2 Systemic Effects 16
         2.2.1.3 Immunological Effects 19
         2.2.1.4 Neurological Effects 20
         2.2.1.5 Developmental Effects 20
         2.2.1.6 Reproductive Effects 21
         2.2.1.7 Genotoxic Effects 21
         2.2.1.8 Cancer 21
      2.2.2 Oral Exposure 22
         2.2.2.1 Death 41
         2.2.2.2 Systemic Effects 41
         2.2.2.3 Immunological Effects 46
         2.2.2.4 Neurological Effects 46
         2.2.2.5 Developmental Effects 47
         2.2.2.6 Reproductive Effects 48
         2.2.2.7 Genotoxic Effects 48
         2.2.2.8 Cancer 48
      2.2.3 Dermal Exposure 50
         2.2.3.1 Death 50
         2.2.3.2 Systemic Effects 50
         2.2.3.3 Immunological Effects 52
         2.2.3.4 Neurological Effects 52
         2.2.3.5 Developmental Effects 52
         2.2.3.6 Reproductive Effects 52

2.2.3.7 Genotoxic Effects 53
2.2.3.8 Cancer 53
2.3 TOXICOKINETICS 53
2.3.1 Absorption 53
2.3.1.1 Inhalation Exposure 53
2.3.1.2 Oral Exposure 54
2.3.1.3 Dermal Exposure 54
2.3.2 Distribution 55
2.3.2.1 Inhalation Exposure 55
2.3.2.2 Oral Exposure 55
2.3.2.3 Dermal Exposure 55
2.3.2.4 Other Routes of Exposure 55
2.3.3 Metabolism 56
2.3.4 Excretion 57
2.3.4.1 Inhalation Exposure 57
2.3.4.2 Oral Exposure 57
2.3.4.3 Dermal Exposure 57
2.3.4.4 Other Routes of Exposure 58
2.4 RELEVANCE TO PUBLIC HEALTH 58
2.5 BIOMARKERS OF EXPOSURE AND EFFECT 69
2.5.1 Biomarkers Used to Identify or Quantify Exposure to Arsenic 70
2.5.2 Biomarkers Used to Characterize Effects Caused by Arsenic 71
2.6 INTERACTIONS WITH OTHER CHEMICALS 72
2.7 POPULATIONS THAT ARE UNUSUALLY SUSCEPTIBLE 73
2.8 METHODS FOR REDUCING TOXIC EFFECTS 73
2.8.1 Reducing Peak Absorption Following Exposure 73
2.8.2 Reducing Body Burden 74
2.8.3 Interfering with the Mechanism of Action for Toxic Effects 74
2.9 ADEQUACY OF THE DATABASE 75
2.9.1 Existing Information on Health Effects of Arsenic 75
2.9.2 Identification of Data Needs 78
2.9.3 On-going Studies 83

3. CHEMICAL AND PHYSICAL INFORMATION 85
3.1 CHEMICAL IDENTITY 85
3.2 PHYSICAL AND CHEMICAL PROPERTIES 85

4. PRODUCTION, IMPORT, USE, AND DISPOSAL 95
4.1 PRODUCTION 95
4.2 IMPORT/EXPORT 95
4.3 USE 95
4.4 DISPOSAL 97

5. POTENTIAL FOR HUMAN EXPOSURE 99
5.1 OVERVIEW 99
5.2 RELEASES TO THE ENVIRONMENT 99
5.2.1 Air 102
5.2.2 Water 102
5.2.3 Soil 102
5.3 ENVIRONMENTAL FATE 103
5.3.1 Transport and Partitioning 103

5.3.2 Transformation and Degradation 103
5.3.2.1 Air 103
5.3.2.2 Water 103
5.3.2.3 Soil 104
5.4 LEVELS MONITORED OR ESTIMATED IN THE ENVIRONMENT 104
5.4.1 Air 104
5.4.2 Water 104
5.4.3 Soil 105
5.4.4 Other Environmental Media 105
5.5 GENERAL POPULATION AND OCCUPATIONAL EXPOSURE 105
5.6 POPULATIONS WITH POTENTIALLY HIGH EXPOSURES 106
5.7 ADEQUACY OF THE DATABASE 106
5.7.1 Identification of Data Needs 106
5.7.2 On-going Studies 108

6. ANALYTICAL METHODS 109
6.1 BIOLOGICAL MATERIALS 109
6.2 ENVIRONMENTAL SAMPLES 113
6.3 ADEQUACY OF THE DATABASE 113
6.3.1 Identification of Data Needs 118
6.3.2 On-going Studies 118

7. REGULATIONS AND ADVISORIES 119

8. REFERENCES 125

9. GLOSSARY 173

APPENDICES

A. USER'S GUIDE A-1

B. ACRONYMS, ABBREVIATIONS, AND SYMBOLS B-1

C. PEER REVIEW C-1

decay. Arsenic is also used to make several types of insect killers and weed killers, such as Ansar®, Scorch®, Phytar®, Bueno®, Crab-E-Rad®, Premix®, and others.

You can find more information on the sources, properties, and uses of arsenic in Chapters 3 and 4.

1.2 WHAT HAPPENS TO ARSENIC WHEN IT ENTERS THE ENVIRONMENT?

Arsenic can enter the environment in several ways. Even though it does not evaporate, arsenic can get into air as dust. This can happen when smelters heat ores containing arsenic, when people burn any material containing arsenic, or when wind blows soil that contains arsenic into the air. Once in the air, the arsenic particles will travel with the wind for a while, but will then settle back to the ground. Most arsenic compounds can also dissolve in water. Thus, arsenic can get into lakes, rivers, or underground water by dissolving in rain or snow, or through the discharge of industrial wastes. Some of the arsenic will stick to the sediment on the bottom of the lake or river, and some will be carried along by the water.

Arsenic is not broken down or destroyed in the environment. However, it can change from one form to another by natural chemical reactions, and also by the action of bacteria that live in soil or water. Although some fish and shellfish build up arsenic in their tissues, most of this is in a form (often called "fish arsenic") that is not toxic.

You can find more information on how arsenic gets into the environment and how it behaves in air, soil, and water in Chapters 4 and 5.

1.3 HOW MIGHT I BE EXPOSED TO ARSENIC?

Because arsenic is a natural part of the environment, low levels of arsenic are present in soil, water, food, and air. Soil usually contains the most, with average levels of about 5,000 parts of arsenic per billion parts of soil (ppb). Levels in food are usually about 20–140 ppb and levels in water are about 2 ppb. Levels in air are usually about 0.02–0.10 micrograms per cubic meter. Thus, you normally take in small amounts of arsenic in the air you breathe, the water you drink, and the food you eat. Of these, food is usually the largest source. You are also likely to swallow small amounts of dust or dirt each day, so this is another way you can be exposed to arsenic. The total amount you take in from these sources is probably about 50 micrograms each day.

In addition to the normal levels of arsenic in air, water, soil, and food, you could be exposed to higher levels in several ways, such as the following:

- Some areas of the country contain unusually high natural levels of arsenic in rock, and this can lead to unusually high levels of arsenic in soil or water. If you live in an area like this, you could take in above-average amounts of arsenic from the soil or from the water.

- Some hazardous waste sites contain large quantities of arsenic. If the material is not properly disposed of, it can get into surrounding water, air, or soil. If you live near such a site, you could be exposed to above-average levels of arsenic from these media.

- If you work in an occupation that involves arsenic production or use (for example, copper or lead smelting, wood treating, pesticide application), you could be exposed to above-average levels of arsenic during your work. The government estimates that about 55,000 people may be exposed in this way.

- If you saw or sand arsenic-treated wood, you could inhale some of the sawdust into your nose or throat. Similarly, if you burn arsenic-treated wood, you could inhale arsenic in the smoke.

- In the past, several kinds of products used in the home (rat poison, ant poison, weed killer, some types of medicines) had arsenic in them. However, most of these uses of arsenic have ended, so you are not likely to be exposed from home products any longer.

You can find more information on how you may be exposed to arsenic in Chapter 5.

1.4 HOW CAN ARSENIC ENTER AND LEAVE MY BODY?

If you swallow arsenic in water, soil, or food, most of the arsenic quickly enters into your body. This is the most likely way for you to be exposed near a waste site. If you breathe air that contains arsenic dusts, many of the dust particles settle onto the lining of the lungs. Most of the arsenic in these particles is then taken up from the lungs into the body. You might be exposed in this way near waste sites where arsenic-contaminated soils are allowed to blow into the air. If you get arsenic-contaminated soil or water on your skin, only a small amount will go through your skin into your body, so this is usually not of concern.

If you are exposed to arsenic, your liver changes some of this to a less harmful organic form. Both inorganic and organic forms leave your body in your urine. Most of the arsenic will be gone within several days, although some will remain in your body for several months or even longer.

You can find more information on how arsenic enters and leaves your body in Chapter 2.

1.5 HOW CAN ARSENIC AFFECT MY HEALTH?

Inorganic arsenic has been recognized as a human poison since ancient times, and large oral doses (above 60,000 ppb in food or water) can produce death. If you swallow lower levels of inorganic arsenic (ranging from about 300 to 30,000 ppb in food or water), you may experience irritation of your stomach and intestines, with symptoms such as pain, nausea, vomiting, and diarrhea. Other effects you might experience from swallowing arsenic include decreased production of red and white blood cells, abnormal heart rhythm, blood-vessel damage, and impaired nerve function causing a "pins and needles" sensation in your hands and feet. Although there is no good evidence that arsenic can injure pregnant women or their fetuses, studies in animals show that doses of arsenic that are large enough to cause illness in pregnant females may cause low birth weight, fetal malformations, or even fetal death.

Perhaps the single most characteristic effect of long-term oral exposure to inorganic arsenic is a pattern of skin changes. This includes a darkening of the skin and the appearance of small "corns" or "warts" on the palms, soles, and torso. While these skin changes are not considered to be a health concern in their own right, a small number of the corns may ultimately develop into skin cancer. Swallowing arsenic has also been reported to increase the risk of cancer in the liver, bladder, kidney, and lung. The Department of Health and Human Services determined that arsenic is a known carcinogen. The International Agency for Research on Cancer (IARC) has determined that arsenic is carcinogenic to humans. The EPA has determined that arsenic is a human carcinogen. Both the EPA and the National Toxicology Program (NTP) have classified arsenic as a known human carcinogen.

If you breathe high levels of inorganic arsenic, you are likely to experience a sore throat and irritated lungs. You may also develop some of the skin effects mentioned above. The exposure level that produces these effects is uncertain, but is probably above 100 micrograms per cubic meter. However, these effects are usually not serious. Of much greater concern is the ability of inhaled inorganic arsenic to increase the risk of lung cancer. This has been seen mostly in humans exposed to arsenic in or around smelters. People who live near smelters, chemical factories, or waste sites with arsenic may have increased risk of lung cancer as well.

If you have direct skin contact with inorganic arsenic compounds, your skin may become irritated with some redness and swelling. However, it does not appear that skin contact is likely to lead to any serious internal effects.

Despite all the adverse health effects associated with inorganic arsenic exposure, there is some evidence that the small amounts of arsenic in the normal diet (10–50 ppb) may be beneficial to your health. For example, animals fed a diet with unusually low concentrations of arsenic did not gain weight normally. They also became pregnant less frequently than animals fed a diet containing a normal amount of arsenic. Further, the offspring from these animals tended to be smaller than normal, and some died at an early age. However, no cases of arsenic deficiency in humans have ever been reported.

Almost no information is available on the effects of organic arsenic compounds in humans. Studies in animals show that most organic arsenic compounds are less toxic than the inorganic forms. However, high doses can produce some of the same effects. Thus, if you are exposed to high doses of an organic arsenic compound, you might develop nerve injury, stomach irritation, or other effects, but this is not known for certain.

You can find more information on the health effects of inorganic and organic arsenic in Chapter 2.

1.6 IS THERE A MEDICAL TEST TO DETERMINE WHETHER I HAVE BEEN EXPOSED TO ARSENIC?

Several sensitive and specific tests can measure arsenic in your blood, urine, hair, or fingernails, and these tests are often helpful in determining if you have been exposed to above-average levels of arsenic. These tests are not usually performed in a doctor's office, but require sending the sample to a testing laboratory.

Measurement of arsenic in your urine is the most reliable means of detecting arsenic exposures that you experienced within the last several days. Most tests measure the total amount of arsenic present in your urine. Sometimes this can be misleading, because the nonharmful forms of arsenic in fish and shellfish can give a high reading even if you have not been exposed to a toxic form of arsenic. For this reason, laboratories sometimes use a more complicated test to separate "fish arsenic" from other forms. Because most arsenic leaves your body within a few days, analysis of your urine cannot detect if you were exposed to arsenic in the past. Tests of your hair or fingernails can tell if you were exposed to high levels over the past 6–12 months, but these tests are not very useful in detecting low level exposures. If high levels of arsenic are detected, this shows that you have been exposed, but unless more is known about when you were exposed and for how long, it is usually not possible to predict whether you will have any harmful health effects.

You can find more information on how arsenic can be measured in your hair, urine, nails, and other tissues in Chapters 2 and 6.

1.7 WHAT RECOMMENDATIONS HAS THE FEDERAL GOVERNMENT MADE TO PROTECT HUMAN HEALTH?

The federal government has taken several steps to protect humans from arsenic. First, EPA has set limits on the amount of arsenic that industrial sources can release into the environment. Second, EPA has restricted or canceled many of the uses of arsenic in pesticides and is considering further restrictions. Third, EPA has set a limit of 50 ppb for arsenic in drinking water. EPA is currently reviewing this value and may lower it. Finally, the Occupational Safety and Health Administration (OSHA) has established a maximum permissible exposure limit of 10 micrograms per cubic meter for airborne arsenic in various workplaces that use inorganic arsenic.

You can find more information on regulations and guidelines that apply to arsenic in Chapter 7.

1.8 WHERE CAN I GET MORE INFORMATION?

If you have any more questions or concerns, please contact your community or state health or environmental quality department or:

Agency for Toxic Substances and Disease Registry
Division of Toxicology
1600 Clifton Road NE, E-29
Atlanta, Georgia 30333

This agency can also provide you with information on the location of the nearest occupational and environmental health clinic. These clinics specialize in the recognition, evaluation, and treatment of illnesses resulting from exposure to hazardous substances.

Eisenberg Fill Site
(alias: Leo Eisenberg's Property)
MOD985768175
PA/SI Reference 21

Toxicological Profile for

POLYCYCLIC AROMATIC HYDROCARBONS (PAHs)

Draft for Public Comment

Update

Comment Period Ends: February 21, 1994

U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry

DRAFT

TOXICOLOGICAL PROFILE FOR POLYCYCLIC AROMATIC HYDROCARBONS

Prepared by:

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October 1993

CONTENTS

FOREWORD v

CONTRIBUTORS vii

LIST OF FIGURES xiii

LIST OF TABLES xv

1. PUBLIC HEALTH STATEMENT 1
   1.1 WHAT ARE POLYCYCLIC AROMATIC HYDROCARBONS? 1
   1.2 WHAT HAPPENS TO POLYCYCLIC AROMATIC HYDROCARBONS WHEN THEY ENTER THE ENVIRONMENT? 2
   1.3 HOW MIGHT I BE EXPOSED TO POLYCYCLIC AROMATIC HYDROCARBONS? 3
   1.4 HOW CAN POLYCYCLIC AROMATIC HYDROCARBONS ENTER AND LEAVE MY BODY? 4
   1.5 HOW CAN POLYCYCLIC AROMATIC HYDROCARBONS AFFECT MY HEALTH? 4
   1.6 IS THERE A MEDICAL TEST TO DETERMINE WHETHER I HAVE BEEN EXPOSED TO POLYCYCLIC AROMATIC HYDROCARBONS? 5
   1.7 WHAT RECOMMENDATIONS HAS THE FEDERAL GOVERNMENT MADE TO PROTECT HUMAN HEALTH? 5
   1.8 WHERE CAN I GET MORE INFORMATION? 6

2. HEALTH EFFECTS 7
   2.1 INTRODUCTION 7
   2.2 DISCUSSION OF HEALTH EFFECTS BY ROUTE OF EXPOSURE 7
      2.2.1 Inhalation Exposure 9
         2.2.1.1 Death 9
         2.2.1.2 Systemic Effects 9
         2.2.1.3 Immunological Effects 10
         2.2.1.4 Neurological Effects 10
         2.2.1.5 Reproductive Effects 10
         2.2.1.6 Developmental Effects 10
         2.2.1.7 Genotoxic Effects 10
         2.2.1.8 Cancer 10
      2.2.2 Oral Exposure 13
         2.2.2.1 Death 13
         2.2.2.2 Systemic Effects 19
         2.2.2.3 Immunological Effects 21
         2.2.2.4 Neurological Effects 21
         2.2.2.5 Reproductive Effects 21
         2.2.2.6 Developmental Effects 22
         2.2.2.7 Genotoxic Effects 23
         2.2.2.8 Cancer 24
      2.2.3 Dermal Exposure 26
         2.2.3.1 Death 26
         2.2.3.2 Systemic Effects 26
         2.2.3.3 Immunological Effects 31
         2.2.3.4 Neurological Effects 32
         2.2.3.5 Reproductive Effects 32
         2.2.3.6 Developmental Effects 32

2.2.3.7 Genotoxic Effects 32
2.2.3.8 Cancer 32
2.3 TOXICOKINETICS 38
2.3.1 Absorption 39
2.3.1.1 Inhalation Exposure 39
2.3.1.2 Oral Exposure 40
2.3.1.3 Dermal Exposure 41
2.3.2 Distribution 43
2.3.2.1 Inhalation Exposure 43
2.3.2.2 Oral Exposure 43
2.3.2.3 Dermal Exposure 44
2.3.3 Metabolism 45
2.3.4 Excretion 51
2.3.4.1 Inhalation Exposure 51
2.3.4.2 Oral Exposure 51
2.3.4.3 Dermal Exposure 52
2.3.4.4 Other Routes of Exposure 52
2.3.5 Mechanisms of Action 53
2.4 RELEVANCE TO PUBLIC HEALTH 55
2.5 BIOMARKERS OF EXPOSURE AND EFFECT 101
2.5.1 Biomarkers Used to Identify or Quantify Exposure to Polycyclic Aromatic Hydrocarbons 102
2.5.2 Biomarkers Used to Characterize Effects Caused by Polycyclic Aromatic Hydrocarbons 103
2.6 INTERACTIONS WITH OTHER SUBSTANCES 104
2.7 POPULATIONS THAT ARE UNUSUALLY SUSCEPTIBLE 109
2.8 METHODS FOR REDUCING TOXIC EFFECTS 112
2.8.1 Reducing Peak Absorption Following Exposure 112
2.8.2 Reducing Body Burden 112
2.8.3 Interfering with the Mechanism of Action for Toxic Effects 113
2.9 ADEQUACY OF THE DATABASE 113
2.9.1 Existing Information on Health Effects of Polycyclic Aromatic Hydrocarbons 114
2.9.2 Identification of Data Needs 114
2.9.3 On-going Studies 121

3. CHEMICAL AND PHYSICAL INFORMATION 125
3.1 CHEMICAL IDENTITY 125
3.2 PHYSICAL AND CHEMICAL PROPERTIES 125

4. PRODUCTION, IMPORT/EXPORT, USE, AND DISPOSAL 139
4.1 PRODUCTION 139
4.2 IMPORT/EXPORT 139
4.3 USE 141
4.4 DISPOSAL 141

5. POTENTIAL FOR HUMAN EXPOSURE 143
5.1 OVERVIEW 143
5.2 RELEASES TO THE ENVIRONMENT 145
5.2.1 Air 145
5.2.2 Water 145
5.2.3 Soil 147
5.3 ENVIRONMENTAL FATE 147
5.3.1 Transport and Partitioning 147

5.3.2 Transformation and Degradation 150
5.3.2.1 Air 150
5.3.2.2 Water 151
5.3.2.3 Sediment and Soil 152
5.4 LEVELS MONITORED OR ESTIMATED IN THE ENVIRONMENT 153
5.4.1 Air 153
5.4.2 Water 154
5.4.3 Sediment and Soil 155
5.4.4 Other Environmental Media 155
5.5 GENERAL POPULATION AND OCCUPATIONAL EXPOSURE 157
5.6 POPULATIONS WITH POTENTIALLY HIGH EXPOSURES 160
5.7 ADEQUACY OF THE DATABASE 161
5.7.1 Identification of Data Needs 161
5.7.2 On-going Studies 164

6. ANALYTICAL METHODS 165
6.1 BIOLOGICAL MATERIALS 165
6.2 ENVIRONMENTAL SAMPLES 179
6.3 ADEQUACY OF THE DATABASE 199
6.3.1 Identification of Data Needs 199
6.3.2 On-going Studies 200

7. REGULATIONS AND ADVISORIES 201

8. REFERENCES 211

9. GLOSSARY 271

APPENDICES

A. USER'S GUIDE A-1

B. ACRONYMS, ABBREVIATIONS, AND SYMBOLS B-1

C. PEER REVIEW C-1

1. PUBLIC HEALTH STATEMENT

This Statement was prepared to give you information about polycyclic aromatic hydrocarbons (PAHs) and to emphasize the human health effects that may result from exposure to them. The Environmental Protection Agency (EPA) has identified 1,350 hazardous waste sites as the most serious in the nation. These sites comprise the "National Priorities List" (NPL): Those sites which are targeted for long-term federal cleanup activities. PAHs have been found in at least 585 of the sites on the NPL. However, the number of NPL sites evaluated for PAHs is not known. As EPA evaluates more sites, the number of sites at which PAHs are found may increase. This information is important because exposure to PAHs may cause harmful health effects and because these sites are potential or actual sources of human exposure to PAHs.

When a substance is released from a large area, such as an industrial plant, or from a container, such as a drum or bottle, it enters the environment. This release does not always lead to exposure. You can be exposed to a substance only when you come in contact with it. You may be exposed by breathing, eating, or drinking substances containing the substance or by skin contact with it.

If you are exposed to substances such as PAHs, many factors will determine whether harmful health effects will occur and what the type and severity of those health effects will be. These factors include the dose (how much), the duration (how long), the route or pathway by which you are exposed (breathing, eating, drinking, or skin contact), the other chemicals to which you are exposed, and your individual characteristics such as age, gender, nutritional status, family traits, life-style, and state of health.

1.1 WHAT ARE POLYCYCLIC AROMATIC HYDROCARBONS?

PAHs are a group of chemicals that are formed during the incomplete burning of coal, oil, gas, wood, garbage, or other organic substances, such as tobacco and charbroiled meat. PAHs can either be man-made or occur naturally. Most of these chemicals have no known use except for research purposes. A few of the PAHs are used in medicines and to make dyes, plastics, and pesticides, while others are contained in asphalt used in road construction. They are found throughout the environment in the air, water, and soil. There are more than 100 different PAH compounds. Although the health effects of the individual PAHs are not exactly alike, the following 17 PAHs are considered as a group in this profile:

- acenaphthene
- acenaphthylene
- anthracene
- benz(a)anthracene
- benzo(a)pyrene
- benzo(e)pyrene
- benzo(b)fluoranthene

- benzo(g,h,i)perylene
- benzo(j)fluoranthene
- benzo(k)fluoranthene
- chrysene
- dibenz(a,h)anthracene
- fluoranthene
- fluorene
- indeno(1,2,3-c,d)pyrene
- phenanthrene
- pyrene

These 17 PAHs were chosen to be included in this profile because (1) more information is available on these than on the others; (2) they are more harmful than many or most of the others; (3) there is a greater chance that you will be exposed to these PAHs than to the others; and (4) they were the ones most frequently identified at NPL hazardous waste sites.

As pure chemicals, PAHs generally exist as colorless, white, or pale yellow-green solids. They can have a faint, pleasant odor. Most PAHs do not occur alone in the environment (including those found at hazardous waste sites). They are found as parts of complex mixtures of chemicals. They can occur in the air either attached to dust particles or as solids in soil or sediment. They can also be found in substances such as crude oil, coal, coal tar pitch, creosote, and road and roofing tar.

More information can be found on the chemical and physical properties of PAHs in Chapter 3 and on their use and disposal in Chapter 4.

1.2 WHAT HAPPENS TO POLYCYCLIC AROMATIC HYDROCARBONS WHEN THEY ENTER THE ENVIRONMENT?

PAHs enter the environment largely as releases to air from volcanoes, forest fires, residential wood burning, and automobile and truck exhausts. They can also enter surface water through discharges from industrial plants and waste water treatment plants, and they can be released to soils at hazardous waste sites. The movement of PAHs in the environment depends on properties like their water solubility, vapor pressure, and molecular weight. PAHs in general do not easily dissolve in water. They are present in air as vapors or stuck to the surfaces of small solid particles and can travel long distances before they are removed through washout in rainfall or particle settling. From surface waters, some PAHs can evaporate into the atmosphere, but most will stick to solid particles and settle to the bottoms of rivers or lakes. In soils, the compounds are most likely to stick tightly to particles. Some PAHs can evaporate from surface soils to air. Certain PAHs in soils can also contaminate underground water. The PAH content of plants and animals living on the land or in water can be many times higher than the content of PAHs in soil or water. PAHs can break down to less short-lived products by reacting with sunlight and other chemicals in the air, generally over a period of days to weeks. Breakdown in soil and water generally takes weeks to months and is due mostly

to the actions of microorganisms. For more information on what happens to PAHs in the environment see Chapter 5.

1.3 HOW MIGHT I BE EXPOSED TO POLYCYCLIC AROMATIC HYDROCARBONS?

PAHs are present throughout the environment, and you may be exposed to these substances at home, while outside, or at the workplace. Typically, you will not be exposed to an individual PAH alone, but to a mixture of PAHs.

In the environment, you are most likely exposed to PAH vapors or PAHs that are attached to dust and other particles in the air. Sources include cigarette smoke, vehicle exhausts, asphalt roads, coal, coal tar, wild fires, agricultural burning, residential wood burning, and hazardous waste sites. Background levels of some representative PAHs in the air are reported to be 0.02–1.2 nanograms per cubic meter (ng/m^3; a nanogram is one-millionth of a milligram) in rural areas and 0.15–19.3 ng/m^3 in urban areas. You may be exposed to PAHs in soil near areas where coal, wood, gasoline, or other products have been burned. You may be exposed to PAHs in the soil on or near hazardous waste sites, such as former manufactured-gas sites and wood-preserving facilities. PAHs have been found in some drinking water supplies in the United States. Background levels of PAHs in drinking water range from 4 to 24 nanograms per liter (ng/L).

In the home, PAHs are present in tobacco smoke, smoke from home burning of wood, creosote-treated wood products, cereals, grains, flour, bread, vegetables, fruits, meat, processed or pickled foods, and contaminated cow's milk or human breast milk. Food grown in contaminated soil or air may also contain PAHs. Cooking meat or other food at high temperatures, which happens during grilling or charring, increases the amount of PAHs in the food. The level of PAHs in the typical U.S. diet is less than 2 parts of total PAHs per billion parts of food (ppb), or less than 2 micrograms per kilogram of food ($\mu g/kg$; a microgram is one-thousandth of a milligram).

The primary sources of exposure to PAHs for most of the U.S. population are inhalation of the compounds in tobacco smoke, wood smoke, and ambient air, and ingestion of PAHs in foods. For some people, the primary exposure to PAHs occurs in the workplace. PAHs have been found in coal tar production plants, coking plants, bitumen and asphalt production plants, coal-gasification sites, smoke houses, aluminum production plants, coal tarring activities, and municipal trash incinerators. PAHs have also been found in other facilities where petroleum, petroleum products, or coal are used or where wood, cellulose, corn, or oil are burned. Populations living near waste sites containing PAHs may be exposed through contact with contaminated air, water, and soil. For more information on human exposure to PAHs see Chapter 5.

1.4 HOW CAN POLYCYCLIC AROMATIC HYDROCARBONS ENTER AND LEAVE MY BODY?

PAHs can enter your body through your lungs when you breathe air that contains them (usually stuck to particles or dust). This is one of the routes of exposure for people living near hazardous waste sites. However, it is not known how rapidly or completely uptake by the lungs occurs. Drinking water and swallowing food, soil, or dust particles that contain PAHs are other routes for these chemicals to enter your body, but uptake is generally slow when PAHs are swallowed. Under normal conditions of environmental exposure, PAHs could rapidly enter your body if your skin comes into contact with soil that contains high levels of PAHs (this could occur near a hazardous waste site) or with used crankcase oil or other products (such as creosote) that contain PAHs. The rate at which PAHs enter your body by ingestion or through the skin is increased when they are present in certain oily mixtures; other oily mixtures decrease absorption into your body.

PAHs can enter all the tissues of your body that contain fat and tend to be stored mostly in your kidneys, liver, and fat, with smaller amounts in your spleen, adrenal glands, and ovaries. PAHs are changed by all tissues in the body into many different substances. Some of these substances are more harmful and some are less harmful than the original PAHs. Results from animal studies show that PAHs do not tend to be stored in your body for a long time. Most PAHs that enter the body leave within a few days, primarily in the feces and urine. More information on how PAHs enter and leave your body can be found in Chapters 2 and 6.

1.5 HOW CAN POLYCYCLIC AROMATIC HYDROCARBONS AFFECT MY HEALTH?

PAHs can be harmful to your health. Several of the PAHs, including benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-c,d)pyrene, have caused tumors in laboratory animals when they breathed them in the air, when they ate them, or when they had long periods of skin contact with them. Reports in humans show that individuals exposed by breathing or skin contact for long periods to mixtures that contain PAHs and other compounds can also develop cancer.

Mice fed high levels of benzo(a)pyrene during pregnancy had difficulty reproducing and so did their offspring. The offspring from pregnant mice fed benzo(a)pyrene also showed other harmful effects, such as birth defects and decreased body weight. Similar effects could occur in humans, but we have no information to show that these effects do occur.

Studies in animals have also shown that PAHs can cause harmful effects on skin, body fluids, and the body's system for fighting disease after both short- and long-term exposure. These effects have not been reported in humans.

The Department of Health and Human Services (DHHS) has determined that benzo(a)anthracene, benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene,

benzo(a)pyrene, dibenz(a,h)anthracene, and indeno(1,2,3-c,d)pyrene may reasonably be anticipated to be carcinogens. The International Agency for Research on Cancer (IARC) has determined the following: benzo(a)anthracene and benzo(a)pyrene are probably carcinogenic to humans; benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene, and indeno(1,2,3-c,d)pyrene are possibly carcinogenic to humans; and anthracene, benzo(g,h,i)perylene, benzo(e)pyrene, chrysene, fluoranthene, fluorene, phenanthrene, and pyrene are not classifiable as to their carcinogenicity to humans. EPA has determined that benz(a)anthracene, benz(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-c,d)pyrene are probable human carcinogens and that acenaphthylene, anthracene, benzo(g,h,i)perylene, fluoranthene, fluorene, phenanthrene, and pyrene are not classifiable as to human carcinogenicity. Acenaphthene has not been classified for carcinogenic effects by the DHHS, IARC, or EPA. More information on the health effects associated with exposure to PAHs can be found in Chapter 2.

1.6 IS THERE A MEDICAL TEST TO DETERMINE WHETHER I HAVE BEEN EXPOSED TO POLYCYCLIC AROMATIC HYDROCARBONS?

In your body, PAHs are changed into chemicals that can attach to substances within the body. The presence of PAHs attached to these substances can then be measured in body tissues or blood after exposure to PAHs. PAHs or their breakdown products can also be measured in urine, blood, or body tissues. Although these tests can show that you have been exposed to PAHs, these tests cannot be used to predict if any health effects will occur or to determine the extent of your exposure to the PAHs. It is not known how effective or informative the tests are after exposure is discontinued. These tests to identify PAHs or their products are not routinely available at a doctor's office because they require special equipment for detecting these chemicals. More information on tests used to determine PAHs in your body is presented in Chapters 2 and 6.

1.7 WHAT RECOMMENDATIONS HAS THE FEDERAL GOVERNMENT MADE TO PROTECT HUMAN HEALTH?

The federal government has set regulations to protect individuals from the possible health effects of eating, drinking, or breathing PAHs. EPA has suggested that taking into your body each day the following amounts of individual PAHs is not likely to cause any significant (noncancer) harmful health effects: 0.3 milligrams (mg) of anthracene, 0.06 mg of acenaphthene, 0.04 mg of fluoranthene, 0.04 mg of fluorene, and 0.03 mg of pyrene per kilogram (kg) of your body weight (one kilogram is equal to 2.2 pounds).

Based on data on benzo(a)pyrene, the federal government has developed regulatory standards and guidelines to protect individuals from the potential health effects of PAHs in drinking water. EPA has provided estimates of levels of total cancer-causing PAHs in lakes and streams associated with various risks of developing cancer in humans. If the following amounts of individual PAHs are released to the environment, EPA must be notified: 1 pound of benzo(b)fluoranthene, benzo(a)pyrene, or dibenz(a,h)anthracene; 10 pounds of benzo(a)anthracene; 100 pounds of acenaphthene, chrysene, fluoranthene, or

indeno(1,2,3-c,d)pyrene; or 5,000 pounds of acenaphthylene, anthracene, benzo(k)fluoranthene, benzo(g,h,i)perylene, fluorene, phenanthrene, or pyrene.

PAHs are generally not produced commercially in the United States except as research chemicals. However, PAHs are found in coal, coal tar, and in the creosote oils and pitches formed from the distillation of coal tars. The National Institute for Occupational Safety and Health (NIOSH) concluded that occupational exposure to coal products can increase the risk of lung and skin cancer in workers and established a recommended occupational exposure limit (REL-TWA) for coal tar products of 0.1 milligram of PAHs per cubic meter of air (0.1 mg/m^3) for a 10-hour work day, 40-hour work week. The American Conference of Governmental Industrial Hygienists (ACGIH) recommends an occupational exposure limit for coal tar products of 0.2 mg/m^3 for an 8-hour work day, 40-hour work week. The Occupational Safety and Health Administration (OSHA) has established a legally enforceable limit of 0.2 mg/m^3 averaged over an 8-hour exposure period.

More information on rules and standards for exposure to PAHs can be found in Chapter 7.

1.8 WHERE CAN I GET MORE INFORMATION?

If you have any more questions or concerns, please contact your community or state health or environmental quality department or:

Agency for Toxic Substances and Disease Registry
Division of Toxicology
1600 Clifton Road NE, E-29
Atlanta, Georgia 30333
(404) 639-6000

This agency can also provide you with information on the location of occupational and environmental health clinics. These clinics specialize in the recognition, evaluation, and treatment of illness resulting from exposure to hazardous substances.

Eisenberg Fill Site
(alias: Leo Eisenberg's Propety)
MOD985768175
PA/SI Reference 22

DEPARTMENT OF NATURAL RESOURCES
Division of Environmental Quality

TELEPHONE OR CONFERENCE RECORD

FILE: KCP&L-Northeast Station

DATE: July 13, 1994

TELEPHONE:

Incoming (X)
Outgoing ( )

CONFERENCE:

Field ( )
Office ( )

SUBJECT: Kansas City drinking water systems

PERSONS INVOLVED:

NAME	REPRESENTING
Kristine Davidson	DNR/HWP/Superfund
Bill Hills	DNR/Kansas City Regional Office

SUMMARY OF CONVERSATION:

Bill told me KC's daily production at the water treatment plant is about 300 MGD, but the 91 Census shows it to be 210 MGD. He stated that the city now has 11 wells, and Gladstone now has 5. Kansas City uses their wells for 25% of the total production, and also provides water to the following customers: Jackson County Water District #1, Platte City, Lathrop, Missouri City, Blue Springs, Raymore, Cass County Water District #2, Peculiar, Belton, and parts of many other cities such as Lee Summit and Raytown.

He said the GIS maps are more current than the Census. Copies of these maps are attached.

Kristine Davidson

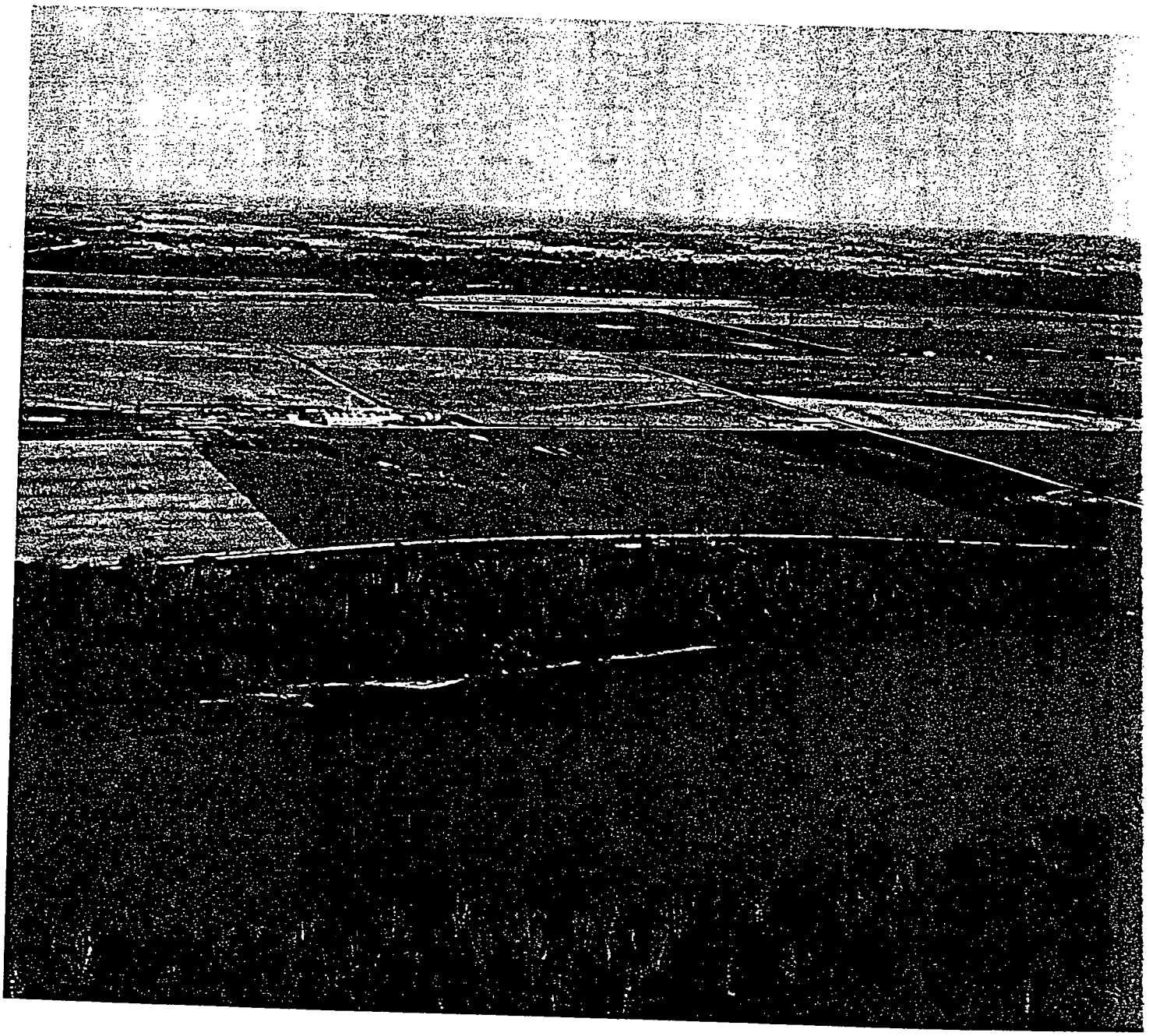
Eisenberg Fill Site
(alias: Leo Eisenberg's Property)
MOD985768175
PA/SI Reference 23

United States
Department of
Agriculture

Soil
Conservation
Service

In cooperation with
Missouri Agricultural
Experiment Station

Soil Survey of Clay and Ray Counties, Missouri



Contents

Index to map units iv
Summary of tables v
Foreword vii
General nature of the survey area 2
How this survey was made 4
Map unit composition 5
General soil map units 7
Soil descriptions 7
Detailed soil map units 15
Soil descriptions 15
Prime farmland 55
Use and management of the soils 57
Crops and pasture 57
Woodland management and productivity 59
Windbreaks and environmental plantings 60
Recreation 61
Wildlife habitat 62
Engineering 64
Soil properties 69
Engineering index properties 69
Physical and chemical properties 70
Soil and water features 72
Classification of the soils 75
Soil series and their morphology 75
Factors of soil formation 97
References 101
Glossary 103
Tables 111

Soil Series

Aholt series 75
Armster series 76
Booker series 77
Bremer series 77
Colo series 78
Cotter series 78
Dockery series 79
Gilliam series 79
Greenton series 80
Grundy series 81
Haynie series 81
Higginsville series 82
Knox series 83
Ladoga series 83
Lagonda series 84
Landes series 84
Leta series 85
Levasy series 86
Macksburg series 86
Modale series 87
Moniteau series 88
Myrick series 88
Nodaway series 88
Norborne series 89
Parkville series 89
Sampsel series 90
Sarpy series 91
Sharpsburg series 91
Sibley series 92
Snead series 92
Wabash series 93
Waldron series 93
Wiota series 94
Zook series 95

Issued January 1986

Figure 10.—Harvesting soybeans in an area of Dockery silt loam.

73—Leta silty clay. This deep, nearly level, somewhat poorly drained soil is on bottom land along the Missouri River. It is protected by levees but still is occasionally flooded by overflow from local tributaries or because of levee breaks. Individual areas are irregular in shape and range from 10 to 100 acres in size.

Typically, the surface layer is very dark gray, very firm silty clay about 5 inches thick. The subsurface layer also is very dark gray, very firm silty clay. It is about 9 inches thick. The subsoil is dark grayish brown, very firm silty clay about 20 inches thick. The substratum to a depth of about 60 inches is stratified light olive brown, dark grayish brown, and grayish brown, friable silt loam and very fine sandy loam. In a few areas the silty clay in the upper part of the soil is less than 20 inches thick.

Included with this soil in mapping are small areas of Modale soils. These soils are loamy or silty in the upper part. They are slightly higher on the landscape than the Leta soil. They make up 5 to 10 percent of the unit.

Permeability is slow in the upper part of the Leta soil and moderate in the loamy lower part. Surface runoff generally is slow. The soil is mildly alkaline or moderately alkaline throughout. Natural fertility is high, and organic matter content is moderate. Available water capacity also is moderate. A seasonal high water table is at a depth of 1 to 3 feet during winter and spring. The shrink-swell potential is high in the surface soil and subsoil and low in the substratum. The surface layer is very firm when dry and sticky when wet and becomes cloddy if tilled when wet or dry. As a result, careful timing of tillage is needed.

Most areas are used for cultivated crops. This soil is suited to soybeans, grain sorghum, corn, and winter wheat. In some areas, surface runoff is very slow and the surface is covered by water after hard rains or by the runoff from adjacent areas. Land grading, shallow surface drains, and open ditches help to remove the excess surface water. Returning crop residue to the soil or regularly adding other organic material improves fertility, helps to prevent surface crusting, and increases the rate of water infiltration.

This soil is suited to trees. The equipment limitation, the seedling mortality rate, and the windthrow hazard are the main management concerns. The use of equipment should be limited to periods when the surface is dry or frozen. Ridging the soil and planting larger stock than is typical on the ridges improve the seedling survival rate. The stands should be thinned less intensively and more frequently than the stands in areas where the windthrow hazard is slight.

This soil generally is unsuited to building site development and onsite waste disposal because of the wetness and the occasional flooding. The history of flooding in a given area should be considered when sites for buildings and sanitary facilities are selected.

The land capability classification is IIw.

74—Levasy silty clay. This deep, nearly level to slightly depressional, poorly drained soil is on the flood plains along the Missouri River. It is protected by levees but still is occasionally flooded by overflow from local tributaries or because of levee breaks. It commonly is ponded after heavy rains. Individual areas range from 10 to more than 100 acres in size.

Typically, the surface layer is very dark gray, very firm silty clay about 6 inches thick. The subsurface layer also is very dark gray, very firm silty clay. It is about 8 inches thick. The subsoil is dark grayish brown, mottled, very firm silty clay about 18 inches thick. The substratum to a depth of about 60 inches is dark grayish brown, mottled, friable or very friable silt loam and very fine sandy loam. In some areas the clayey surface soil extends to a depth of more than 38 inches.

Included with this soil in mapping are small areas of Leta, Parkville, and Waldron soils on the slightly higher parts of the landscape. Leta soils are somewhat poorly drained. Parkville soils have clayey layers to a depth of less than 20 inches. Waldron soils are clayey throughout the substratum. Included soils make up about 5 to 10 percent of the unit.

Permeability is slow in the clayey upper part of the Levasy soil and moderate in the loamy lower part. Surface runoff is very slow or ponded. The soil is mildly alkaline or moderately alkaline throughout. Natural fertility is medium, and organic matter content is moderate. Available water capacity also is moderate. A seasonal high water table is 1.0 foot above the surface to 1.5 feet below during winter and spring. The shrink-swell potential is high in the clayey upper part of the soil and low in the loamy lower part. The surface layer is high in content of clay and can be easily tilled only within a narrow range in moisture content. It crusts or puddles after hard rains.

Most areas are used for row crops. This soil is suited to corn, soybeans, and small grain. The wetness is the main limitation. It can be reduced, however, by open ditches, shallow surface drains, and land grading. Returning crop residue to the soil or regularly adding other organic material improves fertility and tilth, helps to prevent surface crusting, and increases the rate of water infiltration. Fall plowing results in better tilth when the soil is tilled the following spring.

This soil is suited to trees. The equipment limitation, the windthrow hazard, plant competition, and seedling mortality are management concerns. The use of equipment should be limited to periods when the surface is dry or frozen. Ridging the soil and planting larger stock than is typical on the ridges improve the seedling survival rate. The stands should be thinned less intensively and more frequently than the stands in areas where the windthrow hazard is slight. Thorough site preparation, which may include spraying or cutting, helps to control plant competition.

This soil generally is unsuited to building site development and onsite waste disposal because of the ponding and the occasional flooding.

The land capability classification is IIIw.

75—Norborne very fine sandy loam. This deep, nearly level, well drained soil is in the slightly higher areas on the flood plains along the Missouri River. It is subject to rare flooding. Individual areas are long and moderately wide and range from 50 to 200 acres in size.

Typically, the surface layer is very dark brown, very friable very fine sandy loam about 9 inches thick. The subsurface layer also is very dark brown, very friable very fine sandy loam. It is about 8 inches thick. The subsoil is very dark brown, dark brown, and brown, very friable and friable very fine sandy loam about 28 inches thick. The substratum to a depth of about 60 inches is brown, mottled, very friable very fine sandy loam.

Included with this soil in mapping are small areas of Cotter, Landes, and Leta soils. Cotter soils have a silty subsoil. They are in the slightly lower areas. Landes soils contain more sand than the Norborne soil. They are on long, narrow ridges at the slightly higher elevations. Leta soils have a clayey surface layer. They are in small depressions. Included soils make up about 5 to 10 percent of the unit.

Permeability is moderate in the Norborne soil. Surface runoff is slow. Reaction is neutral or slightly acid throughout the profile. Natural fertility is high, and organic matter content is moderate. Available water capacity is high. The surface layer is friable and can be easily tilled throughout a wide range in moisture content.

Most areas are used for cultivated crops. This soil is suited to corn, soybeans, small grain, and grain sorghum. Returning crop residue to the soil or regularly adding other organic material improves fertility, helps to prevent surface crusting, and increases the rate of water infiltration.

This soil is suited to alfalfa, bromegrass, and most other grasses and legumes for pasture and hay. Overgrazing or grazing when the soil is wet, however, causes surface compaction and poor tilth and decreases the

moderately rapid in the upper part of the profile and rapid in the lower part. Slopes range from 0 to 2 percent.

Landes soils commonly are adjacent to Haynie, Leta, and Parkville soils. They are slightly higher on the landscape than the adjacent soils. Haynie soils are coarse-silty. Leta and Parkville soils are clayey in the upper part and loamy in the lower part.

Typical pedon of Landes fine sandy loam, 1,600 feet south and 140 feet east of the northwest corner of sec. 9, T. 51 N., R. 26 W., Ray County:

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) fine sandy loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; many fine roots; neutral; abrupt smooth boundary.

A1—6 to 11 inches; very dark grayish brown (10YR 3/2) fine sandy loam, grayish brown (10YR 5/2) dry; moderate fine and medium granular structure; friable; many fine roots; neutral; clear smooth boundary.

A2—11 to 18 inches; dark brown (10YR 3/3) fine sandy loam, brown (10YR 5/3) dry; moderate medium platy structure parting to weak very fine granular; friable; common fine roots; common fine pores and old root channels; neutral; gradual smooth boundary.

Bw—18 to 27 inches; brown (10YR 4/3) fine sandy loam, pale brown (10YR 6/3) dry; weak very fine subangular blocky structure; friable; common fine roots and old root channels; neutral; clear smooth boundary.

C1—27 to 35 inches; brown (10YR 5/3) loamy fine sand; common medium distinct brownish yellow (10YR 6/6) mottles; massive; friable; common fine roots; common fine pores; slightly effervescent; mildly alkaline; abrupt smooth boundary.

C2—35 to 68 inches; stratified brown (10YR 5/3) and light brownish gray (10YR 6/2) loamy fine sand; a layer of dark grayish brown (10YR 4/2) silty clay loam about 1 inch thick; single grain; loose; slightly effervescent; mildly alkaline.

The mollic epipedon ranges from 10 to 24 inches in thickness. The solum ranges from slightly acid to moderately alkaline.

The A horizon has hue of 10YR and value and chroma of 2 or 3. It is dominantly fine sandy loam, but the range includes sandy loam and very fine sandy loam. The Bw horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. It is dominantly fine sandy loam, but the range includes sandy loam and very fine sandy loam. The C horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3 or more. It is sand, loamy fine sand, or loamy sand. In some pedons it has thin strata of finer textured material.

Leta Series

The Leta series consists of deep, somewhat poorly drained soils on the flood plains along the Missouri River. These soils formed in clayey alluvium 20 to 38 inches deep over loamy alluvium. Permeability is slow in the upper part of the profile and moderate in the lower part. Slopes range from 0 to 2 percent.

Leta soils are similar to Parkville soils and commonly are adjacent to Cotter, Haynie, Levasy, and Parkville soils. Cotter and Haynie soils are not clayey in the upper part. They are slightly higher on the landscape than the Leta soils. Levasy soils are poorly drained and are in slightly depressional areas. Parkville soils formed in clayey alluvium 12 to 20 inches deep over loamy alluvium.

Typical pedon of Leta silty clay, 2,620 feet south and 50 feet west of the northeast corner of sec. 26, T. 51 N., R. 31 W., Clay County:

Ap—0 to 5 inches; very dark gray (10YR 3/1) silty clay, grayish brown (10YR 5/2) dry; weak very fine granular structure; very firm; few fine roots; slightly effervescent; mildly alkaline; abrupt smooth boundary.

A—5 to 14 inches; very dark gray (10YR 3/1) silty clay, gray (10YR 5/1) dry; weak medium subangular blocky structure; very firm; few fine roots; slightly effervescent; mildly alkaline; gradual smooth boundary.

Bw1—14 to 22 inches; dark grayish brown (2.5Y 4/2) silty clay; moderate very fine subangular blocky structure; very firm; few fine roots; very dark grayish brown (2.5Y 3/2) organic stains on faces of peds; slightly effervescent; mildly alkaline; clear smooth boundary.

Bw2—22 to 34 inches; dark grayish brown (2.5Y 4/2) silty clay; few fine distinct dark yellowish brown (10YR 4/4) mottles; moderate medium angular blocky structure; very firm; few very fine roots; slightly effervescent; mildly alkaline; abrupt smooth boundary.

2C—34 to 60 inches; stratified light olive brown (2.5Y 5/4), dark grayish brown (2.5Y 4/2), and grayish brown (10YR 5/2) silt loam and very fine sandy loam; massive; friable; few very fine roots; slightly effervescent; mildly alkaline.

The thickness of the solum ranges from 20 to 38 inches and is the same as the thickness of the clayey upper part of the profile. The mollic epipedon ranges from 10 to 20 inches in thickness. The soils have free carbonates throughout and are mildly alkaline or moderately alkaline.

The A horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 or 2. The B horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 or 2. It has mottles with higher chroma in the lower part. The solum

is silty clay loam or silty clay in which the content of clay ranges from 35 to 48 percent. The 2C horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 or 2. It has mottles with hue of 10YR, 7.5YR, or 5YR, value of 4 to 6, and chroma of 4 to 8. It commonly is stratified silt loam and very fine sandy loam. In some pedons it has thin strata of finer or coarser textured material.

Levasy Series

The Levasy series consists of deep, poorly drained soils on bottom land along the Missouri River. These soils formed in clayey alluvium 20 to 38 inches deep over loamy alluvium. Permeability is slow in the upper part of the profile and moderate in the lower part. Slopes range from 0 to 2 percent.

Levasy soils are similar to Myrick soils and commonly are adjacent to Haynie, Leta, and Myrick soils. The moderately well drained Haynie and somewhat poorly drained Leta soils are slightly higher on the landscape than the Levasy soils. Haynie soils are silty or loamy throughout. Myrick soils are slightly lower on the landscape than the Levasy soils. Also, they have thinner clayey horizons.

Typical pedon of Levasy silty clay, 1,980 feet north and 2,000 feet west of the southeast corner of sec. 10, T. 51 N., R. 27 W., Ray County:

Ap—0 to 6 inches; very dark gray (10YR 3/1) silty clay, very dark gray (10YR 4/1) dry; weak fine subangular blocky structure parting to weak very fine granular; very firm; few fine roots; slightly effervescent; mildly alkaline; abrupt smooth boundary.

A—6 to 14 inches; very dark gray (10YR 3/1) silty clay, gray (10YR 5/1) dry; weak fine subangular blocky structure parting to weak fine granular; very firm; few fine roots; slightly effervescent; mildly alkaline; clear smooth boundary.

Bg1—14 to 24 inches; dark grayish brown (2.5Y 4/2) silty clay; common fine distinct olive brown (2.5Y 4/4) mottles; moderate fine angular blocky structure; very firm; few fine roots; slightly effervescent; mildly alkaline; clear smooth boundary.

Bg2—24 to 32 inches; dark grayish brown (2.5Y 4/2) silty clay; few fine distinct olive brown (2.5Y 4/4) mottles; weak fine angular blocky structure; very firm; slightly effervescent; mildly alkaline; abrupt smooth boundary.

2Cg1—32 to 46 inches; dark grayish brown (2.5Y 4/2) silt loam; common fine distinct olive brown (2.5Y 4/4) mottles; appears massive but has weak bedding planes; friable; strongly effervescent; moderately alkaline; clear smooth boundary.

2Cg2—46 to 60 inches; dark grayish brown (2.5Y 4/2) very fine sandy loam; common fine distinct olive brown (2.5Y 4/4) mottles; appears massive but has weak bedding planes; very friable; strongly effervescent; moderately alkaline.

The thickness of the mollic epipedon ranges from 10 to 24 inches. The clayey A horizon is underlain by loamy deposits at a depth of 20 to 38 inches. The soils have free carbonates throughout and are mildly alkaline or moderately alkaline.

The Ap horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 or 2. The A1 horizon has hue of 10YR to 5Y, value of 2 to 4, and chroma of 1 or 2. The A horizon commonly is silty clay, but the range includes clay and silty clay loam. The B2 horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 or 5, and chroma of 1 or 2. The 2C horizon has hue of 2.5Y or 5Y, value of 4 to 6, and chroma of 1 or 2. It is fine sandy loam, loam, very fine sandy loam, or silt loam.

Macksburg Series

The Macksburg series consists of deep, somewhat poorly drained, moderately slowly permeable soils on uplands. These soils formed in loess. Slopes range from 5 to 9 percent.

Macksburg soils are similar to Grundy and Lagonda soils and commonly are adjacent to Nodaway and Sharpsburg soils. Grundy and Lagonda soils contain more clay in the Bt horizon than the Macksburg soils. Nodaway soils are silty throughout. They are on flood plains along small streams below the Macksburg soils. Sharpsburg soils do not have mottles with chroma 2 in the upper part of the B horizon. They are on ridgetops above the Macksburg soils and on the ends of ridges adjacent to the Macksburg soils.

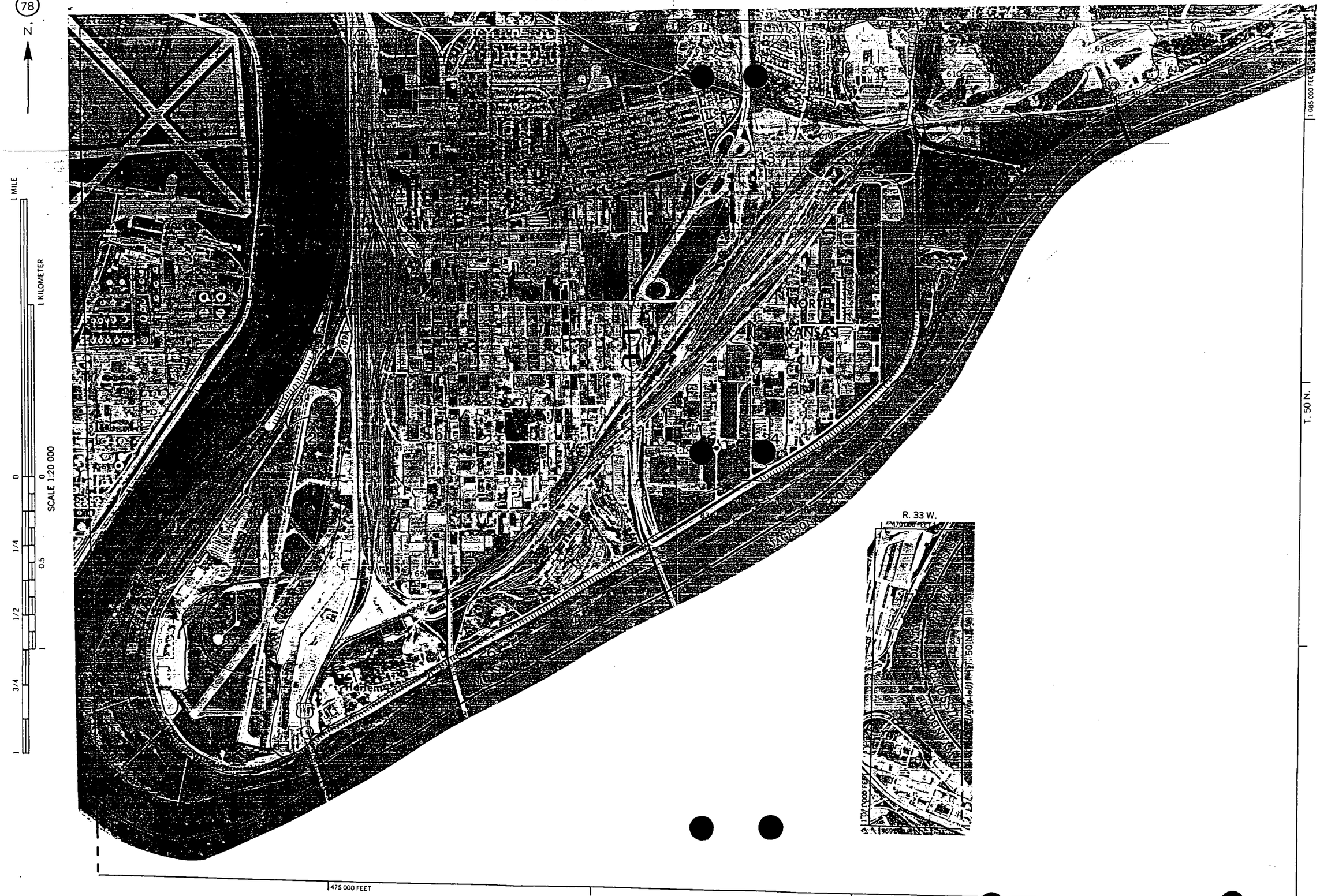
Typical pedon of Macksburg silt loam, 5 to 9 percent slopes, 1,518 feet west and 2,310 feet north of the southeast corner of sec. 36, T. 52 N., R. 31 W., Clay County:

Ap—0 to 7 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; weak fine granular structure; friable; many fine roots; common fine pores and old root channels; neutral; clear smooth boundary.

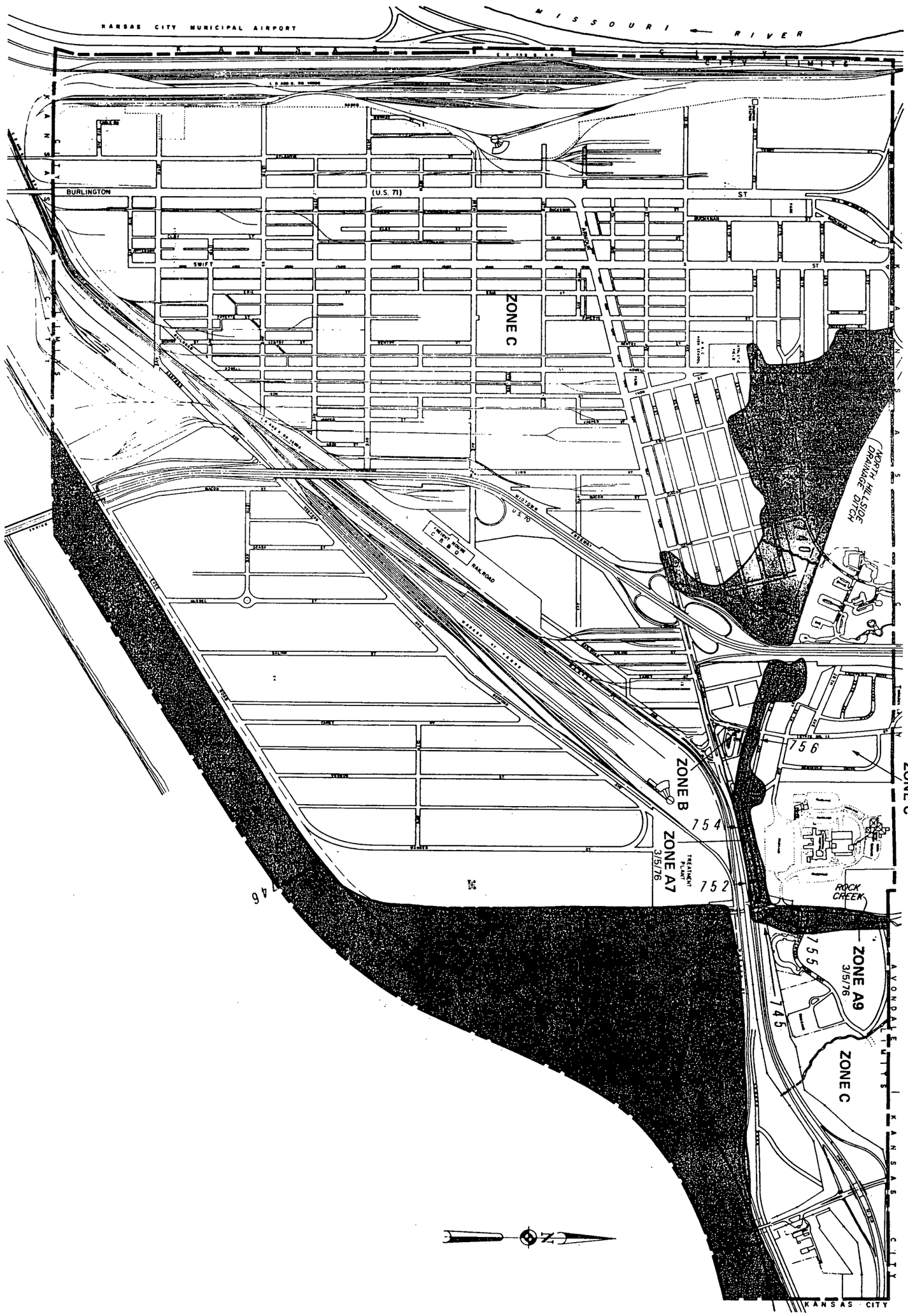
A—7 to 13 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate medium granular structure; friable; many fine roots; common fine pores and old root channels; slightly acid; clear smooth boundary.

AB—13 to 19 inches; very dark grayish brown (10YR 3/2) silty clay loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure parting to moderate medium granular; friable; many fine roots; common fine pores and old root channels; slightly acid; clear smooth boundary.

Bt1—19 to 25 inches; dark grayish brown (10YR 4/2) silty clay loam; common fine faint brown (10YR 5/3) and (10YR 4/3) mottles; moderate very fine subangular blocky structure; firm; common fine roots; few distinct very dark grayish brown (10YR 3/2) clay films on faces of peds; few black stains and concre-



This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1975 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



10	DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT Federal Insurance Administration NORTH KANSAS CITY, MO (CLAY CO.)	500 0 1000 2000 3000 4000 5000 SCALE IN FEET	
		FIA FLOOD HAZARD BOUNDARY MAP No. H 01	FIA FLOOD INSURANCE RATE MAP No. I 01	Map Revised APRIL 30, 1976

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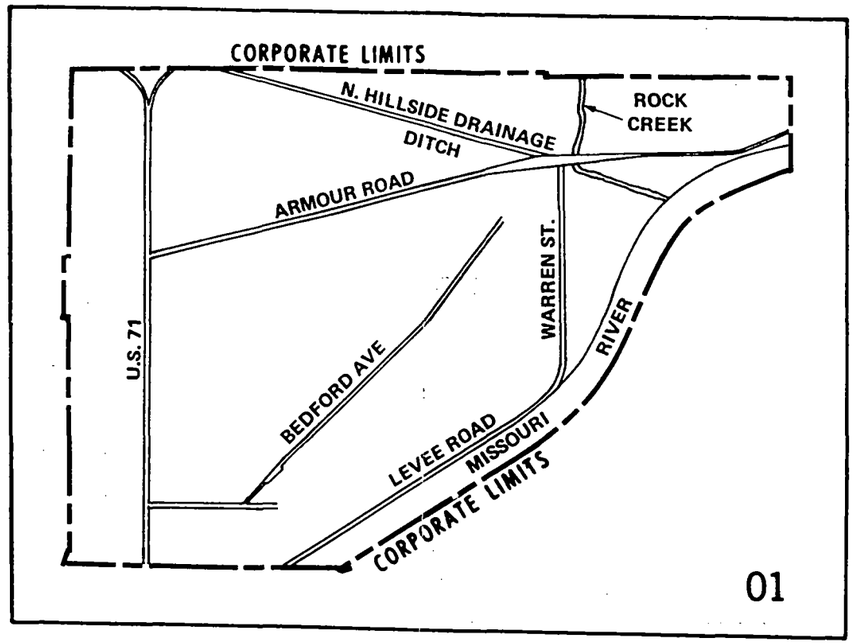
PA/SI Reference 24

CONSULT NFIA SERVICING COMPANY OR LOCAL INSURANCE AGENT OR BROKER TO DETERMINE IF PROPERTIES IN THIS COMMUNITY ARE ELIGIBLE FOR FLOOD INSURANCE.

COMMUNITY No. 290099B



Date of Eligibility for Flood Insurance:

OCTOBER 29, 1971
Revised April 30, 1976
to Change the Community Suffix

LEGEND

Zone A

Zone B

Zone D Boundary

Base Flood (100 yr.) Elevation Line 513

Elevation Reference Mark R.M.

Levee

Sea Wall

EXPLANATION OF ZONE DESIGNATIONS

A flood insurance map displays the zone designations for a community according to areas of designated flood hazards. The zone designations used by FIA are:

Zone Symbol	Category
A	Area of special flood hazards (SFH) and without base flood elevations determined.
A1 through A30	Area of special flood hazards (SFH) with base flood elevations. Zones are assigned according to flood hazard factors, and dates of SFH identification.
AO	Area of special flood hazards that have shallow flood depths (less than two feet) and/or unpredictable flow paths. Base flood elevations are not determined.
V	Area of special flood hazards, with velocity, that are inundated by tidal floods. Zones are assigned according to flood hazard factors and dates of SFH identification.
B	Area of moderate flood hazards.
C	Area of minimal flood hazards.
D	Area of undetermined, but possible, flood hazards.

SPECIAL HAZARD AREA

AREA	DATE OF IDENTIFICATION
ZONES A5, A7, A9, A13	

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

NORTH KANSAS CITY, MO
(CLAY CO.)

MAP INDEX

FIA FLOOD HAZARD BOUNDARY MAPS
No. H 01

FIA FLOOD INSURANCE RATE MAPS
No. I 01

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MOD985768175
PA/SI Reference 25

ENGINEERING GEOLOGY
REPORT NO. 6

1981

GEOLOGIC ASPECTS OF HAZARDOUS-WASTE ISOLATION IN MISSOURI

by

Christopher J. Stohr
Gary St. Ivany
James Hadley Williams

MISSOURI DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGY AND LAND SURVEY
P.O. BOX 250
ROLLA, MISSOURI 65401

CONTENTS

Page	
1	INTRODUCTION
1	GEOLOGIC LIMITATIONS
5	PHYSIOGRAPHIC PROVINCES
5	Ozark Plateaus
14	Coastal Plains
17	Central Lowland
26	CONCLUSIONS
27	ACKNOWLEDGMENTS
28	REFERENCES
31	TABLES
37	APPENDICES

ILLUSTRATIONS

Page	Figure	
2	1	PHYSIOGRAPHIC PROVINCES OF MISSOURI
8	2	GENERALIZED PROFILE OF GROUNDWATER REGIME OF LOSING AND GAINING STREAMS TYPICAL OF THE OZARK PLATEAUS
18	3	CROSS SECTION, NORTHWEST TO SOUTHEAST, ACROSS OSAGE PLAINS

TABLES

Page		
31	A	GENERALIZED GEOLOGIC SECTION OF THE SALEM PLATEAU
32	B	GENERALIZED GEOLOGIC SECTION OF THE SPRINGFIELD PLATEAU
33	C	GENERALIZED GEOLOGIC SECTION OF THE ST. FRANCOIS MOUNTAINS
34	D	GENERALIZED GEOLOGIC SECTION OF THE MISSISSIPPI ALLUVIAL PLAIN
35	E	GENERALIZED GEOLOGIC SECTION OF THE OSAGE PLAINS
36	F	GENERALIZED GEOLOGIC SECTION OF THE DISSECTED TILL PLAINS

APPENDICES

Page		
37	A	GEOLOGIC EXPLORATION USING PITS AND TRENCHES
38	B	GENERAL RECOMMENDATIONS FOR MONITORING-WELL INSTALLATION
40	C	RESERVOIR AND STREAM INTAKES
40	D	PUBLIC WATER SUPPLY DISTRICTS
41	E	THICKNESS OF SURFICIAL MATERIALS
42	F	TOTAL DISSOLVED SOLIDS IN CONSOLIDATED AND UNCONSOLIDATED AQUIFERS
43	G	PUBLIC WATER SUPPLY DAMS
50	H	PUBLIC WATER SUPPLY INTAKES ON MAJOR RIVERS
51	I	PUBLIC WATER SUPPLY INTAKES ON MINOR RIVERS AND STREAMS
53	J	SUGGESTED BASIC EXPLORATION PROCEDURES
54	K	TERMINOLOGY

PLATES

Plate	
1	PUBLIC WATER SUPPLY RESERVOIRS AND DRAINAGE AREAS IN MISSOURI
2	PUBLIC WATER SUPPLY DISTRICTS IN MISSOURI
3	SURFICIAL MATERIAL THICKNESS MAP OF MISSOURI
4	TOTAL DISSOLVED SOLIDS IN CONSOLIDATED AND UNCONSOLIDATED AQUIFERS OF MISSOURI
5	GEOLOGIC LIMITATIONS MAP OF MISSOURI

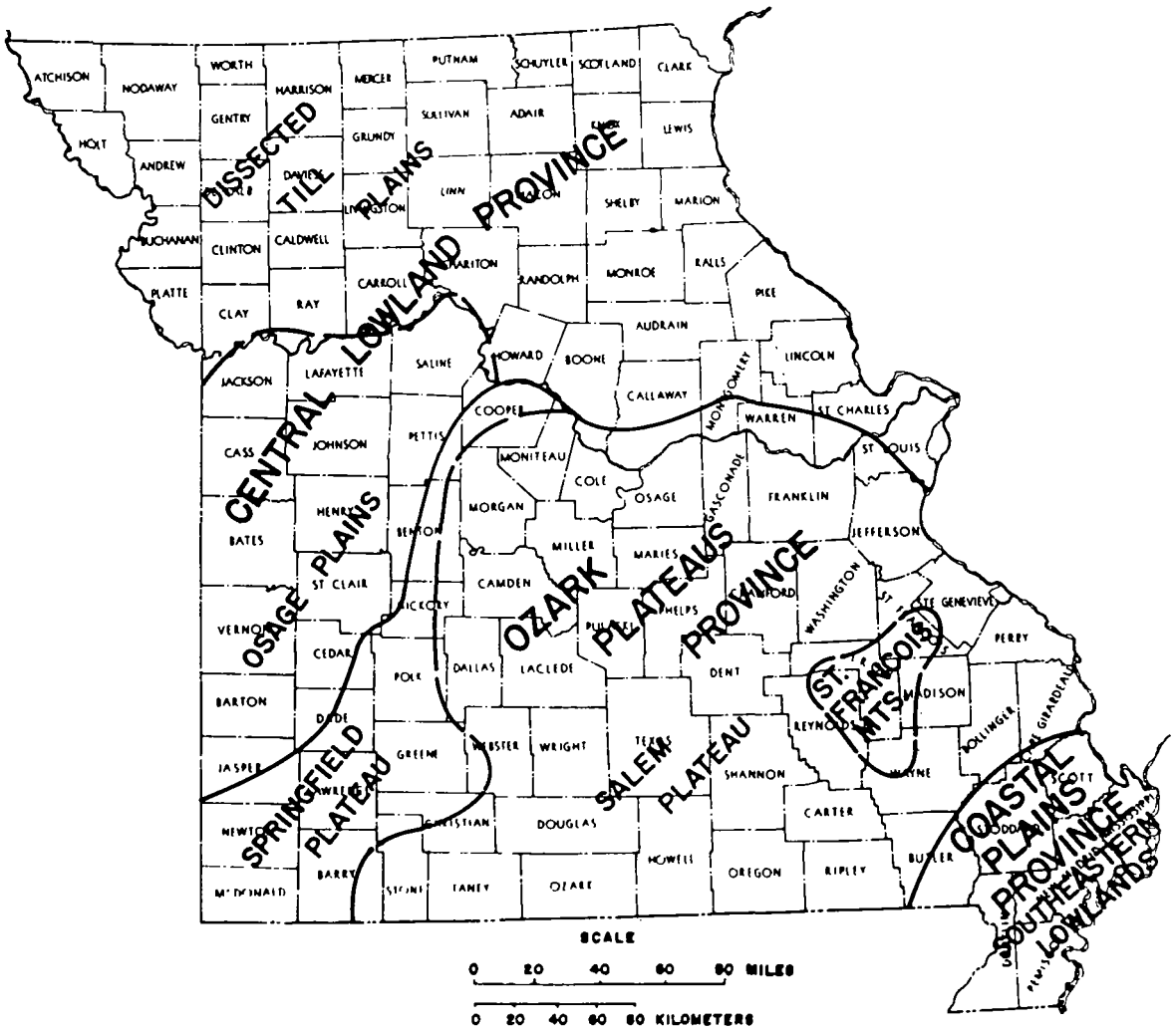

Figure 1. Physiographic Provinces of Missouri

EXPLORATION CONSIDERATIONS

There has been considerable geologic mapping in the Osage Plains, mostly in connection with mineral resources. Groundwater studies have been completed in adjoining counties in Kansas. Soil surveys published by the U.S. Department of Agriculture Soil Conservation Service can provide good preliminary information on surficial materials.

Limestone ledges can be identified by low-altitude aerial photographs. Landforms in the Osage Plains reflect the bedrock better than do the landforms in the other provinces and subprovinces in Missouri. The isolated hilltops and the escarpments have been formed by more resistant sandstone and limestone. The softer, more subdued landforms are underlain predominantly by shale. Soil cover is thicker in the areas of shale bedrock. In some ways, exploration can be done more easily, more rapidly, and more reliably in the Osage Plains than in the other provinces and subprovinces.

Trenching by backhoe or bulldozer can provide useful preliminary information on surficial materials and can often reach bedrock. Trenching permits examination of seeps or perched water tables in surficial materials, and provides means to determine relationships of surficial materials and bedrock.

Exploration procedures are not complex. Basically the questions to answer are the following: (1) Is there sufficient thickness of surficial material? (2) Is there an abundance or general absence of groundwater? (3) Can near-surface perched water tables be controlled?

In summary, the Osage Plains have slight to moderate limitations for potential hazardous-waste sites. Inadequate thickness of surficial materials is the most serious limitation.

DISSECTED TILL PLAINS

BOUNDARIES

The Dissected Till Plains, within the Central Lowland, as described by Fenneman (1938), include essentially all glaciated areas of the state, and loess-covered bedrock adjoining the Mississippi River from Pike County to St. Louis County. The southern boundary of the plains is approximately defined by the Missouri River.

TOPOGRAPHY

The topography of the Dissected Till Plains ranges from the prairies of east-central and northeastern Missouri to steep, bedrock-formed hills and ravines near the Mississippi River. The western two-thirds drains southward into the Missouri River; the eastern third, southeastward to the Mississippi River. The streams in eastern Missouri generally have straight courses that trend southeastward toward the Mississippi River.

Rolling hills characterize the northwestern area, and there are rugged hills in the north-central portion. The broad upland prairies are almost classically developed in the eastern part of the region, near Mexico and Centralia. Similar prairies exist in the northeast near Lewistown, Williamstown, and Kahoka. Flat topography and clay-rich subsoils cause these prairies to be poorly drained.

Topography is rugged along the loess-capped valley walls of the Missouri and Mississippi Rivers. Mature, rugged topgraphy, with short, steep valleys draining into large streams, also exists along the Chariton River and in the Thousand Hills region.

The Dissected Till Plains are distinctive in stream development, with broad flood plains and underfit stream channels. For portions of their lengths, some streams roughly parallel buried preglacial channels. The flat flood plains are interrupted only by terraces and drainage ditches.

STRUCTURAL GEOLOGY

The structural geology is primarily defined by a system of gentle folds bounded on the east by the Lincoln fold and Cap au Gres fault, and on the west by the Forest City basin. There are small local structures throughout the western half of the region.

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Geochemical Survey of Missouri

Geography of Soil Geochemistry of Missouri Agricultural Soils

By RONALD R. TIDBALL

Geochemical Classification by Factor Analysis of Missouri Agricultural Soils

By RONALD R. TIDBALL

GEOLOGICAL SURVEY PROFESSIONAL PAPER 954–H, I

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1984

Geography of Soil Geochemistry of Missouri Agricultural Soils

By RONALD R. TIDBALL

GEOCHEMICAL SURVEY OF MISSOURI

GEOLOGICAL SURVEY PROFESSIONAL PAPER 954–H

A study of the distribution of 43 elements in agricultural soils at 1,140 locations in Missouri

CONTENTS

	Page
Abstract	H1
Introduction	1
Review of literature	1
Acknowledgments	1
Soil parent materials	2
Methods	2
Field methods	2
Laboratory methods	2
Data analysis	4
Results	6
Discussion	7
References cited	10

ILLUSTRATIONS

		Page
FIGURE 1.	Map showing soil- forming parent materials of Missouri	H3
2–44.	Element distribution in selected agricultural soils of Missouri	
2.	Aluminum	12
3.	Arsenic	13
4.	Barium	14
5.	Beryllium	15
6.	Boron	16
7.	Cadmium	17
8.	Calcium	18
9.	Carbon	19
10.	Cerium	20
11.	Chromium	21
12.	Cobalt	22
13.	Copper	23
14.	Fluorine	24
15.	Gallium	25
16.	Iodine	26
17.	Iron	27
18.	Lanthanum	28
19.	Lead	29
20.	Lithium	30
21.	Magnesium	31
22.	Manganese	32
23.	Mercury	33
24.	Molybdenum	34
25.	Neodymium	35
26.	Nickel	36
27.	Niobium	37
28.	Phosphorus	38
29.	Potassium	39
30.	Scandium	40
31.	Selenium	41
32.	Silicon	42
33.	Silver	43
34.	Sodium	44
35.	Strontium	45
36.	Thorium	46

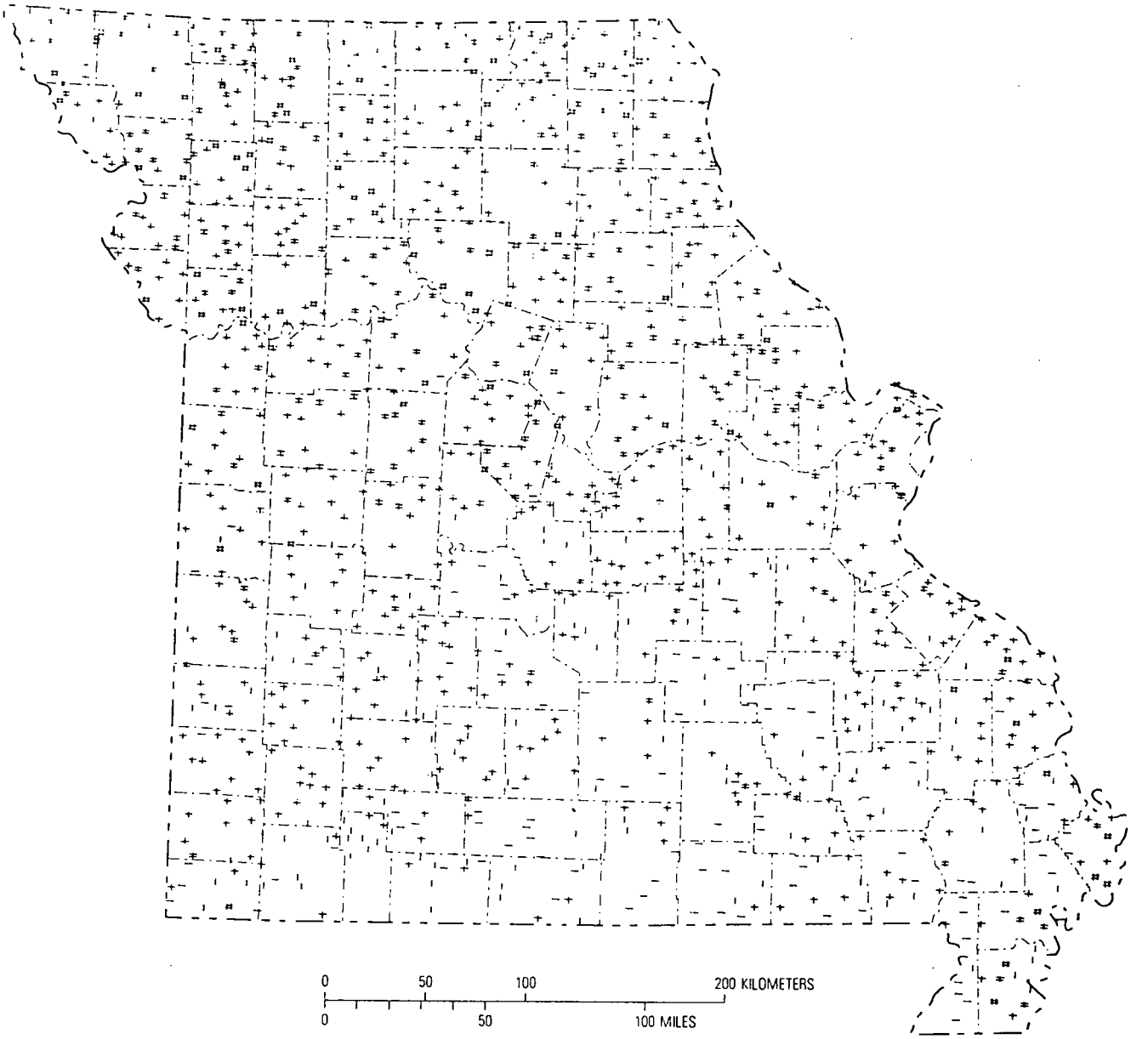
Page

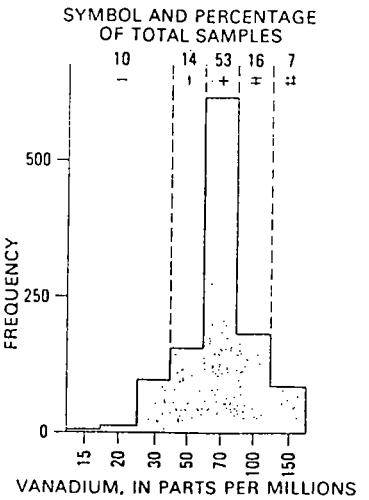
FIGURES 37–44. Element distribution in selected agricultural soils of Missouri—Continued
37. Tin H47
38. Titanium 48
39. Uranium 49
40. Vanadium 50
41. Ytterbium 51
42. Yttrium 52
43. Zinc 53
44. Zirconium 54

TABLES

Page

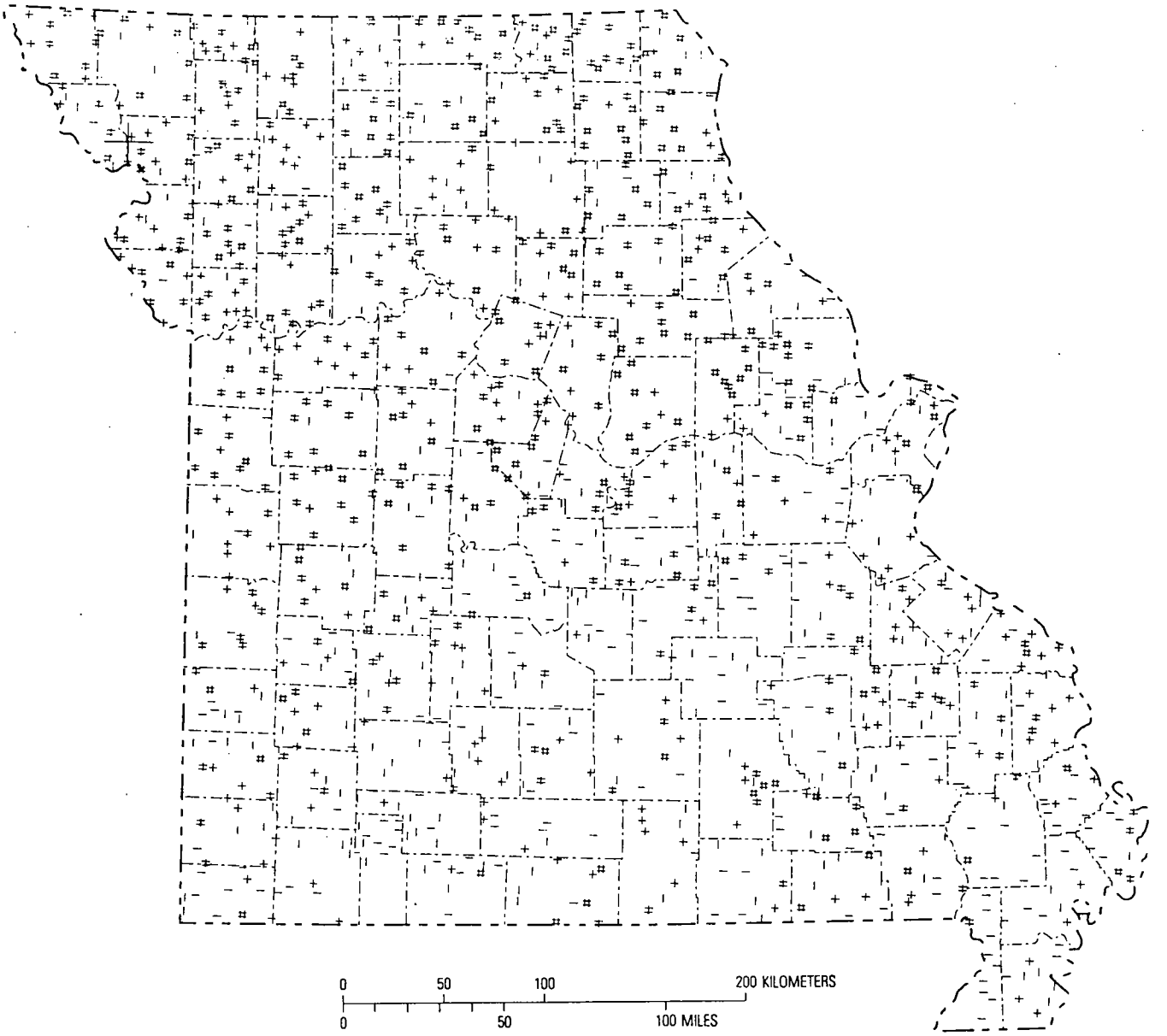
TABLE 1. List of elements looked for, methods of analysis and lower limits of determination H4
2. Average total concentrations of elements in Missouri soils 6
3. Comparison of mean concentrations in Missouri agricultural soils determined in this study with a previous study by Erdman and others (1976b) and with the mean concentrations in parts of the eastern U.S. 7
4. Variance components of soil elements 8
5. Variance mean ratios for soil elements within areas of decreasing size . . 9

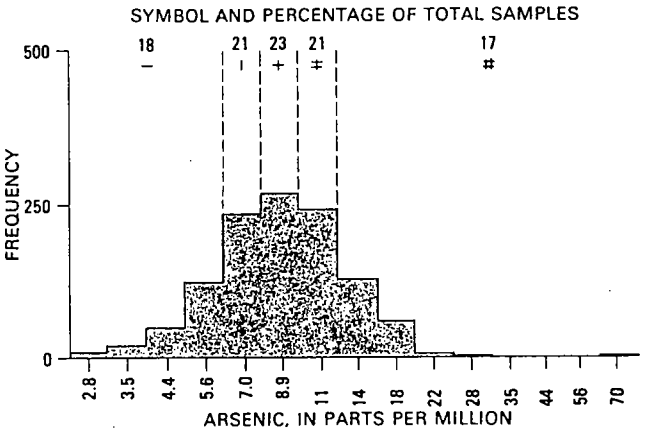




Geometric mean 69
Geometric deviation 1.50
Analytical error variance
(percent of total variance) 30
Number of analyses 1140

FIGURE 40.—Vanadium distribution in selected agricultural soils of Missouri. Map symbols correspond to frequency classes as shown in the histogram.





Geometric mean 8.7
Geometric deviation 1.46
Analytical error variance
(percent of total variance) 15
Number of analyses 1140

FIGURE 3.—Arsenic distribution in selected agricultural soils of Missouri. Map symbols correspond to frequency classes as shown in the histogram.

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DEPARTMENT OF NATURAL RESOURCES
Division of Environmental Quality

TELEPHONE OR CONFERENCE RECORD

FILE: Eisenberg Fill Superfund technical file

DATE: June 8, 1995

TELEPHONE:

Incoming ( )
Outgoing (X)

CONFERENCE:

Field ( )
Office ( )

SUBJECT: North Kansas City 19th Avenue Pumping Station

PERSONS INVOLVED:

NAME	REPRESENTING
Julie A. Bloss	MDNR/HWP/Superfund
"Bear"	City of North Kansas City (816) 274-6022

SUMMARY OF CONVERSATION:
I was transferred to "Bear," from the North Kansas City municipal office operator. After a brief description of my interest in the 19th Avenue Pumping Station, I asked what purpose it serves. "Bear" told me that it serves as a sewage lift station. I gathered that the sewage migrates deeper into the ground; the pump then picks up the sewage and moves it down the line.

I asked "Bear" if the station gathered any analytical data and/or if anyone visits the station. "Bear" said there were no analytical data gathered but the station is visually inspected daily. I asked him if he had noticed any dumping on the adjacent property. He had observed trucks with fill dirt and chunks of concrete (such as broken sidewalks) dumping, but nothing that he believed looked hazardous.

ACTION TAKEN:
I gave "Bear" my phone number and told him he could contact me if he wanted any additional information or observed anything suspicious.

FINAL RESULTS:
This information will be included in my site inspection report.

Julie A. Bloss
Julie A. Bloss
Environmental Specialist

c: Mr. Al Wallen, Superfund

JAB:mlw

Eisenberg Fill Site
(alias: Leo Eisenberg's Propety)
MOD985768175
PA/SI Reference 28

Continental Analytical
SERVICES, INC.

Client: Missouri Dept. of Health
Attn: Larry Evert
307 W. McCarty
Jefferson City, MO 65101

Date Sample Rptd: 04/01/93
Date Sample Recd: 03/18/93
CAS File No: 92-5364
CAS Order No: 15738
Client P.O.:

Lab Number: 93031315 Source #2 (Plant)
Sample Description: Distrib. Sys.1010580 North KC

Date Sampled: 03/16/93
Time Sampled: 0935

Analysis	Concentration	Units	Date Analyzed	Book/Page
MDNR Regulated Vocs			03/24/93	/
1,1,1-Trichloroethane	ND(0.5)	µg/L		1546/30
1,1-Dichloroethylene	ND(0.5)	µg/L		1546/30
1,2-Dichloroethane	ND(0.5)	µg/L		1546/30
1,2-Dichloropropane	ND(0.5)	µg/L		1546/30
Benzene	ND(0.5)	µg/L		1546/30
Carbon Tetrachloride	ND(0.5)	µg/L		1546/30
cis-1,2-Dichloroethylene	ND(0.5)	µg/L		1546/30
Chlorobenzene	ND(0.5)	µg/L		1546/30
Ethylbenzene	ND(0.5)	µg/L		1546/30
o-Dichlorobenzene	ND(0.5)	µg/L		1546/30
p-Dichlorobenzene	ND(0.5)	µg/L		1546/30
Styrene	ND(0.5)	µg/L		1546/30
Tetrachloroethylene	ND(0.5)	µg/L		1546/30
Toluene	ND(0.5)	µg/L		1546/30
trans-1,2-Dichloroethylene	ND(0.5)	µg/L		1546/30
Trichloroethylene	ND(0.5)	µg/L		1546/30
Vinyl Chloride/Chloroethene	ND(0.5)	µg/L		1546/30
Xylene	ND(0.5)	µg/L		1546/30
MDNR Unregulated Vocs			03/24/93	/
1,1,1,2-Tetrachloroethane	ND(0.5)	µg/L		1546/30
1,1,2,2-Tetrachloroethane	ND(0.5) Q	µg/L		1546/30
1,1,2-Trichloroethane	ND(0.5)	µg/L		1546/30
1,1-Dichloroethane	ND(0.5)	µg/L		1546/30
1,1-Dichloropropene	ND(0.5)	µg/L		1546/30
1,2,3-Trichloropropane	ND(0.5) Q	µg/L		1546/30
1,2,4-Trichlorobenzene	ND(0.5) Q	µg/L		1546/30
1,3-Dichloropropane	ND(0.5)	µg/L		1546/30
2,2-Dichloropropane	ND(0.5) Q	µg/L		1546/30
Bromobenzene	ND(0.5)	µg/L		1546/30
Bromodichloromethane	ND(0.5)	µg/L		1546/30
Bromoform	ND(0.5) Q	µg/L		1546/30
Bromomethane	ND(0.5)	µg/L		1546/30
Chloroethane	ND(0.5)	µg/L		1546/30
Chloroform	2.7	µg/L		1546/30
Chloromethane	ND(2.0) M	µg/L		1546/30
cis-1,3-Dichloropropene	ND(0.5)	µg/L		1546/30
Dibromochloromethane	ND(0.5)	µg/L		1546/30
Dibromomethane	ND(0.5)	µg/L		1546/30
Dichloromethane	ND(0.5)	µg/L		1546/30
m-Dichlorobenzene	ND(0.5)	µg/L		1546/30

-Continued-

1804 Glendale Road • Salina, Kansas 67401
913-827-1273 • 800-535-3076 • FAX 913-823-7830

CONTINENTAL ANALYTICAL SERVICES, INC.

LABORATORY REPORT

Client: Missouri Dept. of Health
Lab Number: 93031315

Analysis	Concentration	Units	Date Analyzed	Book/Page
o-Chlorotoluene	ND(0.5)	µg/L		1546/30
p-Chlorotoluene	ND(0.5)	µg/L		1546/30
trans-1,3-Dichloropropene	ND(0.5)	µg/L		1546/30

Analysis	Date Prepared	QC Batch	Analyst	Analytical Method
MDNR Regulated Vocs	NA	1GC4082	TEB	MDNR/502.2M
MDNR Unregulated Vocs	NA	1GC4082	TEB	MDNR/502.2M

M - Reporting limit higher than normal due to matrix interferences.

Q - This compound did not meet the method Quality Control criteria.

Laboratory analyses were performed on samples utilizing procedures published in Title 40 of the Code of Federal Regulations part 136, July 1, 1986 or in EPA Publication, SW-846, 3rd edition, Nov. 1986. ND(), where noted, indicates none detected with the detection limit in parentheses.

Samples will be retained for thirty days unless otherwise notified.

CONTINENTAL ANALYTICAL SERVICES, INC.

Clifford J. Baker

Clifford J. Baker
Laboratory Director

CAS

Continental Analytical
S E R V I C E S , I N C .

Client: Missouri Dept. of Health
Attn: Larry Evert
307 W. McCarty
Jefferson City, MO 65101

Date Sample Rptd: 04/01/93
Date Sample Recd: 03/18/93
CAS File No: 92-5364
CAS Order No: 15738
Client P.O.:

Lab Number: 93031316
Sample Description: Trip Blank 1010580 North KC

Date Sampled: / /
Time Sampled:

Analysis	Concentration	Units	Date Analyzed	Book/Page
No Tests Assigned	on hold.		03/31/93	/

Analysis	Date Prepared	QC Batch	Analyst	Analytical Method
No Tests Assigned	NA			

Laboratory analyses were performed on samples utilizing procedures published in Title 40 of the Code of Federal Regulations part 136, July 1, 1986 or in EPA Publication, SW-846, 3rd edition, Nov. 1986. ND(), where noted, indicates none detected with the detection limit in parentheses.

Samples will be retained for thirty days unless otherwise notified.

CONTINENTAL ANALYTICAL SERVICES, INC.

Clifford J. Baker
Laboratory Director

1804 Glendale Road • Salina, Kansas 67401
913-827-1273 • 800-535-3076 • FAX 913-823-7830

Clay Co.

Continental Analytical
SERVICES, INC.

Client: Missouri Dept. of Natural Resources, ESP
Attn: Ron Heckman
2710 W. Main
Jefferson City, MO 65109

Date Sample Rptd: 12/08/93
Date Sample Recd: 11/30/93
CAS File No: 93-6185
CAS Order No: 19985
Client P.O.: PWS# 1010580

Lab Number: 93111844
Sample Description: North Kansas City, Lab Faucet

Date Sampled: 11/29/93
Time Sampled: 0715

Analysis	Concentration	Units	Date Analyzed	Book/Page
MDNR Pesticides-Method 507			12/04/93	/
Alachlor	ND(0.5)	µg/L		1956/8
Atrazine	ND(0.5)	µg/L		1956/8
Butachlor	ND(0.5)	µg/L		1956/8
Metolachlor	ND(0.5)	µg/L		1956/8
Metribuzin	ND(0.5)	µg/L		1956/8
Propachlor	ND(0.5)	µg/L		1956/8
Simazine	ND(0.5)	µg/L		1956/8

Analysis	Date Prepared	QC Batch	Analyst	Analytical Method
MDNR Pesticides-Method 507	12/01/93	1	JDL	Method 507

Laboratory analyses were performed on samples utilizing procedures published in Title 40 of the Code of Federal Regulations, Parts 136 or 141, or in EPA Publication, SW-846, 3rd edition, September, 1986. ND(), where noted, indicates none detected with the detection limit in parentheses.

Samples will be retained for thirty days unless otherwise notified.

CONTINENTAL ANALYTICAL SERVICES, INC.

Clifford J. Baker

Clifford J. Baker
Laboratory Director

1804 Glendale Road • Salina, Kansas 67401-6675
913-827-1273 • 800-535-3076 • FAX 913-823-7830

Continental Analytical
SERVICES, INC.

November 1993

NORTH KANSAS CITY

1852 BURLINGTON
NORTH KANSAS CI, MO 64116

RE: Sampling for Pesticide Compounds in Drinking Water
Public Water System Name: North Kansas City; Water System Number: 1010580

The Missouri Department of Natural Resources has contracted Continental Analytical Services, Inc., a private laboratory, to have your water supply analyzed for pesticides. To obtain accurate results, please read instruction carefully, follow instructions, and then return this form with the samples.

1. The samples MUST BE collected early in the day on the Monday or Tuesday following receipt of the sampling kit. We have arranged for United Parcel Service (UPS) to pick up the samples and return them to Continental Analytical Services (CAS) prepaid. If your UPS driver should arrive before you have been able to sample, please instruct him/her to come back and pick up your samples the next day.

2. Place the blue ice in a freezer until sampling is completed.

3. Sample(s) must be taken at entry points. An entry point is the location where water enters the distribution system after treatment (chlorination, filtration, etc.). Most systems will have a wellhouse for each well in the system where the sample will be collected.

4. When sampling, open the tap and allow the system to flush until the water temperature has stabilized. At each sampling point, completely fill the liter glass bottle(s). The sample bottles contain sodium thiosulfate as a preservative. DO NOT dump out the preservative or rinse out the bottle.

5. Label the bottles with the date & time sampled, sample point description and identification number of the public water system.

6. Complete the bottom portion of this form with the Date and Time sampled and sampler signature. Sampling points are listed below. If incorrect, please make necessary changes. When UPS arrives, place the frozen blue ice, the sample(s), and this form in the cooler. Seal the cooler and place the return label on the outside of the cooler. UPS will pick up the cooler and return it to CAS.

7. If you have any questions, please call Doreen Simpson at (913) 827-1273.

Sample Number	Sample Point Identification	Sample Point Description	Date Sampled	Time Sampled
1	1010580001	LAB FAUCET (COLD WATER WAY)		

Sampled By: Dawn McGuire Date: 11-29-93 0715

Cooler Sealed By: Dawn McGuire Date: 11-29-93 0716

Opened at Lab By: J O'Brien Date: 11-30-93 1100

11-29-93 0715

1804 Glendale Road • Salina, Kansas 67401-6675
913-827-1273 • 800-535-3076 • FAX 913-823-7830

STATE OF MISSOURI
Mel Carnahan, Governor • David A. Shorr, Director
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM
RESULT OF SAMPLE ANALYSIS

Sample No. 94-B748

Reported to: TERRY TIMMONS
Affiliation: PDW

Date: 6/07/94
Project Code: 3404/3000

Sample Description:
NORTH KANSAS CITY, ENTRY POINT TO DISTRIBUTION SYSTEM
MO1010580

Collected by: McGUIRE
Affiliation: MISC

Date: 04/01/94

PARAMETERS	RESULTS
TOTAL DISS SOLIDS	290 mg/L
TURBIDITY	<1 NTU
ALKALINITY AS CaCO3	63 mg/L
HARDNESS AS CaCO3	120 mg/L
FLUORIDE	0.36 mg/L
SULFATE	110 mg/L
CHLORIDE	25 mg/L
CYANIDE	<.005 mg/L
DISS. SILVER	<50 ug/L
DISS. ALUMINUM	<100 ug/L
DISS. ARSENIC	<25 ug/L

STATE OF MISSOURI
Mel Carnahan, Governor • David A. Shorr, Director
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

Page 2
Sample no. 94-B748
Date 6/07/94

PARAMETERS	RESULTS
DISS. BARIUM	<500 ug/L
DISS. BERYLLIUM	<2 ug/L
DISS. CALCIUM	19.7 mg/L
DISS. CADMIUM	<2 ug/L
DISS. CHROMIUM	<50 ug/L
DISS. COPPER	<500 ug/L
DISS. IRON	<150 ug/L
DISS. MERCURY	<0.20 ug/L
DISS. POTASSIUM	6.68 mg/L
DISS. MAGNESIUM	18.3 mg/L
DISS. MANGANESE	<25 ug/L
DISS. SODIUM	46.0 mg/L
DISS. NICKEL	<50 ug/L
DISS. LEAD	<5.0 ug/L
DISS. ANTIMONY	<3.0 ug/L

STATE OF MISSOURI
Mel Carnahan, Governor • David A. Shorr, Director
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

Page 3
Sample no. 94-B748
Date 6/07/94

PARAMETERS	RESULTS
DISS. SELENIUM	<25 ug/L
DISS. THALLIUM	<1.0 ug/L
DISS. ZINC	<500 ug/L

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

Division of Environmental Quality

TELEPHONE OR CONFERENCE RECORD

Eisenberg Fill Site
(alias: Leo Eisenberg's Property)
MOD985768175
PA/SI Reference 29

FILE: Eisenberg Fill Superfund Technical File

DATE: June 6, 1995

TELEPHONE:

Incoming ( )
Outgoing (X)

CONFERENCE:

Field ( )
Office ( )

SUBJECT: Water supply information about the city of Lee's Summit.

PERSONS INVOLVED:

NAME	REPRESENTING
Misty Whittle	MDNR/Hazardous Waste Program, Superfund Section
Mr. Charles Dellario (816)251-2402	Superintendent, Lee's Summit Water Quality Department

SUMMARY OF CONVERSATION:

On June 6, 1995, I called the city of Lee's Summit to inquire about their drinking water systems. I spoke with Mr. Charles Dellario. Mr. Dellario reported that Lee's Summit, on an average year, receives two-thirds of their water from Independence and one-third of their water from Kansas City. He could not tell me the location of the well/surface water intakes, he suggested calling his suppliers (Independence and Kansas City) for this information. The water supplies 56,000-57,000 people in Lee's Summit. The city of Lee's Summit also supplies, Cass County District 3, Cass County District 6, Jackson County District 12-Greenwood, the city of Winnebago (emergency only), and the city of Pleasant Hill. In the past, the city served Tri-county District 13.

ACTION TAKEN:

I informed Julie Bloss, Site Evaluation Unit, Hazardous Waste Program, Superfund Section of the above conversation.

FINAL RESULTS:

Information supplied to Julie Bloss, who will take final action.

Misty Whittle
Misty Whittle
Hazardous Waste Program

MW:

Eisenberg Fill Site
(alias: Leo Eisenberg's Property)
MOD985768175
PA/SI Reference 30

DEPARTMENT OF NATURAL RESOURCES
Division of Environmental Quality

TELEPHONE OR CONFERENCE RECORD

FILE: Eisenberg Fill Superfund Technical File

DATE: June 6 , 1995

TELEPHONE:

Incoming (X)
Outgoing ( )

CONFERENCE:

Field ( )
Office ( )

SUBJECT: Water supply information about Kansas City.

PERSONS INVOLVED:

NAME	REPRESENTING
Misty Whittle	MDNR/Hazardous Waste Program, Superfund Section
Mr. Frank Pogge (816)274-2376	Kansas City Water Services Department, Deputy Director

SUMMARY OF CONVERSATION:

On June 6, 1995, Mr. Frank Pogge returned my phone call. He informed me that the city receives their water from the Missouri River, with a few alluvial wells on the banks of the Missouri River. The city serves between 650,000-700,000 people, as well as thirty other communities and water districts.

ACTION TAKEN:

I will inform Julie Bloss of the information, and if necessary will call Mr. Pogge for the names of the other 30 communities.

Misty Whittle
Misty Whittle
Hazardous Waste Program

MW:

DEPARTMENT OF NATURAL RESOURCES
Division of Environmental Quality

TELEPHONE OR CONFERENCE RECORD

FILE: Eisenberg Fill Superfund Technical File

DATE: June 7 , 1995

TELEPHONE:

Incoming (X)
Outgoing ( )

CONFERENCE:

Field ( )
Office ( )

SUBJECT: Water supply information about Kansas City.

PERSONS INVOLVED:

NAME	REPRESENTING
Misty Whittle	MDNR/Hazardous Waste Program, Superfund Section
Mr. Frank Pogge (816)274-2376	Kansas City Water Services Department, Deputy Director

SUMMARY OF CONVERSATION:

On June 7, 1995, Mr Frank Pogge returned my phone call in reference to the thirty other communities and water districts the Kansas City Water Department serves. He agreed to fax me the information on the other communities and water districts that the Kansas City Water Department serves.

ACTION TAKEN:

I informed Julie Bloss, Site Evaluation Unit, Hazardous Waste Program, Superfund Section of the above conversation.

FINAL RESULTS:

Fax received and attached. Information supplied to Julie Bloss, who will take final action.

Misty Whittle
Misty Whittle
Hazardous Waste Program

MW

RECEIVED
'95 JUN 7 PM 4 36
HAZARDOUS WASTE PROGRAM
MISSOURI DEPARTMENT OF
NATURAL RESOURCES

Water Services Department

City Hall 5th Floor, 414 East 12th Street, Kansas City, MO 64106-2776

City of Kansas City, Missouri
Heart of America

	Area Code 816
Auditing & Accounts	274-1451
Engineering	274-1755
Industrial Waste	274-1662
Permits	274-1361
Reading & Services	274-2404
FAX	274-2975
Line Maintenance	274-2800
FAX	274-2818
Sewage Treatment	274-8373
FAX	231-5674
Water Treatment	454-6233
FAX	454-9916

****** FAX TRANSMITTAL *******

Date: 7 June 1995 Time: _____ am / pm

To: Misty Whittle
MDNR

K.C.Mo. Water Services FAX Number: (816) 274-2975

Destination FAX Number: (314) - 751-7869

Number of pages, including this Transmittal page 2

Subject: Communities we sell water

Remarks:

From: Frank Pogge

SUBURBAN CUSTOMERS SERVICE CONDITIONS

CONTINUOUS SUPPLY - CONTRACT

BELTON
BIRMINGHAM
BLUE SPRINGS
CASS CO. DIST. NO. 2
CLAY CO. DIST. NO. 2
CLAY CO. DIST. NO. 6
CLAY CO. DIST. NO. 9
FERRELVIEW
JACKSON CO. DIST. NO. 1
JACKSON CO. DIST. NO. 2
LATHROP
LEE'S SUMMIT
MISSOURI CITIES WATER CO.
NORTHMOOR
PLATTE CITY
RAYMORE
RAYTOWN WATER CO.
WEATHERBY LAKE

CONTINUOUS SUPPLY - NO CONTRACT

FORD MOTOR CO.

KCMO SUPPLY/SYSTEM/OPERATION

AVONDALE
CLAYCOMO (WEST)
GLADSTONE (OAKWOOD MANOR)
OAKS
OAKWOOD PARK
VILLAGE OF OAKS
VILLAGE OF OAKVIEW
RANDOLPH

EMERGENCY SUPPLY - CONTRACT

B.P.U. - KANSAS CITY, KS.
INDEPENDENCE WATER CO.
JOHNSON CO. DIST. NO. 1
NORTH KANSAS CITY

EMERGENCY SUPPLY - NO CONTRACT

GLADSTONE

May 1, 1995

Eisenberg Fill Site
(alias: Leo Eisenberg's Propety)
MOD985768175
PA/SI Reference 31

DEPARTMENT OF NATURAL RESOURCES
Division of Environmental Quality

TELEPHONE OR CONFERENCE RECORD

FILE: Eisenberg Fill Superfund technical file

DATE: June 9, 1995

TELEPHONE:

Incoming ( )
Outgoing (X)

CONFERENCE:

Field ( )
Office ( )

SUBJECT: Drinking water supply for Kansas City, KS

PERSONS INVOLVED:

NAME	REPRESENTING
Ms. Julie A. Bloss	MDNR/HWP/Superfund
Ms. Sheryl Brown	Board of Public Utilities, KC Kansas - (913) 573-9372

SUMMARY OF CONVERSATION:

I called to inquire about the source of the drinking water supply for Kansas City, Kansas. Ms. Sheryl Brown told me that the Quindaro plant at 3601 North 12th Street uses a surface water intake. This intake supplies Wyndotte County and parts of Johnson County. No wells are currently in use with this system; however, a Raney well will be used at the new plant, located at 55th and Nearman, north of Leavenworth Road in Kansas City, Kansas.

ACTION TAKEN:

Both the well and surface water intake are outside the target area for the Eisenberg Fill site. I will use this information to update our PA/SI files.

Julie A. Bloss
Julie A. Bloss
Environmental Specialist

JAB:mlw

Eisenberg Fill Site
(alias: Leo Eisenberg's Property)
MOD985768175
PA/SI Reference 32

DEPARTMENT OF NATURAL RESOURCES
Division of Environmental Quality

TELEPHONE OR CONFERENCE RECORD

FILE: Eisenberg Fill Superfund Technical File

DATE: June 9 and 10, 1995

TELEPHONE:

Incoming ( )
Outgoing (X)

CONFERENCE:

Field ( )
Office ( )

SUBJECT: Water supply information about Blue Springs, Platte City, Lathrop, Jackson County Water District #2, and Ferrelview.

PERSONS INVOLVED:

NAME	REPRESENTING
Misty Whittle	MDNR/HWP/ SPF
Ms. Juanita Hardman (816)228-0136	Blue Springs Water Department
Ms. Jackie Bryan (816)858-3046	Platte City Water Department
Ms. Susie Freece (816)528-4521	Lathrop Water Department
(816)464-5010	Ferrelview
(816)353-5550	Jackson Co. Water District #2

SUMMARY OF CONVERSATION:
On June 9, 1995, I phoned the city of Blue Springs to inquire about their drinking water system. Ms. Hardman informed me that at the end of May 1995 the city was serving 16,640 people and the city received 55% of their water from Kansas City, MO.

On June 9, 1995, I phoned Platte City to inquire about their drinking water system. Ms. Bryan informed me that Platte City has a population of 2,947, and they service 1,313 meters. The city receives 100% of their water from Kansas City, MO.

On June 9, 1995, I phoned the city of Lathrop to inquire about their drinking water system. Ms. Susie Freece informed me that Lathrop services 775 meters, and the city receives 100% of their water from Kansas City, MO.

On June 9 and 10, 1995, I phoned the city of Ferrelview to inquire about their drinking water system. I phoned twice on the 9th and twice on the 10th, and could only get an answering machine. I left two messages on Friday for the water department to return my call.

On June 10th, 1995, I phoned Jackson Co. Water District #2 to inquire about their drinking water system. I was advised to call back on Thursday when the director, Mr. Bud Fitzwater, was in the office.

ACTION TAKEN:

I informed Julie Bloss, Site Evaluation Unit, Hazardous Waste Program, Superfund Section of the above conversation.

FINAL RESULTS:

Information supplied to Julie Bloss, who will take final action.

Misty Whittle

Misty Whittle
Hazardous Waste Program

MW:

Rules of
Department of Natural Resources
Division 20—Clean Water Commission
Chapter 7—Water Quality

Title		Page
10 CSR 20-7.010	Prevention of Pollution from Wells to Subsurface Waters of the State (Rescinded July 10, 1980)	3
10 CSR 20-7.015	Effluent Regulations	3
10 CSR 20-7.020	Effluent Regulations (Rescinded July 11, 1980)	10
10 CSR 20-7.030	Water Quality Standards (Rescinded December 11, 1977)	10
10 CSR 20-7.031	Water Quality Standards	10

precision and accuracy of the analyzed results can be determined.

4. If, for any reason, the permittee does not comply with or will be unable to comply with any discharge limitations or standards specified in the permit, the permittee shall provide the department with the following information, with the next discharge monitoring report as required under subsection (9)(A):

A. A description of the discharge and cause of noncompliance;

B. The period of noncompliance, including exact dates and times and/or the anticipated time when the discharge will return to compliance; and

C. Steps being taken to reduce, eliminate and prevent recurrence of the noncompliance.

5. In the case of any discharge subject to any applicable toxic pollutant effluent standard under Section 307(a) of the Federal Clean Water Act, the information required by paragraph (9)(A)4. regarding a violation of this standard shall be provided within twenty-four (24) hours from the time the owner or operator of the water contaminant source, point source or wastewater treatment facility becomes aware of the violation or potential violation. If this information is provided orally, a written submission covering these points shall be provided within five (5) working days of the time the owner or operator of the water contaminant source, point source or wastewater treatment facility becomes aware of the violation.

(B) Dilution Water. Dilution of treated wastewater with cooling water or other less contaminated water to lower the effluent concentration to limits required by an effluent regulation of the Clean Water Law shall not be an acceptable means of treatment.

(C) Compliance.

1. New sources. Water contaminant sources, point sources and wastewater treatment facilities and their tributary sewer systems on which construction begins after the effective date of the applicable effluent guidelines shall meet all requirements of this regulation and the Missouri Clean Water Law.

2. Sources for which construction and operating permits were issued prior to the effective date of this regulation shall meet all the requirements of the existing permit. Where the existing permit contains more stringent limitations than those contained in this regulation, the permittee may apply to the department for a modification of the permit to contain the new limitations. The department will notify the applicant of its decision to modify or deny the application within sixty (60) days after receiving an application.

(D) Compliance with New Source Performance Standards.

1. Except as provided in paragraph (9)(D)2., any new water contaminant source, point source or wastewater treatment facility on which construction commenced after October 18, 1972, or any new source, which meets the applicable promulgated new source performance standards before the commencement of discharge, shall not be subject to any more stringent new source performance standards or to any more stringent technology-based standards under Subsection 301(b)(2) of the Federal Clean Water Act for the shortest of the following periods:

A. Ten (10) years from the date that construction is completed;

B. Ten (10) years from the date the source begins to discharge process or other nonconstruction related wastewater; or

C. The period of depreciation or amortization of the facility for the purposes of Section 167 or 169 (or both) of the *Internal Revenue Code* of 1954.

2. The protection from more stringent standards of performance afforded by paragraph (9)(D)1. does not apply to—

A. Additional or more stringent permit conditions which are not technology based, for example, conditions based on water quality standards or effluent standards or prohibitions under Section 307(a); and

B. Additional permit conditions controlling pollutants listed as toxic under Section 307(a) of the Federal Clean Water Act or as hazardous substances under Section 311 of the Federal Clean Water Act and which are not controlled by new source performance standards. This exclusion includes permit conditions controlling pollutants other than those identified as hazardous where control of those other pollutants has been specifically identified as the method to control the hazardous pollutant.

(E) Bypassing.

1. Any bypass or shutdown of a wastewater treatment facility and tributary sewer system or any part of a facility and sewer system that results in a violation of permit limits or conditions is prohibited except—

A. Where unavoidable to prevent loss of life, personal injury or property damages;

B. Where unavoidable excessive storm drainage or runoff would damage any facilities or processes necessary for compliance with the effluent limitations and conditions of this permit; and

C. Where maintenance is necessary to ensure efficient operation and alternative measures have been taken to maintain effluent quality during the period of maintenance;

2. The permittee shall notify the department by telephone within twenty-four (24) hours and follow with a written report within five (5) days of all bypasses or shutdowns that result in a violation of permit limits or conditions. POTWs that bypass during storm water infiltration events need only report on their discharge monitoring reports. This section does not excuse any person from any liability, unless this relief is otherwise provided by the statute.

(F) Sludge facilities shall meet the applicable control technology for sewage sludge treatment, use and disposal as published by the Environmental Protection Agency (EPA) in 40 CFR 503 and applicable state standards and limitations published in 10 CSR 20 and 10 CSR 80. Where there are no standards available or applicable, or when more stringent standards are appropriate to protect human health and the environment, the department shall set specific limitations in permits on a case-by-case basis using best professional judgment.

(G) Industrial, agricultural and other nondomestic water contaminant sources, point sources or wastewater treatment facilities which are not included under subsection (2)(B), (3)(B), (4)(B), or (8)(B)—

1. These facilities shall meet the applicable control technology currently effective as published by the EPA in 40 CFR 405—471 as revised on July 1, 1987. Where there are no standards available or applicable, the department shall set specific parameter limitations using best professional judgment; and

2. Agrichemical facilities shall be designed and constructed so that all bulk liquid pesticide nonmobile storage containers and all bulk liquid fertilizer nonmobile storage containers are located within a secondary containment facility. Dry bulk pesticides and dry bulk fertilizers shall be stored in a building so that they are protected from the weather. The floors of the buildings shall be constructed of an approved design and material(s). At an agrichemical facility, the following procedures shall be conducted in an operational area: all transferring, loading, unloading, mixing and repackaging of bulk agrichemicals. All precipitation collected in the operational containment area or secondary containment area as well as process generated wastewater shall be stored and disposed of in a no-discharge manner or treated to meet the applicable control technology referenced in paragraph (9)(G)1.

Auth: section 644.026, RSMo (Supp. 1987). Original rule filed June 6, 1974, effective June 16, 1974. Amended: Filed April 1, 1975, effective April 11, 1975.*

Rescinded: Filed Oct. 16, 1979, effective July 11, 1980. Readopted: Filed Feb. 4, 1980, effective July 11, 1980. Rescinded and readopted: Filed Nov. 10, 1982, effective May 12, 1983. Amended: Filed Sept. 11, 1984, effective March 12, 1985. Amended: Filed July 25, 1985, effective Dec. 26, 1985. Amended: Filed Feb. 1, 1988, effective June 13, 1988. Amended: Filed Sept. 13, 1988, effective Feb. 14, 1989. Amended: Filed July 15, 1991, effective Jan. 13, 1992. Amended: Filed Sept. 2, 1993, effective May 9, 1994.

**Original authority 1972, amended 1973, 1987.*

10 CSR 20-7.020 Effluent Regulations
(Rescinded July 11, 1980)

10 CSR 20-7.030 Water Quality Standards
(Rescinded December 11, 1977)

10 CSR 20-7.031 Water Quality Standards

PURPOSE: This rule identifies beneficial uses of waters of the state, criteria to protect those uses and defines the anti-degradation policy. It is developed in response to the Missouri Clean Water Law and the federal Clean Water Act, Section 303(c)(1) and (2), which requires that state water quality standards be reviewed at least once every three years. These revisions are pursuant to the national goal of protection of fish, shellfish and wildlife and recreation in and on the water as outlined in Section 101(a)(2) of the Act.

Editor's Note: The secretary of state has determined that the publication of this rule in its entirety would be unduly cumbersome or expensive. The entire text of the material referenced has been filed with the secretary of state. This material may be found at the Office of the Secretary of State or at the headquarters of the agency and is available to any interested person at a cost established by state law.

(1) Definitions.

(A) Acute toxicity—Conditions producing adverse effects or lethality on aquatic life following short-term exposure. The acute criteria in Tables A and B are maximum concentrations which protect against acutely toxic conditions. Acute toxicity is also indicated by exceedence of whole-effluent toxicity (WET) test conditions of paragraph (3)(I)2. For substances not listed in Table A or B, 0.3 of the median lethal concentration, or the no observed acute effect concentration for representative species, may be used to determine absence of acute toxicity.

(B) Aquifer—A subsurface water-bearing bed or stratum which stores or transmits water in recoverable quantities that is currently being used or could be used as a water source for private or public use. It does not include water in the vadose zone.

(C) Beneficial water uses. Beneficial uses (1)(C)1.—11. of classified waters are identified in Tables G and H. Beneficial uses (1)(C)12.—15. of classified waters must be determined on a site-by-site basis and are therefore not listed in Tables G and H.

1. Irrigation—Application of water to cropland or directly to plants that may be used for human or livestock consumption. Occasional supplemental irrigation, rather than continuous irrigation, is assumed.

2. Livestock and wildlife watering—Maintenance of conditions to support health in livestock and wildlife.

3. Cold-water fishery—Waters in which naturally occurring water quality and habitat conditions allow the maintenance of a naturally reproducing or stocked trout fishery and other naturally reproducing populations of recreationally important fish species.

4. Cool-water fishery—Waters in which naturally occurring water quality and habitat conditions allow the maintenance of a sensitive, high-quality sport fishery (including smallmouth bass and rock bass) and other naturally reproducing populations of recreationally important fish species.

5. Protection of aquatic life (General warm-water fishery)—Waters in which naturally occurring water quality and habitat conditions allow the maintenance of a wide variety of warm-water biota, including naturally reproducing populations of recreationally important fish species. This includes all Ozark Class C and P streams, all streams with seven (7)-day Q_{10} low flows of more than one-tenth cubic feet per second (0.1 cfs), all P1 streams and all classified lakes. However, individual Ozark Class C streams may be determined to be limited warm-water fisheries on the basis of limited habitat, losing-stream classification, land-use characteristics or faunal studies which demonstrate a lack of recreationally important fish species.

6. Protection of aquatic life (Limited warm-water fishery)—Waters in which natural water quality and/or habitat conditions prevent the maintenance of naturally reproducing populations of recreationally important fish species. This includes non-Ozark Class C streams and non-Ozark Class P streams with seven (7)-day Q_{10} low flows equal to or less than 0.1 cfs and Ozark Class C streams with the characteristics outlined in paragraph (1)(C)5.

7. Human health protection (Fish consumption and secondary contact recreation)—Criteria to protect this use are based on the assumption of an average amount of fish consumed on a long-term basis. Protection of this use includes compliance with Federal Drug Administration (FDA) limits for fish tissue, maximum water concentrations corresponding to the 10^{-6} cancer risk level and other human health fish consumption criteria. Secondary contact recreation assumes limited physical contact with the water without likelihood of water ingestion.

8. Whole-body-contact recreation—Activities in which there is direct human contact with the raw surface water to the point of complete body submergence. The raw water may be ingested accidentally and certain sensitive body organs, such as the eyes, ears and the nose, will be exposed to the water. Although the water may be ingested accidentally, it is not intended to be used as a potable supply unless acceptable treatment is applied. Water so designated is intended to be used for swimming, water skiing or skin diving.

9. Boating and canoeing—Activities in which limited contact with water is assumed.

10. Drinking water supply—Maintenance of a raw water supply which will yield potable water after treatment by public water treatment facilities.

11. Industrial process water and industrial cooling water—Water to support various industrial uses; since quality needs will vary by industry, no specific criteria are set in these standards.

12. Storm- and flood-water storage and attenuation—Waters which serve as overflow and storage areas during flood or storm events slowly release water to downstream areas, thus lowering flood peaks and associated damage to life and property.

13. Habitat for resident and migratory wildlife species, including rare and endangered species—Waters that provide essential breeding, nesting, feeding and predator escape habitats for wildlife including waterfowl, birds, mammals, fish, amphibians and reptiles.

14. Recreational, cultural, educational, scientific and natural aesthetic values and uses—Waters that serve as recreational sites for fishing, hunting and observing wildlife;

waters of historic or archeological significance; waters which provide great diversity for nature observation, educational opportunities and scientific study.

15. Hydrologic cycle maintenance—Waters hydrologically connected to rivers and streams serve to maintain flow conditions during periods of drought. Waters that are connected hydrologically to the groundwater system recharge groundwater supplies and assume an important local or regional role in maintaining groundwater levels.

(D) Biocriteria. Numeric values or narrative expressions that describe the reference biological integrity of aquatic communities inhabiting waters that have been designated for aquatic-life protection.

(E) Chronic toxicity—Conditions producing adverse effects on aquatic life or wildlife following long-term exposure but having no readily observable effect over a short time period. Chronic numeric criteria in Tables A and B are maximum concentrations which protect against chronic toxicity; these values shall be considered four (4)-day averages. Chronic toxicity is also indicated by exceedence of WET test conditions of subsection (4)(P). For substances not listed in Table A or B, commonly used endpoints such as the no-observed effect concentration or inhibition concentration of representative species may be used to demonstrate absence of toxicity.

(F) Classified waters—All waters listed as L1, L2 and L3 in Table G and P, P1 and C in Table H. During normal flow periods, some rivers back water into tributaries which are not otherwise classified. These permanent backwater areas are considered to have the same classification as the water body into which the tributary flows.

1. Class L1—Lakes used primarily for public drinking water supply.

2. Class L2—Major reservoirs.

3. Class L3—Other lakes which are waters of the state. These include both public and private lakes. For effluent regulation purposes, publicly owned L3 lakes are those for which a substantial portion of the surrounding lands are publicly owned or managed.

4. Class P—Streams that maintain permanent flow even in drought periods.

5. Class P1—Standing-water reaches of Class P streams.

6. Class C—Streams that may cease flow in dry periods but maintain permanent pools which support aquatic life.

7. Class W—Wetlands that are waters of the state that meet the criteria in the *Corps of Engineers Wetlands Delineation Manual* (January 1987), and subsequent federal revisions. Class W waters do not include wetlands that are artificially created on dry land and maintained for the treatment of mine drainage, stormwater control, drainage associated with road construction, or industrial, municipal or agricultural waste. Class W determination on any specific site shall be consistent with federal law.

(G) Ecoregion. A major region within the state which contains waters with similar geological, hydrological, chemical and biological characteristics.

(H) Epilimnion—Zone of atmospheric mixing in a thermostratified lake.

(I) Fecal coliform bacteria—A group of bacteria originating in intestines of warm-blooded animals which indicates the possible presence of pathogenic organisms in water.

(J) Hypolimnion—Zone beneath the zone of atmospheric mixing in a thermostratified lake.

(K) Lethal concentration $_{50}$ (LC_{50})—Concentration of a toxicant which would be expected to kill fifty percent (50%) of the individuals of the test species organisms in a test of specified length of time.

(L) Losing streams—A stream which distributes thirty percent (30%) or more of its flow through natural processes, such as through permeable geologic materials into a bedrock aquifer within two (2) miles' flow distance downstream of an existing or proposed discharge. Flow measurements to determine percentage of water loss must be corrected to approximate the seven (7)-day Q_{10} stream flow. If a stream bed or drainage way has an intermittent flow or a flow insufficient to measure in accordance with this rule, it may be determined to be a losing stream on the basis of channel development, valley configuration, vegetation development, dye tracing studies, bedrock characteristics, geographical data and other geological factors. A list of known losing streams is available from the Water Pollution Control Program. Other streams may be determined to be losing by the Division of Geology and Land Survey.

(M) Low-flow conditions—

1. Seven (7)-day one (1)-in-ten (10)-year low flow (7-day Q_{10})—The average minimum flow for seven (7) consecutive days that has a probable recurrence interval of once-in-ten (10) years; and

2. Sixty (60)-day, one (1)-in-two (2)-year low flow (60-day, Q_2)—The average minimum flow for sixty (60) consecutive days that has a probable recurrence interval of once-in-two (2) years.

(N) Mixing zone—An area of dilution of effluent in the receiving water beyond which chronic toxicity criteria must be met.

(O) Outstanding national resource waters—Waters which have outstanding national recreational and ecological significance. These waters shall receive special protection against any degradation in quality. Congressionally designated rivers, including those in the Ozark national scenic riverways and the wild and scenic rivers system, are so designated (see Table D).

(P) Outstanding state resource waters—High quality waters with a significant aesthetic, recreational or scientific value which are specifically designated as such by the Clean Water Commission (see Table E).

(Q) Ozark streams—Streams lying within the Ozark faunal region as described in the *Aquatic Community Classification System for Missouri*, Missouri Department of Conservation, 1989.

(R) Reference stream reaches. Stream reaches determined by the department to be the best available representatives of ecoregion waters in a natural condition, with respect to habitat, water quality, biological integrity and diversity, watershed land use and riparian conditions.

(S) Regulated-flow streams—A stream that derives a majority of its flow from an impounded area with a flow-regulating device.

(T) Water hardness—The total concentration of calcium and magnesium ions expressed as calcium carbonate. For purposes of this rule, hardness will be determined by the twenty-fifth percentile value, so that no more than twenty-five percent (25%) of samples fall below the value of a representative number of samples from the water body in question or from a similar water body at the appropriate stream flow conditions.

(U) Water quality criteria—Chemical, physical and biological properties of water that are necessary to protect beneficial water uses.

(V) Zone of initial dilution—A small area of initial mixing below an effluent outfall beyond which acute toxicity criteria must be met.

(W) Zone of passage—A continuous water route necessary to allow passage of organisms with no acutely toxic effects produced on their populations.

(X) Wetlands—Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas. This definition is consistent with both the United States Army Corps of Engineers 33 CFR 328.3(b) and the United States Environmental Protection Agency 40 CFR 232.2(r).

(Y) Whole effluent toxicity tests—A toxicity test conducted under specified laboratory conditions on specific indicator organisms. To estimate chronic and acute toxicity of the effluent in its receiving stream, the effluent

may be diluted to simulate the computed percent effluent at the edge of the mixing zone or zone of initial dilution.

(Z) Other definitions as set forth in the Missouri Clean Water Law and 10 CSR 20-2.010 shall apply to terms used in this rule.

(2) Antidegradation. The antidegradation policy shall provide three (3) levels of protection.

(A) Public health, existing in-stream water uses and a level of water quality necessary to protect existing uses shall be maintained and protected.

(B) For all waters of the state, if existing water quality is better than applicable water quality criteria established in these rules, that existing quality shall be fully maintained and protected. Water quality may be lowered only if the state finds, after full satisfaction of the intergovernmental coordination and public participation requirements, that the lowered water quality is necessary to allow important economic and social development in the geographical area in which the waters are located. In allowing the lowering of water quality, the state shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control before allowing any lowering of water quality. This provision allows a proposed new or modified point or nonpoint source of pollution to result in limited lowering of water quality provided that—

1. The source does not violate any of the general criteria set fourth in section (3) of this rule, or any of the criteria for protection of beneficial uses set forth in section (4) of this rule;

2. The source meets all applicable technological effluent limitations and minimum standards of design for point sources or minimum pollution control practices for nonpoint sources; and

3. The lowering of water quality, in the judgment of the department, is necessary for the accommodation of important economic and social development in the geographical vicinity of the discharge. In making a preliminary determination based on socioeconomic development considerations, the department may consider the potential for regional increases in utility rates, taxation levels or recoverable costs associated with the production of goods or services that may result from the imposition of a strict no-degradation policy. Consideration may also be given to the possible indirect effects of a policy on per capita income and the level of employment in the geographical vicinity of the proposed pollution source. Any preliminary decision by the department to allow a limited lowering of water quality will be stated as such in a public notice issued pursuant to 10 CSR 20-6.010. Pursuant to that provision, a public hearing will be held in the geographical vicinity of the proposed pollution source, if the department determines there is significant public interest in and need for a hearing.

(C) There shall be no lowered water quality in outstanding national resource waters or outstanding state resource waters, as designated in Tables D and E.

(3) General Criteria. The following water quality criteria shall be applicable to all waters of the state at all times including mixing zones. No water contaminant, by itself or in combination with other substances, shall prevent the waters of the state from meeting the following conditions:

(A) Waters shall be free from substances in sufficient amounts to cause the formation of putrescent, unsightly or harmful bottom deposits or prevent full maintenance of beneficial uses;

(B) Waters shall be free from oil, scum and floating debris in sufficient amounts to be unsightly or prevent full maintenance of beneficial uses;

(C) Waters shall be free from substances in sufficient amounts to cause unsightly color or turbidity, offensive odor or prevent full maintenance of beneficial uses;

(D) Waters shall be free from substances or conditions in sufficient amounts to result in toxicity to human, animal or aquatic life;

(E) There shall be no significant human health hazard from incidental contact with the water;

(F) There shall be no acute toxicity to livestock or wildlife watering;

(G) Waters shall be free from physical, chemical or hydrologic changes that would impair the natural biological community;

(H) Waters shall be free from used tires, car bodies, appliances, demolition debris, used vehicles or equipment and solid waste as defined in Missouri's Solid Waste Law, section 260.200, RSMo, except as the use of such materials is specifically permitted pursuant to section 260.200—260.247;

(I) Waters in mixing zones and unclassified waters which support aquatic life on an intermittent basis shall be subject to the following requirements:

1. The acute toxicity criteria of Tables A and B and the requirements of subsection (4)(B); and

2. The following whole effluent toxicity conditions must be satisfied:

A. Single dilution method. The percent effluent at the edge of the zone of initial dilution will be computed and toxicity tests performed at this percent effluent. These tests must show statistically insignificant mortality on the most sensitive of at least two (2) representative, diverse species; and

B. Multiple dilution method. An LC_{50} will be derived from a series of test dilutions. The computed percent effluent at the edge of the zone of initial dilution must be less than three-tenths (0.3) of the LC_{50} for the most sensitive of at least two (2) representative, diverse species.

(4) Specific Criteria. The specific criteria shall apply to classified waters. Protection of drinking water supply is limited to surface waters designated for raw drinking water supply and aquifers. Protection of whole-body-contact recreation is limited to classified waters designated for that use. Only waters designated for livestock and wildlife watering are considered to be long-term supplies and are subject to the chronic toxicity requirements of the specific criteria.

(A) The maximum chronic toxicity criteria in Tables A and B shall apply to waters designated for the indicated uses given in Tables G and H. All Table A and B criteria are chronic toxicity criteria, except those specifically identified as acute criteria. Water contaminants shall not cause or contribute to concentrations in excess of these values. However, exceptions may be granted in the following cases:

1. Permanent flow streams when the stream flow is less than seven (7)-day Q_{10};

2. Regulated flow streams if the flow is less than the minimum release flow agreed upon by the regulating agencies;

3. When natural upstream concentrations of dissolved oxygen are below the criteria, wasteload allocations and permits for point source discharges will be developed so that existing natural dissolved oxygen concentrations, as determined on a regional or watershed basis, are maintained;

4. For the natural and unavoidable chemical and physical changes that occur in the hypolimnion of lakes. Streams below impoundments shall meet applicable specific criteria;

5. For mixing zones.

A. The mixing zone shall be exempted from the chronic criteria requirements of this section for those components of waste that are rendered nontoxic by dilution, dissipation or rapid chemical transformation. Acute numeric criteria of Tables A and B and whole effluent acute toxicity requirements of subsection (3)(I) must be met at all times within the mixing zone, except within the zone of initial dilution.

The following criteria do not apply to thermal mixing zones. Criteria for thermal mixing zones are listed in paragraph (4)(D)6.

B. The maximum size of mixing zones and zone of initial dilution will be determined as follows:

(I) Class C streams and streams with seven (7)-day Q_{10} low flows of 0.1 cfs or less.

(a) Mixing zone—length of one-quarter (1/4) mile. If multiple discharges affect a reach or if zone of passage requirements mandate less extensive mixing zones, shorter mixing zones may be required.

(b) Zone of initial dilution—not allowed;

(II) Streams with seven (7)-day Q_{10} low flow of one-tenth to twenty (0.1—20) cfs—

a. Mixing zone—one-quarter (1/4) of the stream width, cross-sectional area or volume of flow; length one-quarter (1/4) mile. If the discharger can document that rapid and complete mixing of the effluent occurs in the receiving stream, the mixing zone may be up to one-half (1/2) of the stream width, cross-sectional area or volume of flow; and

b. Zone of initial dilution—one-tenth (0.1) of the mixing zone width, cross-sectional area or volume of flow;

(III) Streams with seven (7)-day Q_{10} low flow of greater than twenty (20) cfs—

a. Mixing zone—one-quarter (1/4) of stream width, cross-sectional area or volume of flow; length of one-quarter (1/4) mile; and

b. Zone of initial dilution—one-tenth (0.1) of the mixing zone width, cross-sectional area or volume of flow and no more than ten (10) times the effluent design flow volume unless the use of diffusers or specific mixing zone studies can justify more dilution; and

(IV) Lakes.

(a) Mixing zone—not to exceed one-quarter (1/4) of the lake width at the discharge point or one hundred feet (100') from the discharge point, whichever is less.

(b) Zone of initial dilution—not allowed.

C. A mixing zone shall not overlap another mixing zone in a manner that the maintenance of aquatic life in the body of water in the overlapping area would be further adversely affected.

D. Other factors that may prohibit or further limit the size and location of mixing zones are the size of the river, the volume of discharge, the stream bank configuration, the mixing velocities, other hydrologic or physiographic characteristics and the designated uses of the water, including type of aquatic life supported, potential effects on mouths of tributary streams and proximity to water supply intakes.

E. Zones of passage must be provided wherever mixing zones are allowed.

F. Mixing zone and zone of initial dilution size limits will normally be based on streams at the seven (7)-day Q_{10} low flow. However, this percent of stream size limits also applies at higher stream flows and discharge limitations may be based on higher stream flows if discharge volume or quality may be adjusted to correlate with stream flow; and

6. For wetlands. Water quality needs will vary depending on the individual characteristics of wetlands. Application of numeric criteria will depend on the specific aquatic life, wildlife and vegetational requirements.

(B) Toxic Substances.

1. Water contaminants shall not cause the criteria in Tables A and B to be exceeded. Concentrations of these substances in bottom sediments or waters shall not harm benthic organisms and shall not accumulate through the food chain in harmful concentrations, nor shall state and federal maximum fish tissue levels for fish consumption be exceeded. More stringent criteria may be imposed if there is evidence of additive or synergistic effects. Site-specific criterial modifications may be allowed. With the department's approval, entities may conduct studies to determine if site-specific factors would justify modifications in the criteria that apply to specific receiving waters. In approving a study and reviewing its results, the department will take into account EPA and other appropriate guidelines as they exist at the time the study is submitted for approval.

2. For compliance with this rule, metals shall be analyzed by the following methods:

A. Aquatic life protection and human-health protection—fish consumption.

(I) Mercury—total recoverable metals.

(II) All other metals—dissolved metals;

B. Drinking water supply—dissolved metals; and

C. All other beneficial uses—total recoverable metals.

3. Other potentially toxic substances for which sufficient toxicity data are not available may not be released to waters of the state until safe levels are demonstrated through adequate bioassay studies.

4. Drinking water criteria, for substances which are rendered nontoxic by transformation processes in the surface water body, shall apply at water supply withdrawal points.

5. Site-specific alternative criteria for human health—fish consumption may be allowed. Designation of this site-specific criteria must follow the established variance request process.

(C) Fecal Coliform Bacteria. Protections of whole-body-contact recreation is limited to classified waters designated for that use. For periods when the stream or lake is not affected by stormwater runoff, the fecal coliform count shall not exceed two hundred colonies per one hundred milliliters (200/100 ml) during the recreational season in waters designated for whole-body-contact recreation or at any time in losing streams. The recreational season is from April 1 to October 31.

(D) Temperature.

1. For general and limited warm-water fisheries beyond the mixing zone, water contaminant sources and physical alteration of the water course shall not raise or lower the temperature of a stream more than five degrees Fahrenheit (5°F). Water contaminant sources shall not cause or contribute to stream temperature in excess of ninety degrees Fahrenheit (90°F). However, site-specific ambient temperature data and requirements of sensitive resident aquatic species will be considered, when data are available, to establish alternative maxima or deviations from ambient temperatures.

2. For cool-water fisheries beyond the mixing zone, water contaminant sources and physical alteration of the water course shall not raise or lower the temperature of a stream more than five degrees Fahrenheit (5°F). Water contaminant sources shall not cause or contribute to stream temperature in excess of eighty-four degrees Fahrenheit (84°F).

3. For cold-water fisheries beyond the mixing zone, water contaminant sources and physical alteration of the water course shall not raise or lower the temperature of the water body more than two degrees Fahrenheit (2°F). Water contaminant sources shall not cause or contribute to temperatures above sixty-eight degrees Fahrenheit (68°F).

4. Water contaminant sources shall not cause any measurable rise in the temperature of lakes. An increase is allowable for Lake Springfield, Thomas Hill Reservoir and Montrose Lake; however, discharges from these lakes must comply with temperature limits for streams.

5. For the Mississippi River Zones 1A and 2, the water temperature outside the mixing zone shall not exceed the maximum limits indicated in the following list during more than one percent (1%) of the time in any calendar year. In Zone 1B, limits may not be exceeded more than five percent (5%) of the time in a calendar year. At no time shall the river water temperature outside of the thermal mixing zone exceed the listed limits by more than three degrees Fahrenheit (3°F).

	A,B (°F)	C (°F)
January	45	50
February	45	50
March	57	60
April	68	70
May	78	80
June	86	87
July	88	89
August	88	89
September	86	87
October	75	78
November	65	70
December	52	57

A = Zone 1A—Des Moines River to Lock and Dam No. 25

B = Zone 1B—Lock and Dam No. 25 to Lock and Dam No. 26.

C = Zone 2—Lock and Dam No. 26 to the Missouri-Arkansas state line

6. Thermal mixing zones shall be limited to twenty-five percent (25%) of the cross-sectional area or volume of a river, unless biological surveys performed in response to section 316(a) of the federal Clean Water Act (or equivalent) indicate no significant adverse impact on aquatic life. Thermal plume lengths and widths within rivers, and all plume dimensions within lakes, shall be determined on a case-by-case basis and shall be based on physical and biological surveys when appropriate.

(E) pH. Water contaminants shall not cause pH to be outside of the range of 6.5—9.0.

(F) Taste- and Odor-Producing Substances. Taste- and odor-producing substances shall be limited to concentrations in the streams or lakes that will not interfere with beneficial uses of the water. For those streams and lakes designated for drinking water supply use, the taste- and odor-producing substances shall be limited to concentrations that will not interfere with the production of potable water by reasonable water treatment processes.

(G) Turbidity and Color. Water contaminants shall not cause or contribute to turbidity or color that will cause substantial visible contrast with the natural appearance of the stream or lake or interfere with beneficial uses.

(H) Solids. Water contaminants shall not cause or contribute to solids in excess of a level that will interfere with beneficial uses. The stream or lake bottom shall be free of materials which will adversely alter the composition of the benthos, interfere with the spawning of fish or development of their eggs or adversely change the physical or chemical nature of the bottom.

(I) Radioactive Materials. All streams and lakes shall conform with state and federal limits for radionuclides established for drinking water supply.

(J) Dissolved Oxygen. Water contaminants shall not cause the dissolved oxygen to be lower than the levels described in Table A or as indicated in paragraph (4)(A)3.

(K) Total Dissolved Gases. Operation of impoundments shall not cause the total dissolved gas concentrations to exceed one hundred ten percent (110%) of the saturation value for gases at the existing atmospheric and hydrostatic pressures.

(L) Sulfate and Chloride Limit for Protection of Aquatic Life.

1. Streams with seven (7)-day Q_{10} low flow of less than one (1) cubic foot per second. The concentration of chloride plus sulfate shall not exceed one thousand milligrams per liter (1000 mg/l) at the seven (7)-day Q_{10} low flow. Table A includes additional chloride criteria.

2. Class P1, L1, L2 and L3 waters and streams with seven (7)-day Q_{10} low flow of more than one (1) cubic foot per second. The total chloride plus sulfate concentration shall not exceed the estimated natural background concentration by more than twenty percent (20%) at the sixty (60)-day Q_2 low flow.

3. If higher concentrations can be demonstrated through bioassays or studies not to be detrimental to indigenous aquatic life, then an appropriate higher concentration shall be allowed.

(M) Carcinogenic Substances. Carcinogenic substances shall not exceed concentrations in water which correspond to the 10^{-6} cancer risk rate. This risk rate equates to one (1) additional cancer case in a population of one (1) million with lifetime exposure. Derivation of this concentration assumes average water and fish consumption amounts. Assumptions are two (2) liters of water and 6.5 grams of fish consumed per day. Federally established final maximum contaminant levels for drinking water supply shall supersede drinking water supply criteria developed in this manner.

(N) All methods of sample collection, preservation and analysis used in applying criteria in these standards shall be in accord with those prescribed in the latest edition of *Standard Methods for the Examination of Water and Wastewater* or other procedures approved by the Environmental Protection Agency and the Missouri Department of Natural Resources.

(O) Criteria to protect designated uses are based on current technical literature, especially the Environmental Protection Agency's publication, *Quality Criteria for Water*, 1986. Criteria may be modified or expanded as additional information is developed or as needed to define narrative criteria for particular situations or locations.

(P) WET Chronic Tests Chronic WET tests performed at the percent effluent at the edge of the mixing zone shall not be toxic to the most sensitive of at least two (2) representative, diverse species. Pollutant attenuation processes such as volatilization and biodegradation which may occur within the allowable mixing zone will be considered in interpreting results.

(Q) Biocriteria. The biological integrity of waters, as measured by lists or numeric diversity indices of benthic invertebrates, fish, algae or other appropriate biological indicators, shall not be significantly different from reference waters. Waters shall be compared with reference waters of similar size within an ecoregion. Reference water locations are listed in Table I.

(5) Groundwater.

(A) Water contaminants shall not cause or contribute to exceedence of Table A. Column VII limits in aquifers and caves. Substances not listed in Table A shall be limited so that drinking water, livestock watering and irrigation uses are protected.

(B) When criteria in Column I or II of Table A are more stringent than Column VII criteria, appropriate Column I or II criteria shall apply to waters in caves and to aquifers which contribute an important part of base flow of surface waters designated for aquatic life protection. Other substances not listed in Table A shall be limited in these aquifers and caves so that the aquatic life use is protected.

(C) Column VII and other criteria shall apply in any part of the aquifer, including the point at which the pollutant enters the aquifer. A specific monitoring depth requirement for releases to aquifers is included in 10 CSR 20-7.015(7)(A).

(D) For aquifers in which contaminant concentrations exceed Column VII criteria or other protection criteria, and existing and potential uses are not impaired, alternative site-specific criteria may be allowed. To allow alternative criteria, the management authority must demonstrate that alternative criteria will not impair existing and potential uses. The demonstration must consider the factors and be subject to the review requirements of 10 CSR 20-7.015(7)(F).

(6) Metropolitan No-Discharge Streams. No water contaminant except uncontaminated cooling water, permitted stormwater discharges in compliance with permit conditions and excess wet-weather bypass discharges not interfering with beneficial uses, shall be discharged to streams listed in Table F. Existing interim discharges may be allowed

until interceptors are available within two thousand feet (2000') or a distance deemed feasible by the department, or unless construction of outfalls to alternative receiving waters not listed in Table F is deemed feasible by the department. Existing discharges include wastewater volumes up to the design capacity of existing permitted treatment facilities, including phased increases in design capacity approved by the department prior to the effective date of this rule. Additional facilities may be constructed to discharge to these waters only if they are intended to be interim facilities in accordance with a regional wastewater treatment plan approved by the department.

(7) Outstanding National Resource Waters. Under section (2), antidegradation section of this rule, new releases to outstanding national resource waters from any source other than publicly-owned waste treatment facilities and mine dewatering water are prohibited and releases from allowed facilities are subject to special effluent limitations as required in 10 CSR 20-7.015(6)(B)3. Table D contains a list of outstanding national resource waters.

(8) Outstanding State Resource Waters.

(A) The commission wishes to recognize certain high-quality waters that may require exceptionally stringent water-quality management requirements to assure conformance with the antidegradation policy. The degree of management requirements will be decided on an individual basis. To qualify for inclusion, all of the following criteria must be met. The waters listed in Table E must—

1. Have a high level of aesthetic or scientific value;
2. Have an undeveloped watershed; and
3. Be located on or pass through state or federally owned lands.

(9) Lake Taneycomo. The commission wishes to recognize the uniqueness of Lake Taneycomo with respect to its high water clarity, its importance as a trout fishery and as the central natural resource in the rapidly developing Branson area and threats to the lake's water quality imposed by development. An especially stringent antidegradation policy will be observed in the development of effluent rules, discharge permits and nonpoint-source management plans and permits to assure that the high visual quality and aquatic resources are maintained. The use of the best treatment technology for point- and nonpoint-source discharges in the lake's watershed between Table Rock Lake and Power Site Dam will be the guiding principle in establishing limitations.

(10) Compliance with new or revised National Pollutant Discharge Elimination System (NPDES) or Missouri operating permit limitations based on criteria in this rule shall be achieved with all deliberate speed and no later than three (3) years from the date of issuance of the permit.

(11) Severance. If a section, subsection, paragraph, sentence, clause, phrase or any part of this rule be declared unconstitutional or invalid for any reason, the remainder of this rule shall not be affected and shall remain in full force and effect.

(12) Effective Date. This rule becomes effective immediately upon adoption and compliance with the requirements of subsection 644.036.3. of the Missouri Clean Water Law and Chapter 536, RSMo.

Auth: sections 644.021, RSMo (1986) and 644.026, RSMo (Supp. 1987). Original rule filed May 13, 1977, effective Dec. 11, 1977. Amended: Filed Oct. 15, 1980, effective April 11, 1981. Amended: Filed July 12, 1984, effective Dec. 13, 1984. Rescinded and readopted: Filed Aug. 4, 1987, effective Dec. 12, 1987. Amended: Filed Nov. 14, 1988, effective April 15, 1989. Rescinded and readopted: Filed Sept. 5, 1990, effective March 14, 1991. Amended: Filed Sept. 2, 1993, effective May 9, 1994.

**Original authority: 644.021, RSMo (1972), amended 1973 and 644.026, RSMo (1972), amended 1973, 1987.*

TABLE H—STREAM CLASSIFICATIONS AND USE DESIGNATIONS

WATERBODY	CLASS	MILES	FROM	TO	COUNTY	COUNTY 2	IRR	LWW	AQL	CLF	CDF	WBC	BTG	DWS	IND
Missouri R.	P	129.0	Gasconade R.	Chariton R.	Gasconade	Chariton	x	x	x				x	x	x
Missouri R	P	125.0	Chariton R.	Kansas R.	Chariton	Jackson	x	x	x				x	x	x
Missouri R	P	179.0	Kansas R.	State Line	Jackson	Atchison	x	x	x				x	x	x
Trib. to Missouri R.	P1	2.5	Mouth	21.44N.1E	St. Charles			x	x						
Trib. to Missouri R.	C	6.0	Mouth	23.51N.23W	Saline			x	x						
Trib. to Missouri R	P	1.5	Mouth	26.47N.14W	Moniteau			x	x						
Trib. to Missouri R	C	0.5	26.47N.14W	26.47N.14W	Moniteau			x	x						
Trib. to Missouri R.	C	2.6	Mouth	07.44N.01W	Franklin			x	x						
Mistaken Cr	P	6.0	Mouth	20.42N.7W	Osage			x	x						
Mistaken Cr	C	1.5	20.42N.7W	30.42N.7W	Osage			x	x						
Moccasin Cr	C	2.0	Mouth	26.63N.33W	Gentry			x	x						
Monegaw Cr	P	2.0	Mouth	21.38N.27W	St. Clair			x	x			x	x		
Monegaw Cr	C	10.0	21.38N.27W	9.39N.28W	St. Clair			x	x				x		
Moniteau Cr	P	20.5	Mouth	Hwy. 124	Howard			x	x				x		
Moniteau Cr.	C	13.5	Hwy 124	16.52N.14W	Howard	Randolph		x	x						
Moniteau Cr.	P	17.0	Mouth	16.46N.15W	Cole	Moniteau		x	x				x		
Moniteau Cr.	C	15.5	16.46N.15W	21.46N.15W	Moniteau	Cooper		x	x				x		
Montgomery Br	C	6.5	15.38N.23W	6.37N.22W	Hickory			x	x						
Mooney Br.	C	2.0	Mouth	3.33N.10W	Texas			x	x						
Moore Br.	C	3.8	Mouth	27.35N.31W	Vernon			x	x						
Moores Br.	P	2.5	Mouth	34.35N.33W	Vernon			x	x						
Moores Br.	C	2.5	34.35N.33W	33.35N.33W	Vernon			x	x						
Moreau R.	P	33.0	Mouth	1.43N.13W	Cole			x	x			x	x		
Trib. to Moreau R.	C	0.5	Mouth	6.43N.12W	Cole			x	x						
Morgan Cr.	C	1.5	Mouth	17.43N.14W	Cole			x	x						
Mormon Fk	C	13.5	Mouth	19.42N.32W	Bates			x	x						
Morris Br.	C	1.0	Mouth	12.49N.7W	Callaway			x	x						
Morris Hollow	C	1.5	Mouth	17.22N.16W	Ozark			x	x						
Moss Cr	P	23.0	Mouth	7.50N.25W	Carroll			x	x						
Trib. to Moss Cr	P	0.5	Mouth	12.52N.24W	Carroll			x	x						
Moss Hollow	C	1.0	Mouth	26.42N.5E	Jefferson			x	x						
Mossy Cr	C	0.2	Mouth	07.40N.21W	Benton			x	x						
Mound Br.	C	10.0	Mouth	13.40N.31W	Bates			x	x						
Mound Cr	C	4.0	Mouth	Hwy. 65	Livingston			x	x						
Mountain Cr	P	6.0	Mouth	23.35N.17W	Laclede			x	x						
Mouse Cr	C	1.0	15.47N.32W	22.47N.32W	Jackson			x	x						
Mozingo Cr	C	8.5	Mouth	36.65N.35W	Nodaway			x	x						
Mud Cr	C	9.0	Mouth	20.55N.13W	Monroe	Randolph		x	x						
Mud Cr.	P	4.5	36.56N.26W	23.55N.26W	Caldwell			x	x						
Trib. to Mud Cr.	C	0.5	Mouth	12.55N.26W	Caldwell			x	x						
Trib. to Mud Cr	C	1.0	Mouth	12.55N.26W	Caldwell			x	x						
Trib. to Mud Cr	C	2.0	Mouth	24.55N.26W	Caldwell			x	x						
Mud Cr	C	1.0	Mouth	08.34N.04E	St.Francois			x	x						
Mud Cr	C	7.5	23.55N.26W	18.54N.26W	Caldwell	Ray		x	x						
Mud Cr	C	1.5	Mouth	5.45N.13W	Cole			x	x						
Mud Cr	C	2.0	Mouth	36.52N.18W	Howard			x	x						
Mud Cr	C	3.0	Mouth	22.26N.7E	Butler			x	x						
Mud Cr Ditch	P	3.5	28.56N.25W	36.56N.26W	Livingston	Caldwell		x	x						
Old Chan. Mud Cr	P	3.0	Mouth	29.56N.25W	Livingston			x	x						

IRR LWW AQL CLF CDF WBC BTG DWS IND

IRR—Irrigation
LWW—Livestock & Wildlife Watering
AQL—Protection of Warm Water Aquatic Life and Human Health—Fish Consumption

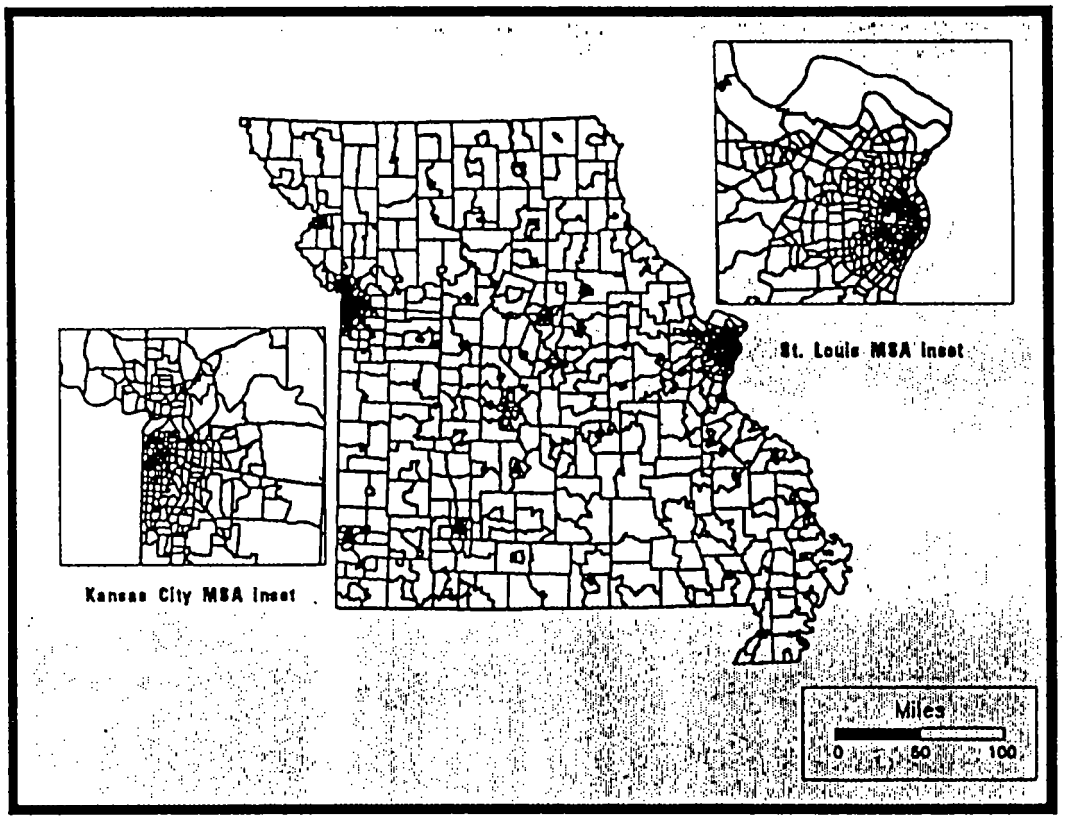
CLF—Cool Water Fishery
CDF—Cold Water Fishery
WBC—Whole Body Contact Recreation

BTG—Boating and Canoeing
DWS—Drinking Water Supply
IND—Industrial

Eisenberg Fill Site
(alias: Leo Eisenberg's Propety)
MOD985768175
PA/SI Reference 34

MO
HI.Li/Ce
3:T 67

1990 Missouri Census Tract Outline Maps



Missouri State Library
DEC 29 1992 455
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Missouri State Census Data Center

Missouri State Library (MOSL), Jefferson City
Missouri Office of Administration (OA), Jefferson City
Urban Information Center (UIC), UM-St. Louis
Office of Social and Economic Data Analysis (OSEDA), UM Extension-Columbia
Geographic Resources Center (GRC), UM-Columbia
MO Small Business Development Centers (SBDC), UM-Columbia

October, 1992

PREFACE

he Missouri State Census Data Center (MSCDC) is a cooperative program among state agencies and the U.S. Bureau of the Census. The program is designe nhance the awareness, access and use of public data and information. The Missouri State Library and the Missouri Office of Administration, Division of Bud nd Planning are the lead agencies of the MSCDC. Four units of the University serve as "core-agencies" and provide information systems development and suppo ervices for the program. These core units include the Office of Social and Economic Data Analysis (OSEDA) at Columbia, the Urban Information Center (UIC UM-St. Louis, the Geographic Resources Center (GRC) at Columbia, and the Missouri Small Business Development Centers.

ition to the lead and core agencies, there are over three dozen affiliates around the state who participate in the dissemination of census information and elated materials.

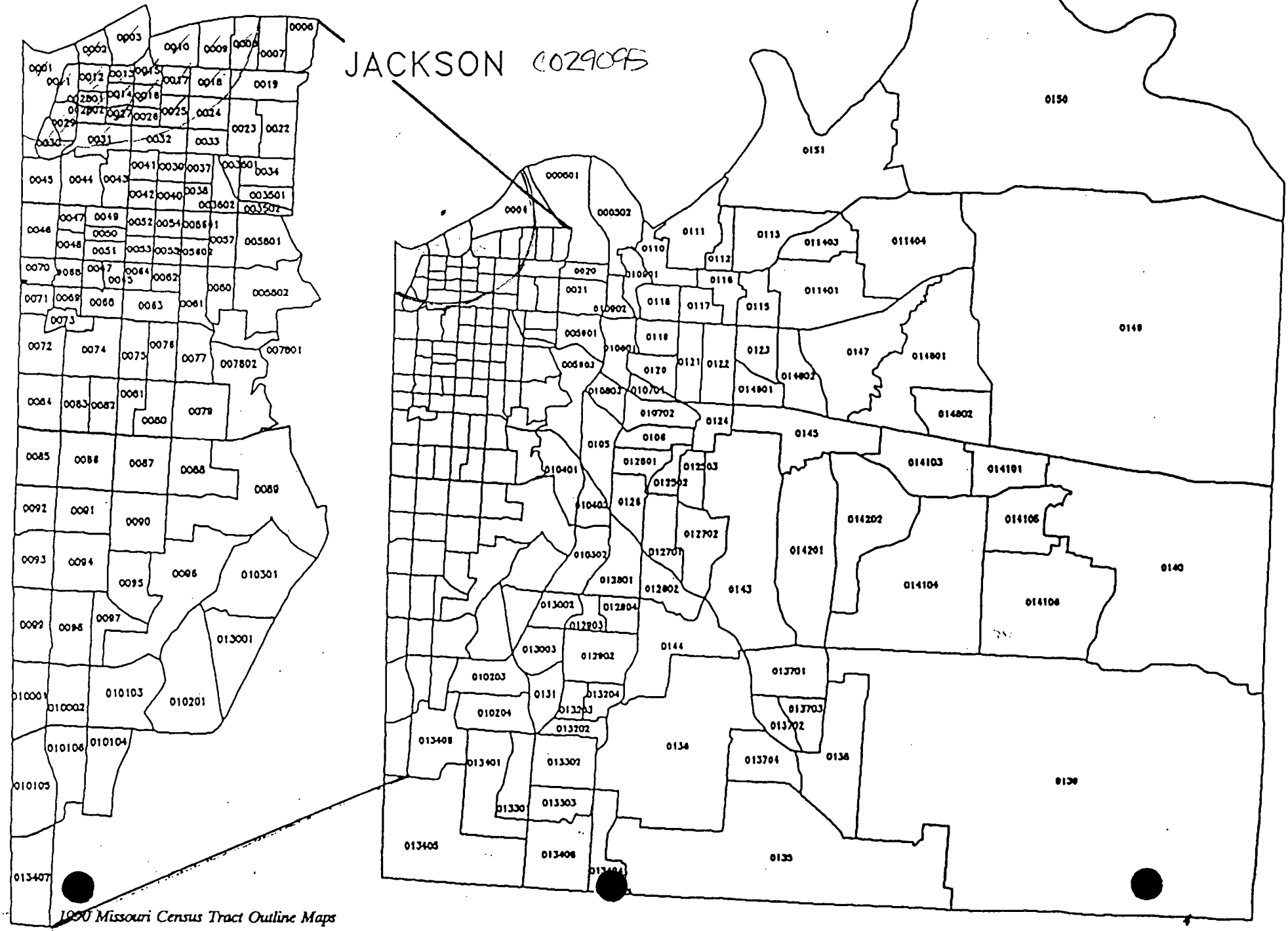
he MSCDC group uses the capabilities of the University of Missouri Computing Network to support over 2,000 public machine-readable data files that are urrently available through the program.

or further information about the MSCDC, contact one of the following units:

Kate Graf, Missouri State Library (Jefferson City)	314/751-1823
Ryan Burson, Missouri Office of Administration, Dept. of Budget and Planning (Jefferson City)	314/751-9325
Evelyn J. Cleveland, Office of Social and Economic Data Analysis (Columbia)	314/882-7396
Linda McDaniel, Urban Information Center (St. Louis)	314/553-6035
Tim Haithcoat, Geographic Resources Center (Columbia)	314/882-1404
Terry Maynard, Missouri Small Business Development Centers (Columbia)	314/882-5138

2-4 mile portion of site in Jackson County = 0001 + 0002 + 0003 + 0010 + 0009 + 0008 + 0011 + 0012 + 0013 + 0015 + 0017 + 0018 + 002801 + 0014 + 0016 + 0029 + 0030 + 0031 + 002802 + 0027 + 0026 + 0025

JACKSON 029095



1990 Missouri Census Tract Outline Maps

MISSOURI STATE CENSUS DATA CENTER (MSCDC)
1990 SUMMARY TAPE FILE 3 EXTRACT REPORTS - BASIC TABLES
Table 1. General Population

	TRACT No.	*Total Persons*	*Percent Sampled*	*Persons per Square Mile*	*Land Area*	**Distance from site (MILES)**
Clay Co.						
29047	0200.00	183	9.7	35.7	5.13	**1-2**
29047	0201.00	4105	11.5	3957.5	1.04	**1/4 - 1***
29047	0202.01	4,193	10.90	2,494.1	1.68	**1-3**
29047	0202.02	3,255	16.10	1,262.3	2.58	**2-4**
29047	0203.00	5,859	11.40	2,723.4	2.15	**3-4**
29047	0204.00	2,525	14.10	2,343.6	1.08	**2-3**
29047	0205.00	6,171	18.30	3,128.9	1.97	**1-3**
29047	0206.02	4,202	15.40	1,837.1	2.29	**2-4**
29047	0206.04	4,550	16.00	2,520.6	1.81	**3-4**
29047	0209.01	5,143	11.80	2,447.7	2.10	**2-4**
Jackson Co.						
29095	0001.00	0	0.00	0.0	1.02	**3-4**
29095	0002.00	84	15.70	324.8	0.26	**2-3**
29095	0003.00	2,093	11.10	3,746.9	0.56	**2-3**
29095	0008.00	3,797	14.20	7,957.9	0.48	**2-3**
29095	0009.00	3,058	10.70	5,474.5	0.56	**3-4**
29095	0010.00	3,062	11.90	5,130.6	0.60	**3-4**
29095	0011.00	1,575	11.20	7,022.3	0.22	**3-4**
29095	0012.00	620	12.00	2,365.4	0.26	**3-4**
29095	0013.00	925	13.20	6,389.8	0.14	**3-4**
29095	0014.00	881	11.70	4,686.2	0.19	**3-4**
29095	0015.00	1,005	13.20	4,390.2	0.23	**3-4**
29095	0016.00	1,486	11.30	7,547.8	0.20	**3-4**
29095	0017.00	1,138	9.80	4,439.6	0.26	**3-4**
29095	0018.00	3,435	12.10	9,042.9	0.38	**3-4**
29095	0025.00	1,584	11.60	5,779.2	0.27	**3-4**
29095	0026.00	29	10.70	179.3	0.16	**3-4**
29095	0027.00	166	16.50	1,097.0	0.15	**3-4**
29095	0028.01	0	0.00	0.0	0.14	**3-4**
29095	0028.02	0	0.00	0.0	0.15	**3-4**
29095	0029.00	990	14.00	3,637.6	0.27	**3-4**
29095	0030.00	2,094	13.10	7,793.7	0.27	**3-4**
29095	0031.00	203	12.20	368.8	0.55	**3-4**
Platte Co.						
29165	0300.02	3,048	18.20	1,368.2	2.23	**2-4**
		71,459	**Population, 4-mile radius of site**			

***1/3 (1/4 - 1/2 mile), 2/3 (1/2 - 1 mile); Other data split equally between rin**

SOURCE:

U.S. Dept. of Commerce, Bureau of the Census, '1990 Census of Population and Housing' Calulations-Urban Information Center, UMSL

NOTE: For additional information contact: OSEDA, 224 Lewis Hall
University of Missouri-Extension, Columbia, MO 65211

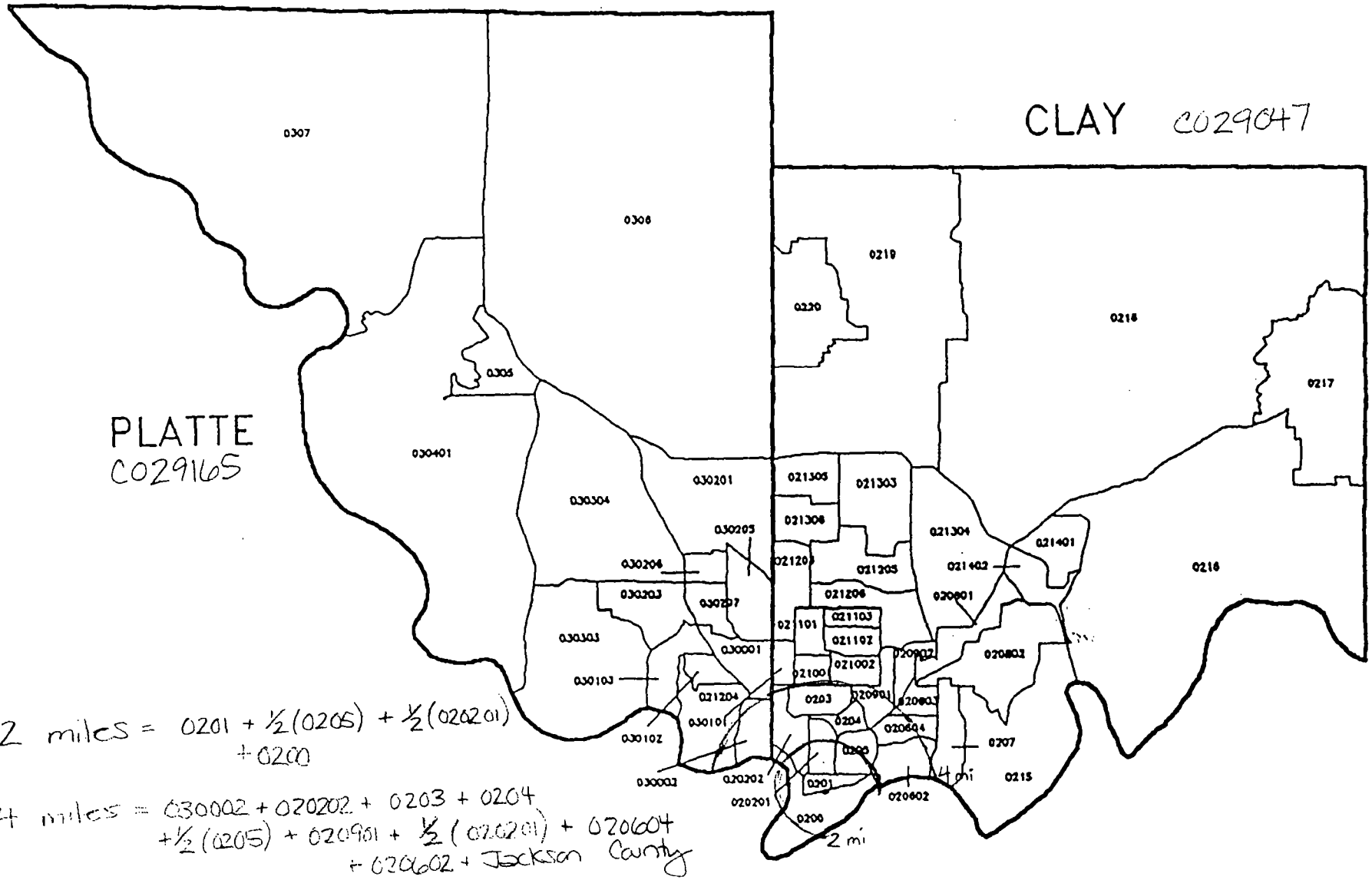
Introduction

Census tracts are small, relatively permanent statistical subdivisions of a county. They are identified by a four-digit basic number and may have a two-digit suffix (ex. 6059.02). The decimal point separating the four-digit tract number from the two-digit suffix is shown in printed reports, microfiche, census maps and in machine readable files.

Tract numbers may range from 0001 through 9499.99 and are unique within a county. Numbers ranging from 9501 through 9989.99 denote a block numbering area (BNA). The suffix .99 identified a census tract that was populated entirely by persons aboard one or more civilian or military ships. Suffixes ranging from .80 through .98 identify census tracts that either were revised or were created during the 1990 census data collection activities. Some of these revisions may have resulted in census tracts that have extremely small land area and may have little or no population or housing.

For your convenience, this report presents all census tracts outlines by county or group of counties in Missouri. The Missouri State Census Data Center has the facilities to produce more detailed maps which display major roads, waterways, etc. It is available upon request. Price is dependent upon the number of areas of interest. Contact a representative of the MSCDC, for additional information.

Please refer to the next page for location of the county or counties of interest.



0-2 miles = 0201 + ½(0205) + ½(020201) + 0200

2-4 miles = 030002 + 020202 + 0203 + 0204 + ½(0205) + 020901 + ½(020201) + 020604 + 020602 + Jackson County

Eisenberg Fill Site
(alias: Leo Eisenberg's Property)
MOD985768175
PA/SI Reference 35

1990 CPH-1-18

1990 Census of Population and Housing

Summary Population and Housing Characteristics

Kansas

Issued August 1991

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Rockwell A. Schnabel, Deputy Secretary

Economics and Statistics Administration
Michael R. Darby, Under Secretary
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BUREAU OF THE CENSUS
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CONTENTS

	Page
List of Statistical Tables	iv
How to Use This Census Report	I-1
Table Finding Guide	II-1
User Notes	III-1
Statistical Tables (For detailed list of statistical tables, see page iv.)	1

APPENDIXES

A. Area Classifications	A-1
B. Definitions of Subject Characteristics	B-1
C. Accuracy of the Data	C-1
D. Collection and Processing Procedures	D-1
E. Facsimiles of Respondent Instructions and Questionnaire Pages	E-1
F. Data Products and User Assistance	F-1
G. Maps	G-1

Table 16. Land Area and Population Density: 1990—Con.

[For definitions of terms and meanings of symbols, see text]

State County Place and [In Selected States] County Subdivision	All persons	Land area: Square kilometers	Land area: Square miles	Persons per— Square kilometer	Persons per— Square mile
PLACE AND COUNTY SUBDIVISION—Con.					
Harveyville city, Wabaunsee County	267	.4	.1	667.5	2 670.0
Havana city, Montgomery County	121	.3	.1	403.3	1 210.0
Haven city, Reno County	1 198	1.2	.5	998.3	2 396.0
Havensville city, Pottawatomie County	135	.3	.1	450.0	1 350.0
Haviland city, Kiowa County	624	1.2	.5	520.0	1 248.0
Hays city, Ellis County	17 767	15.6	6.0	1 138.9	2 961.2
Haysville city, Sedgwick County	8 364	8.4	3.3	995.7	2 534.5
Hazelton city, Barber County	128	1.5	.6	85.3	213.3
Hepler city, Crawford County	150	2.0	.8	75.0	187.5
Herington city	2 685	5.6	2.1	479.5	1 278.6
Dickinson County	2 685	5.4	2.1	497.2	1 278.6
Morris County	–	.2	.1	–	–
Herndon city, Rawlins County	170	.7	.3	242.9	566.7
Hesston city, Harvey County	3 012	6.1	2.4	493.8	1 255.0
Hiawatha city, Brown County	3 603	5.1	2.0	706.5	1 801.5
Highland city, Doniphan County	942	1.4	.5	672.9	1 884.0
Hill City city, Graham County	1 835	2.4	.9	764.6	2 038.9
Hillsboro city, Marion County	2 704	4.4	1.7	614.5	1 590.6
Hoisington city, Barton County	3 182	2.9	1.1	1 097.2	2 892.7
Holcomb city, Finney County	1 400	2.5	.9	560.0	1 555.6
Hollenberg city, Washington County	28	.2	.1	140.0	280.0
Holton city, Jackson County	3 196	6.0	2.3	532.7	1 389.6
Holyrood city, Ellsworth County	492	1.0	.4	492.0	1 230.0
Hope city, Dickinson County	404	1.2	.5	336.7	808.0
Horace city, Greeley County	168	.6	.2	280.0	840.0
Horton city, Brown County	1 885	4.2	1.6	448.8	1 178.1
Howard city, Elk County	815	1.8	.7	452.8	1 164.3
Hoxie city, Sheridan County	1 342	2.1	.8	639.0	1 677.5
Hoyt city, Jackson County	489	1.1	.4	444.5	1 222.5
Hudson city, Stafford County	159	.3	.1	530.0	1 590.0
Hugoton city, Stevens County	3 179	3.6	1.4	883.1	2 270.7
Humboldt city, Allen County	2 178	3.7	1.4	588.6	1 555.7
Hunnewell city, Sumner County	87	1.2	.5	72.5	174.0
Hunter city, Mitchell County	116	.5	.2	232.0	580.0
Huron city, Atchison County	75	2.2	.8	34.1	93.8
Hutchinson city, Reno County	39 308	53.6	20.7	733.4	1 898.9
Independence city, Montgomery County	9 942	11.7	4.5	849.7	2 209.3
Ingalls city, Gray County	301	.7	.3	430.0	1 003.3
Inman city, McPherson County	1 035	1.2	.5	862.5	2 070.0
Iola city, Allen County	6 351	9.2	3.5	690.3	1 814.6
Isabel city, Barber County	104	.7	.3	148.6	346.7
Iuka city, Pratt County	197	1.6	.6	123.1	328.3
Jamestown city, Cloud County	325	.7	.3	464.3	1 083.3
Jennings city, Decatur County	188	.7	.3	268.6	626.7
Jetmore city, Hodgeman County	850	2.6	1.0	326.9	850.0
Jewell city, Jewell County	529	1.1	.4	480.9	1 322.5
Johnson City city, Stanton County	1 348	2.9	1.1	464.8	1 225.5
Junction City city, Geary County	20 604	17.5	6.8	1 177.4	3 030.0
Kanopolis city, Ellsworth County	605	3.1	1.2	195.2	504.2
Kanorado city, Sherman County	276	.7	.3	394.3	920.0
Kansas City city, Wyandotte County	149 767	279.2	107.8	536.4	1 389.3
Kechi city, Sedgwick County	517	2.2	.8	235.0	646.3
Kensington city, Smith County	553	.8	.3	691.3	1 843.3
Kincaid city, Anderson County	170	1.3	.5	130.8	340.0
Kingman city, Kingman County	3 196	8.0	3.1	399.5	1 031.0
Kinsley city, Edwards County	1 875	3.4	1.3	551.5	1 442.3
Kiowa city, Barber County	1 160	2.7	1.1	429.6	1 054.5
Kirwin city, Phillips County	269	2.5	.9	107.6	298.9
Kismet city, Seward County	421	.5	.2	842.0	2 105.0
Labette city, Labette County	74	.5	.2	148.0	370.0
La Crosse city, Rush County	1 427	2.6	1.0	548.8	1 427.0
La Cygne city, Linn County	1 066	3.2	1.2	333.1	888.3
La Harpe city, Allen County	650	2.2	.9	295.5	722.2
Lake Quivira city	983	3.3	1.3	297.9	756.2
Johnson County	943	2.5	1.0	377.2	943.0
Wyandotte County	40	.8	.3	50.0	133.3
Lakin city, Kearny County	2 060	2.3	.9	895.7	2 288.9
Lancaster city, Atchison County	299	.6	.2	498.3	1 495.0
Lane city, Franklin County	247	.6	.2	411.7	1 235.0
Langdon city, Reno County	62	.3	.1	206.7	620.0
Lansing city, Leavenworth County	7 120	22.1	8.5	322.2	837.6
Larned city, Pawnee County	4 490	6.0	2.3	748.3	1 952.2
Latham city, Butler County	160	.6	.2	266.7	800.0
Latimer city, Morris County	20	.2	.1	100.0	200.0
Lawrence city, Douglas County	65 608	59.4	22.9	1 104.5	2 865.0
Leavenworth city, Leavenworth County	38 495	58.8	22.7	654.7	1 695.8
Leawood city, Johnson County	19 693	38.8	15.0	507.6	1 312.9
Lebanon city, Smith County	364	.8	.3	455.0	1 213.3
Lebo city, Coffey County	835	2.0	.8	417.5	1 043.8
Lecompton city, Douglas County	619	2.3	.9	269.1	687.8
Lehigh city, Marion County	180	.8	.3	225.0	600.0
Lenexa city, Johnson County	34 034	75.2	29.0	452.6	1 173.6
Lenora city, Norton County	329	1.3	.5	253.1	658.0
Leon city, Butler County	707	1.3	.5	543.8	1 414.0
Leona city, Doniphan County	39	.2	.1	195.0	390.0
Leonardville city, Riley County	374	.7	.3	534.3	1 246.7
Leoti city, Wichita County	1 738	3.4	1.3	511.2	1 336.9
PLACE AND COUNTY SUBDIVISION—Con.					
Le Roy city, Coffey County	568	2.2	.8	258.2	710.0
Lewis city, Edwards County	451	.8	.3	563.8	1 503.3
Liberal city, Seward County	16 573	24.6	9.5	673.7	1 744.5
Liberty city, Montgomery County	140	.7	.3	200.0	466.7
Liebenthal city, Rush County	112	.3	.1	373.3	1 120.0
Lincoln Center city, Lincoln County	1 381	2.7	1.0	511.5	1 381.0
Lincolnville city, Marion County	197	.6	.2	328.3	985.0
Lindsborg city, McPherson County	3 076	3.6	1.4	854.4	2 197.1
Linn city, Washington County	472	.9	.3	524.4	1 573.3
Linwood city, Leavenworth County	409	1.1	.4	371.8	1 022.5
Little River city, Rice County	496	.8	.3	620.0	1 653.3
Logan city, Phillips County	633	3.9	1.5	162.3	422.0
Lone Elm city, Anderson County	32	.2	.1	160.0	320.0
Longford city, Clay County	68	.4	.2	170.0	340.0
Long Island city, Phillips County	170	1.1	.4	154.5	425.0
Longton city, Elk County	389	3.1	1.2	125.5	324.2
Lorraine city, Ellsworth County	147	.6	.2	245.0	735.0
Lost Springs city, Marion County	106	.6	.2	176.7	530.0
Louisburg city, Miami County	1 964	4.6	1.8	427.0	1 091.1
Louisville city, Pottawatomie County	215	1.3	.5	165.4	430.0
Lucas city, Russell County	452	1.4	.5	322.9	904.0
Luray city, Russell County	261	.8	.3	326.3	870.0
Lyndon city, Osage County	964	1.9	.7	507.4	1 377.1
Lyons city, Rice County	3 688	5.3	2.1	695.8	1 756.2
McCracken city, Rush County	231	2.5	1.0	92.4	231.0
McCune city, Crawford County	462	.8	.3	577.5	1 540.0
McDonald city, Rawlins County	184	.5	.2	368.0	920.0
McFarland city, Wabaunsee County	224	.5	.2	448.0	1 120.0
Macksville city, Stafford County	488	2.6	1.0	187.7	488.0
McLouth city, Jefferson County	719	1.3	.5	553.1	1 438.0
McPherson city, McPherson County	12 422	13.3	5.1	934.0	2 435.7
Madison city, Greenwood County	845	1.6	.6	528.1	1 408.3
Mahaska city, Washington County	98	.6	.2	163.3	490.0
Maize city, Sedgwick County	1 520	2.0	.8	760.0	1 900.0
Manchester city, Dickinson County	80	.7	.3	114.3	266.7
Manhattan city	37 712	28.6	11.0	1 318.6	[illegible]
Pottawatomie County	143	2.2	.9	65.0	[illegible]
Riley County	37 569	26.4	10.2	1 423.1	3 683.2
Mankato city, Jewell County	1 037	2.6	1.0	398.8	1 037.0
Manter city, Stanton County	186	.6	.2	310.0	930.0
Maple Hill city, Wabaunsee County	406	.5	.2	812.0	2 030.0
Mapleton city, Bourbon County	96	1.3	.5	73.8	192.0
Marion city, Marion County	1 906	4.5	1.7	423.6	1 121.2
Marquette city, McPherson County	593	.9	.4	658.9	1 482.5
Marysville city, Marshall County	3 359	4.9	1.9	685.5	1 767.9
Matfield Green city, Chase County	33	.5	.2	66.0	165.0
Mayetta city, Jackson County	267	.4	.1	667.5	2 670.0
Mayfield city, Sumner County	110	.3	.1	366.7	1 100.0
Meade city, Meade County	1 526	2.4	.9	635.8	1 695.6
Medicine Lodge city, Barber County	2 453	3.3	1.3	743.3	1 886.9
Melvern city, Osage County	423	.9	.3	470.0	1 410.0
Menlo city, Thomas County	50	.3	.1	166.7	500.0
Meriden city, Jefferson County	622	.9	.4	691.1	1 555.0
Merriam city, Johnson County	11 821	11.1	4.3	1 065.0	2 749.1
Milan city, Sumner County	109	.3	.1	363.3	1 090.0
Mildred city, Allen County	46	.6	.2	76.7	230.0
Milford city, Geary County	384	.4	.2	960.0	1 920.0
Miltonvale city, Cloud County	484	1.9	.7	254.7	691.4
Minneapolis city, Ottawa County	1 983	3.7	1.4	535.9	1 416.4
Minneola city, Clark County	705	1.2	.4	587.5	1 762.5
Mission city, Johnson County	9 504	6.6	2.6	1 440.0	3 655.4
Mission Hills city, Johnson County	3 446	5.2	2.0	662.7	1 723.0
Mission Woods city, Johnson County	182	.3	.1	606.7	1 820.0
Moline city, Elk County	473	.9	.3	525.6	1 576.7
Montezuma city, Gray County	838	1.7	.7	492.9	1 197.1
Moran city, Allen County	551	1.1	.4	500.9	1 377.5
Morganville city, Clay County	181	.9	.3	201.1	603.3
Morland city, Graham County	234	1.2	.5	195.0	468.0
Morrill city, Brown County	299	.5	.2	598.0	1 495.0
Morrowville city, Washington County	173	.4	.1	432.5	1 720.0
Moscow city, Stevens County	252	.5	.2	504.0	1 260.0
Mound City city, Linn County	789	3.0	1.2	263.0	657.5
Moundridge city, McPherson County	1 531	2.0	.8	765.5	1 913.8
Mound Valley city, Labette County	405	1.7	.7	238.2	578.6
Mount Hope city, Sedgwick County	805	.8	.3	1 006.3	2 683.3
Mulberry city, Crawford County	555	1.3	.5	426.9	1 110.0
Mullinville city, Kiowa County	289	1.6	.6	180.6	481.7
Mulvane city	4 674	4.6	1.8	1 016.1	2 596.7
Sedgwick County	3 466	3.3	1.3	1 050.3	2 666.2
Sumner County	1 208	1.4	.5	862.9	2 416.0
Munden city, Republic County	143	.5	.2	286.0	[illegible]
Muscotah city, Atchison County	194	.9	.3	215.6	[illegible]
Narka city, Republic County	113	.5	.2	226.0	[illegible]
Nashville city, Kingman County	118	.6	.2	196.7	590.0
Natoma city, Osborne County	392	1.1	.4	356.4	980.0
Neodesha city, Wilson County	2 837	2.9	1.1	978.3	2 579.1
Neosho Falls city, Woodson County	157	1.4	.5	112.1	314.0
Neosho Rapids city, Lyon County	235	1.3	.5	180.8	470.0
Ness City city, Ness County	1 724	2.6	1.0	663.1	1 724.0
Netawaka city, Jackson County	167	2.5	1.0	66.8	167.0
New Albany city, Wilson County	60	.6	.2	100.0	300.0

Eisenberg Fill Site
(alias: Leo Eisenberg's Propety)
MOD985768175
PA/SI Reference 37

MISSOURI DEPARTMENT OF

2901 West Truman Boulevard
P.O Box 180
Jefferson City Missouri 65102-0180

Telephone: 314/751-4115
Missouri Relay Center: 1-800-735-2966 (TDD)

JERRY J. PRESLEY, Director

RECEIVED
'95 JUN 30 AM 11 05
HAZARDOUS WASTE PROGRAM
MISSOURI DEPARTMENT OF
NATURAL RESOURCES

June 26, 1995

Ms. Julie A. Bloss
Department of Natural Resources
PO Box 176
Jefferson City, MO 65102-0176

Re: Hazardous Waste Site - Eisenberg Fill Site

Dear Ms. Bloss:

Thank you for your letter of June 2, 1995 regarding threatened and endangered species within the proposed project area.

Department staff examined map and computer files for federal and state rare, threatened and endangered species and determined that sensitive species or communities are known to occur on the immediate site or surrounding area. Please refer to the attached Heritage Database report for details.

This report reflects information we currently have in our database. We provide this information for planning purposes only; it should not be regarded as a definitive statement as to the presence or absence of rare/endangered species or high-quality natural communities. You may need to conduct additional on-site inspections to verify the presence or absence of such species or communities.

Please note that we do not keep records regarding presence/absence of wetland resources, except when these habitats are of sufficient quality to qualify as natural features in our inventory. The U.S. Army Corps of Engineers or U.S. Fish and Wildlife Service should be consulted with regard to presence/absence of wetlands.

Thank you for the opportunity to review and comment.

Sincerely,

DAN F. DICKNEITE
PLANNING DIVISION CHIEF

Enclosure

COMMISSION

JERRY P. COMBS ANDY DALTON ANITA B. GORMAN JOHN POWELL

Department of Natural Resources
Hazardous Waste Site
Eisenberg Fill Site
Kansas City, MO - Clay County

The following species and/or natural communities are known from the vicinity of the project site.

SCIENTIFIC NAME	COMMON NAME	FED STATUS	STATE STATUS	DATE	TOWN/RANGE	SEC	MANAGED AREA
ULMUS THOMASII	ROCK ELM		R	1987	050N032W	13	
DRYOPTERIS GOLDIANA	GOLDIE'S FERN		R	1987	050N032W	09	HIDDEN VALLEY DESIGNATED NATURAL AREA HIDDEN VALLEY CITY PARK
MESIC FOREST			-	1987	050N032W	09	HIDDEN VALLEY DESIGNATED NATURAL AREA HIDDEN VALLEY CITY PARK

The following Managed Areas are located in the vicinity of the project site.

MANAGED AREA	OWNER	TOWN/RANGE	SEC
HIDDEN VALLEY CITY PARK	KANSAS CITY	050N033W	09
HIDDEN VALLEY DESIGNATED NATURAL AREA	KANSAS CITY	050N032W	09 W2
KANSAS CITY RIVERFRONT PARK	KANSAS CITY	050N032W	15 AND SECS 16, 17, 18
		050N033W	22 AND SECS 27, 28

Additional information for planning purposes.

Overwintering bald eagles may occur in the project area, as they are common winter residents in big river habitats and major lakes where they feed on fish.

Pallid sturgeons are big river fish that may range widely in the Mississippi River and Missouri River system. Because the preferred habitat and range of the species are unknown, any project that modifies big river habitat or impacts water quality should consider the possible impact to pallid sturgeon populations.

FEDERAL STATUS - The federal status is derived from the provisions of the federal Endangered Species Act, which is administered by the U.S. Fish and Wildlife Service. The Endangered Species Act provides federal protection for plants and animals listed as Endangered or Threatened. E = Endangered T = Threatened A,B,C = Candidate for Federal listing.

MISSOURI STATUS - The state status is determined by the Department of Conservation under Constitutional authority. Rule 3CSR10-4.111 of the Wildlife Code of Missouri and certain state statutes apply to state listed species. E = Endangered R = Rare SU = Status Undetermined WL = Watch List EXT = Extirpated XTN = Extinct.
Great blue heron rookeries, natural communities and geologic features may also occur on this printout. The status given these elements is provided for informational purposes only. C = Common, - = No status. These elements are not necessarily afforded protection through endangered species law or statute.

Department of Natural Resources
Hazardous Waste Site
Eisenberg Fill Site
Kansas City, MO - Clay County

Additional information for planning purposes.

Indiana bats roost and raise young under the bark of trees in riparian forests and upland forests near perennial streams in north Missouri. Favored roosts are large diameter (>9" dbh; best are ≥21" dbh) dead oaks and hickories, and living shagbark hickory. Other tree species such as elm, cottonwood, ash, and maple, if they have exfoliating bark, also may be used as roosts. Indiana bats especially need snags standing in openings, at edges, or where tree canopy is sparse. Projects should avoid or minimize the removal of potential roost trees from riparian zones or from woodlots within 0.6 mile of perennial streams or permanent water. If removal of potential roost trees is unavoidable, it should be done when Indiana bats are not likely to be present, i.e., between 15 September and 1 April. During the course of development, if possible, leave snags standing. Indiana bats feed upon terrestrial and aquatic insects; they preferentially forage in and around the canopy of riparian and floodplain forest, but also along forest/field edges and fencerows. Therefore, mature forest canopy should be enhanced and stream quality not degraded.

FEDERAL STATUS - The federal status is derived from the provisions of the federal Endangered Species Act, which is administered by the U.S. Fish and Wildlife Service. The Endangered Species Act provides federal protection for plants and animals listed as Endangered or Threatened. E = Endangered T = Threatened A,B,C = Candidate for Federal listing.

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Eisenberg Fill Site
(alias: Leo Eisenberg's Property)
MOD985768175
PA/SI Reference 36

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Fish and Wildlife Enhancement
Columbia Field Office
608 East Cherry Street
Columbia, Missouri 65201

IN REPLY REFER TO:

FWS/AES-CMFO

JUN 20 1995

RECEIVED
'95 JUN 21 AM 11 09
HAZARDOUS WASTE PROGRAM
MISSOURI DEPARTMENT OF
NATURAL RESOURCES

Julie A. Bloss
Missouri Department of Natural Resources
Division of Environmental Quality
P.O. Box 176
Jefferson City, Missouri 65102-0176

Dear Ms. Bloss:

This is in reference to your request of June 2, 1995, for information regarding environmental resources and identifying sensitive environments including wetlands at or near the Eisenberg Fill site in North Kansas City, Missouri. Our comments concern the presence of federally-listed threatened or endangered species within the area of influence of the project area. This response is provided by the U.S. Fish and Wildlife Service (Service) under the authority of the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.), the National Environmental Policy Act of 1969 (42 U.S.C. 4321-4327), the Endangered Species Act of 1973, (16 U.S.C. 1531-1543), as amended, among other statutes, regulations and guidance information.

Category 1 (C1) candidate species are also provided. Category 1 candidate species are those species that the Service has sufficient information on file of the biological vulnerability and threats to list the species as endangered or threatened.

The federally-endangered bald eagle (*Haliaeetus leucocephalus*) is found during the winter months along the stretch of the Missouri River under question. Eagles will roost in tall trees and on cliffs along the river and feed on fish and carrion. The eagles may be adversely affected from indirect effects of eating dead and dying animals impacted from the hazardous substance in question.

Fish species found in the Missouri River in Missouri are the federally-endangered pallid sturgeon (*Scaphirhynchus albus*), and the C1 candidate species, sturgeon chub (*Macrhybopsis gelida*) and sicklefin chub (*M. meeki*). The habitat and range of these fish includes the entire Missouri River and the lower Mississippi River especially areas with strong currents and sand or gravel bottoms. The entire life history of these fish is unknown, but they are believed to use shallow areas around islands and bars, chutes, and backwaters. These areas should be protected from the released hazardous substance. Sensitive times during the year when spawning is believed to occur include early May through late August.

Please contact the Missouri Department of Conservation (Planning Division, P.O. Box 180, Jefferson City, Missouri 65102-0180) for information concerning State-listed rare and endangered species.

Based on a review of available information, it appears that wetland habitat does occur extensively along the Missouri River. The Service's National Wetland Inventory maps can be obtained from USGS/ESIC at the Mid Continent Mapping Center, Rolla, Missouri 65401 or call 314/341-0851.

We appreciate the opportunity to supply information for the investigation of the Eisenberg Fill site. Should you have questions, or if we can be of any further assistance, please contact Ms. Colette Charbonneau at the address above, or by telephone at (314) 876-1911 or FAX at (314) 876-1914.

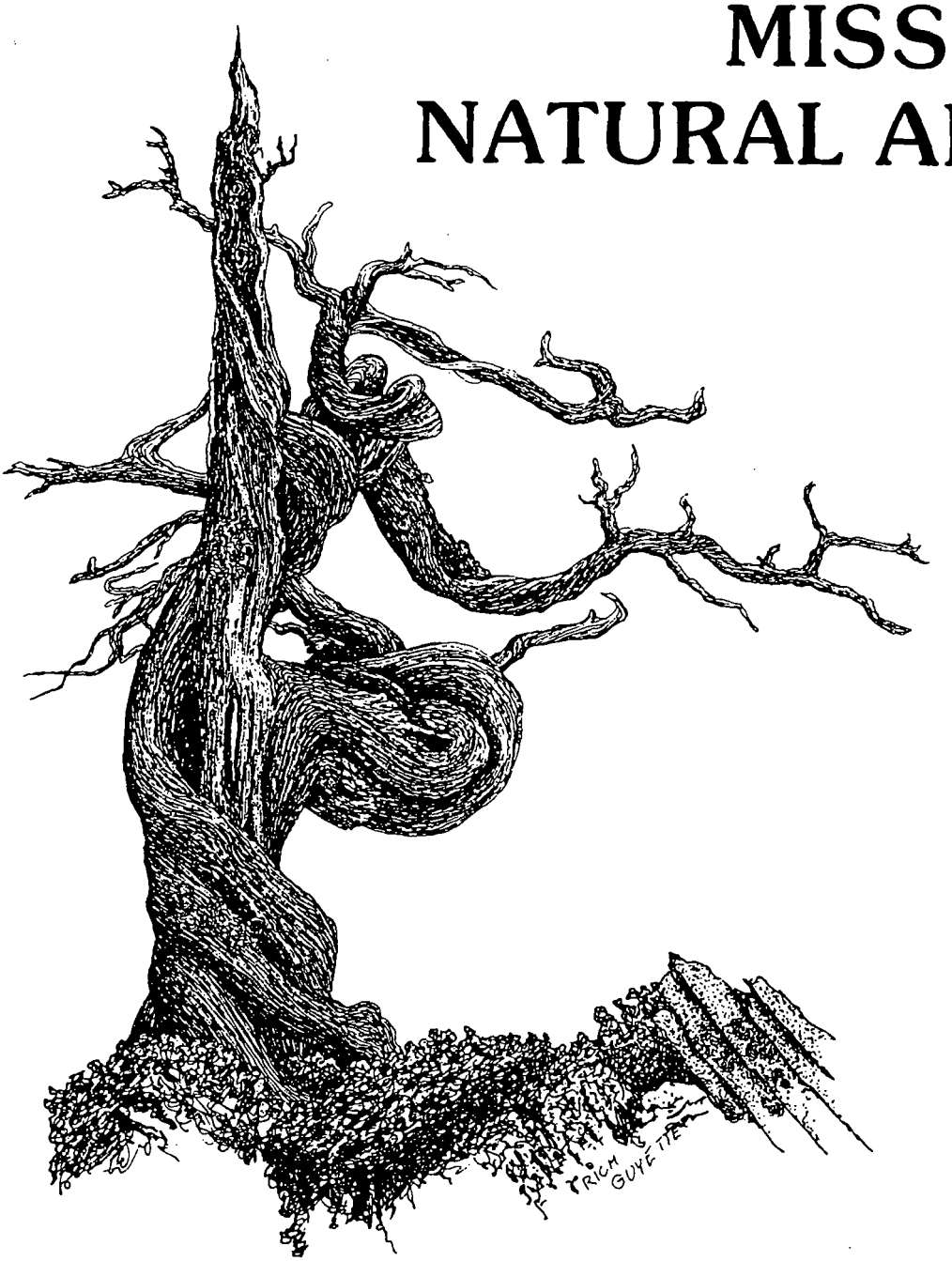
Sincerely,

Michael J. LeValley for

Gary D. Frazer
Field Supervisor

Eisenberg Fill Site
(alias: Leo Eisenberg's Property)
MOD985768175
PA/SI Reference 38

DIRECTORY OF MISSOURI NATURAL AREAS



Directory of Missouri Natural Areas

by
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Department of Conservation Natural Areas Coordinator
and
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Missouri Department of Conservation

Missouri Department of Natural Resources

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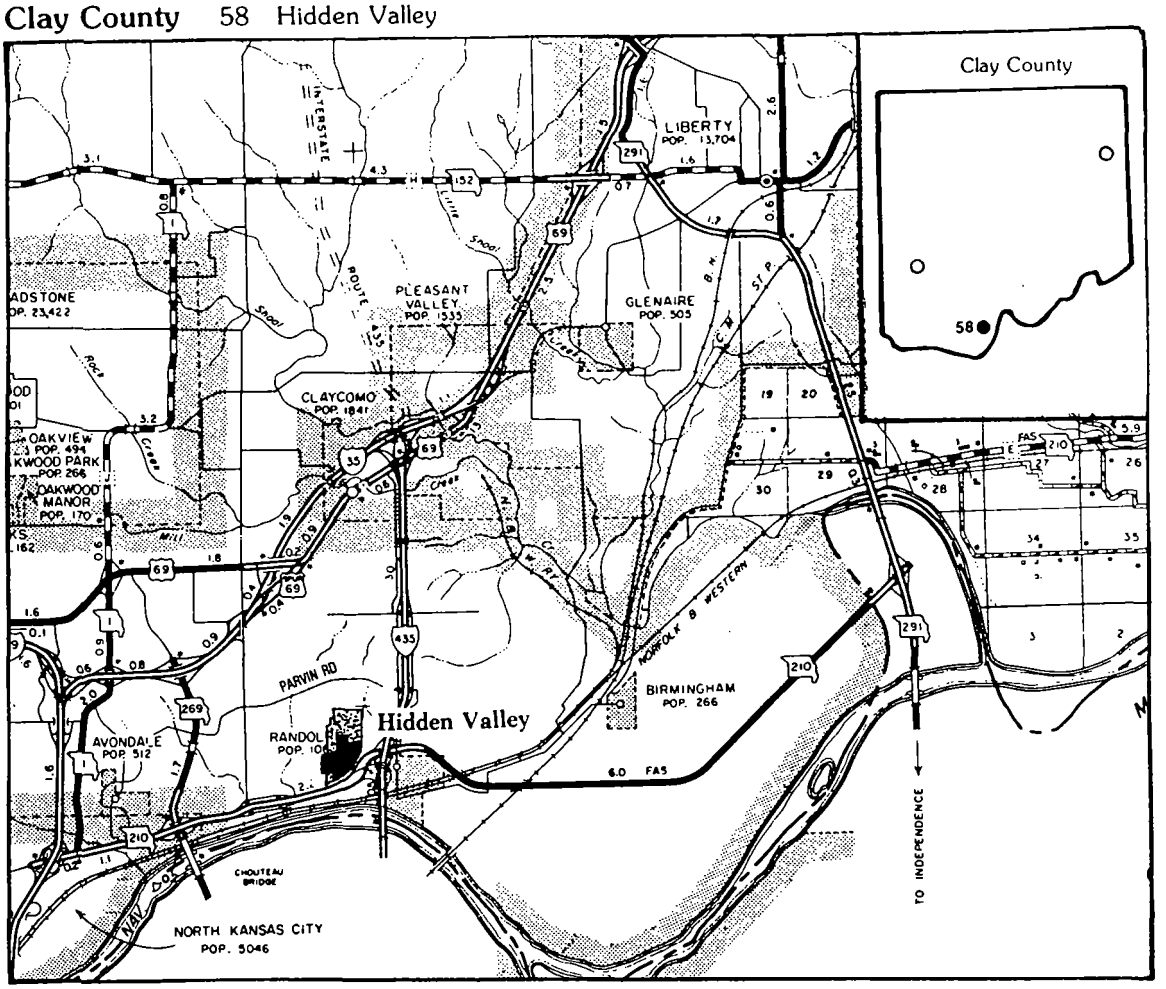
Table of Contents

Introduction 2
Map of Statewide Distribution of Missouri Natural Areas 4
Numerical Listing of Missouri Natural Areas 5
Alphabetical Listing of Missouri Natural Areas 6
County Listing of Missouri Natural Areas 7
The Natural Divisions of Missouri 9
Map of Natural Divisions of Missouri 11
What the Land Once Was 12
Natural Areas Descriptions and Vicinity Maps 14
Index 114



Hidden Valley Natural Area

An 82-acre area located within Hidden Valley Park in the W½ Sec. 9, T50N, R32W, North Kansas City 7.5 min. topographic map. Access is from Parvin Road to Hidden Valley Park. Designated April 17, 1978.

Natural Features—Upland forest on deep loess soils (Knox silt loam) and rugged hills in the Western Section of the Glaciated Plains Natural Division. Common overstory trees include northern red, white, and chinquapin oak, shagbark hickory, sugar maple, basswood and hackberry. A small stream runs through the area. An overlook platform was recently constructed in the interior of this natural area to give the visitor a panoramic vantage point for viewing the unique topography of the area. Hidden Valley Natural Area is owned and managed by the Kansas City Parks and Recreation Department. It is registered with the Department of Conservation. For further information contact Kansas City Parks and Recreation Department, 5600 East Gregory, Kansas City, Missouri 64132, 816/444-4363.

Maple Woods Natural Area

An 18-acre portion of the Maple Woods Nature Preserve in Gladstone. Access is from a parking lot on 76th Street. Part of the SW¼, Sec. 18, T51N, R32W, North Kansas City 7.5 min. topographic map. Designated October 5, 1978.

Natural Features—An old growth upland forest with many wildflowers and beautiful fall colors in the Western Section of the Glaciated Plains Natural Division. Sugar maple, red oak, white oak and basswood are the dominant trees. Maple Woods Natural Area is owned by the Conservation Department and leased to the City of Gladstone for management and use as a nature preserve. For further information contact the City of Gladstone Recreation Department, P.O. Box 10719, 7010 N. Holmes, Gladstone, Missouri 64118, phone 816/436-2200.

Isley Park Woods Natural Area

A 15-acre area located within Isley Park in Excelsior Springs. Excelsior Springs 7.5 min. topographic map. Designated June 20, 1983.

Natural Features—An old growth upland forest on a steep, north-facing hillside in the Western Section of the Glaciated Plains Natural Division. Northern red, white, bur and chinquapin oak, as well as walnut, basswood and sugar maple are all common in these rich woods. Spring wildflowers are abundant, and migrating warblers and other birds use the area. The area is owned and managed by the City of Excelsior Springs. For further information contact the Director of Parks and Recreation, Community Center, 112 Thompson Avenue, Excelsior Springs, Missouri 64024 phone 816/637-6051.

Eisenberg Fill Site
(alias: Leo Eisenberg's Property)
MOD985768175
PA/SI Reference 39

FINAL REPORT ON THE

MISSOURI NATURAL FEATURES INVENTORY

Buchanan, Cass, Clay, Clinton, Jackson and Platte Counties

BY

Michael P. Currier
and
Tim E. Smith
Natural Heritage Biologists

NATURAL HISTORY SECTION
MISSOURI DEPARTMENT OF CONSERVATION
JEFFERSON CITY, MO 65102

NOVEMBER 1988

Funded by:

The Nature Conservancy
(Doris Jones Stein Foundation and
Oppenheimer Industries)

and

Missouri Department of Conservation

Cover design and illustrations: Martha Daniels & Jim D. Wilson
Upper: Skeleton Plant (*Lygodesmia juncea*)
Lower: American Bittern (*Botaurus lentiginosus*)

TABLE OF CONTENTS

Page

LIST OF TABLES AND FIGURES.....iv

LIST OF APPENDICES.....v

ACKNOWLEDGMENTS.....vi

SUMMARY.....viii

INTRODUCTION.....1

Description of Study Area.....3

METHODS.....9

A. Organization and Terminology of Natural Features Inventory.....9

1. Categories 9

2. Classification of Features 11

3. Natural Quality 12

4. Ranking of Features 13

B. Inventory Procedures 15

1. Compiling Available Information 15

2. Examining Maps and Aerial Photographs 15

3. Aerial Survey 16

4. Initial Ground Survey 17

5. Final Field Survey 17

Page

SURVEY RESULTS.....18

A. Summary of Results by Category.....21

1. Natural Areas.....21

2. Endangered Species Habitat.....23

3. Relict Species Habitat.....27

4. Geologic Areas.....28

5. Natural Study Areas.....28

6. Unique Areas.....29

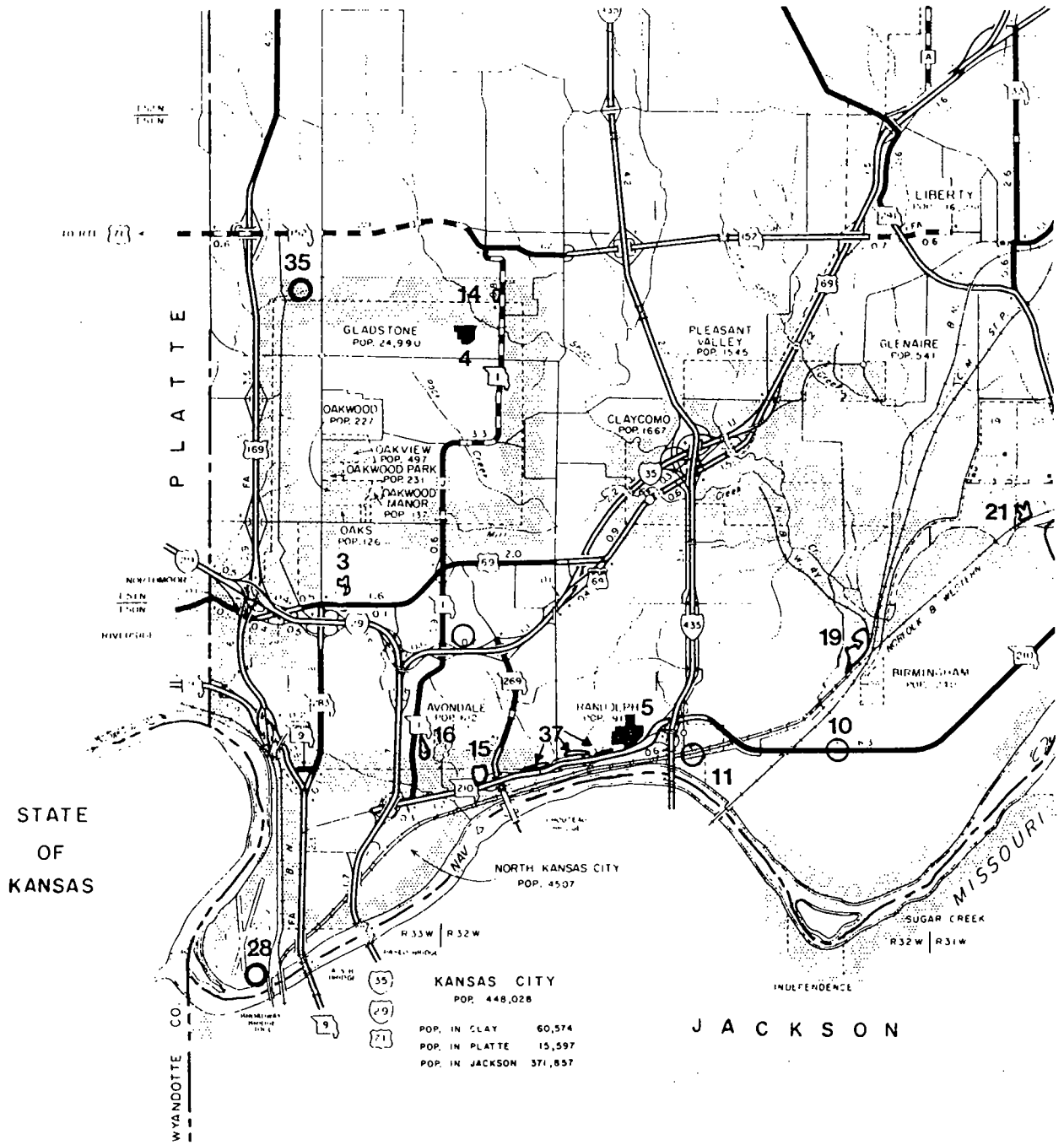
7. Aquatic Areas.....29

B. Discussion and Highlights.....29

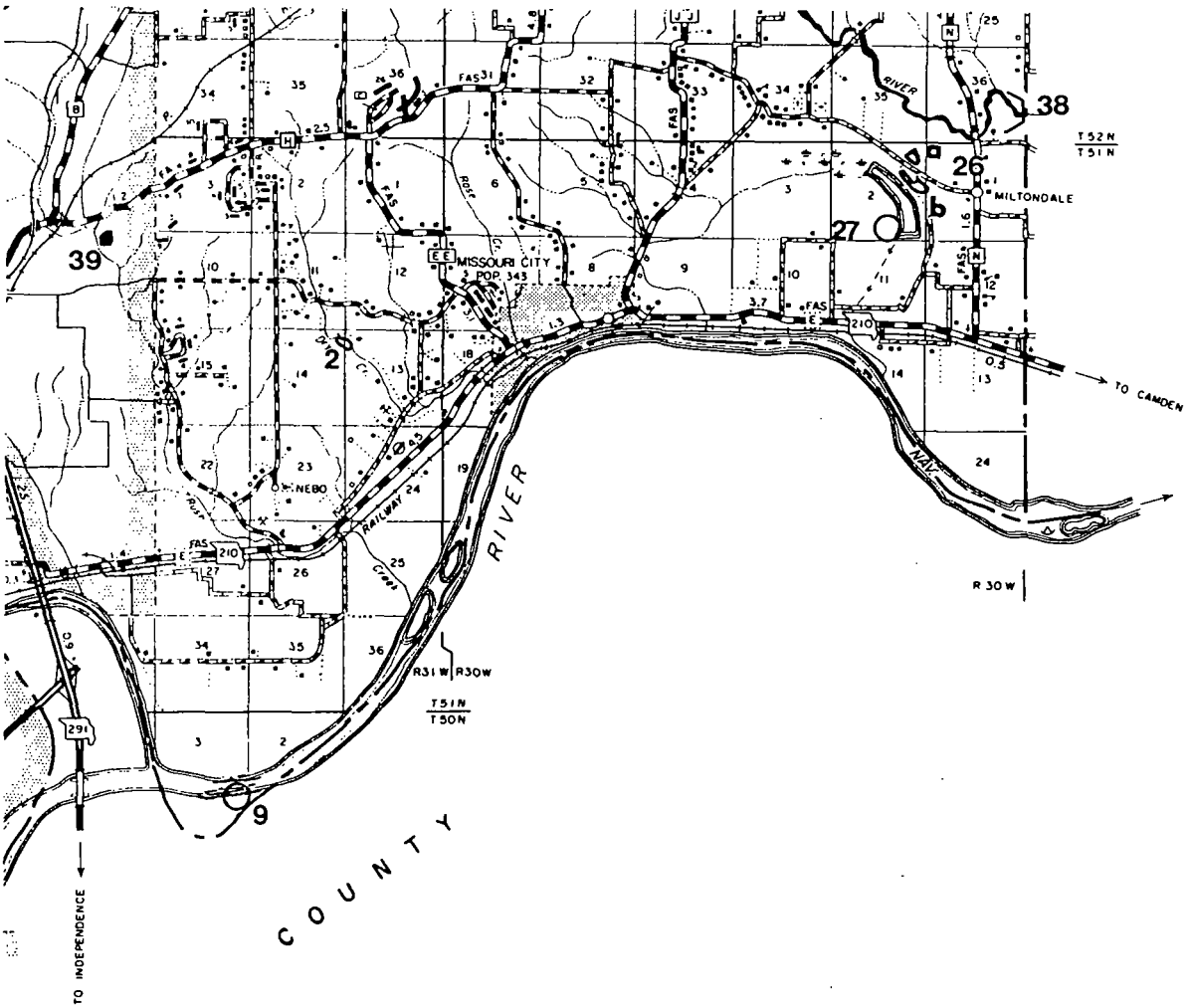
REFERENCES CITED.....33

APPENDICES.....36

CLAY CO. SOUTHWEST



CLAY CO. SOUTHEAST



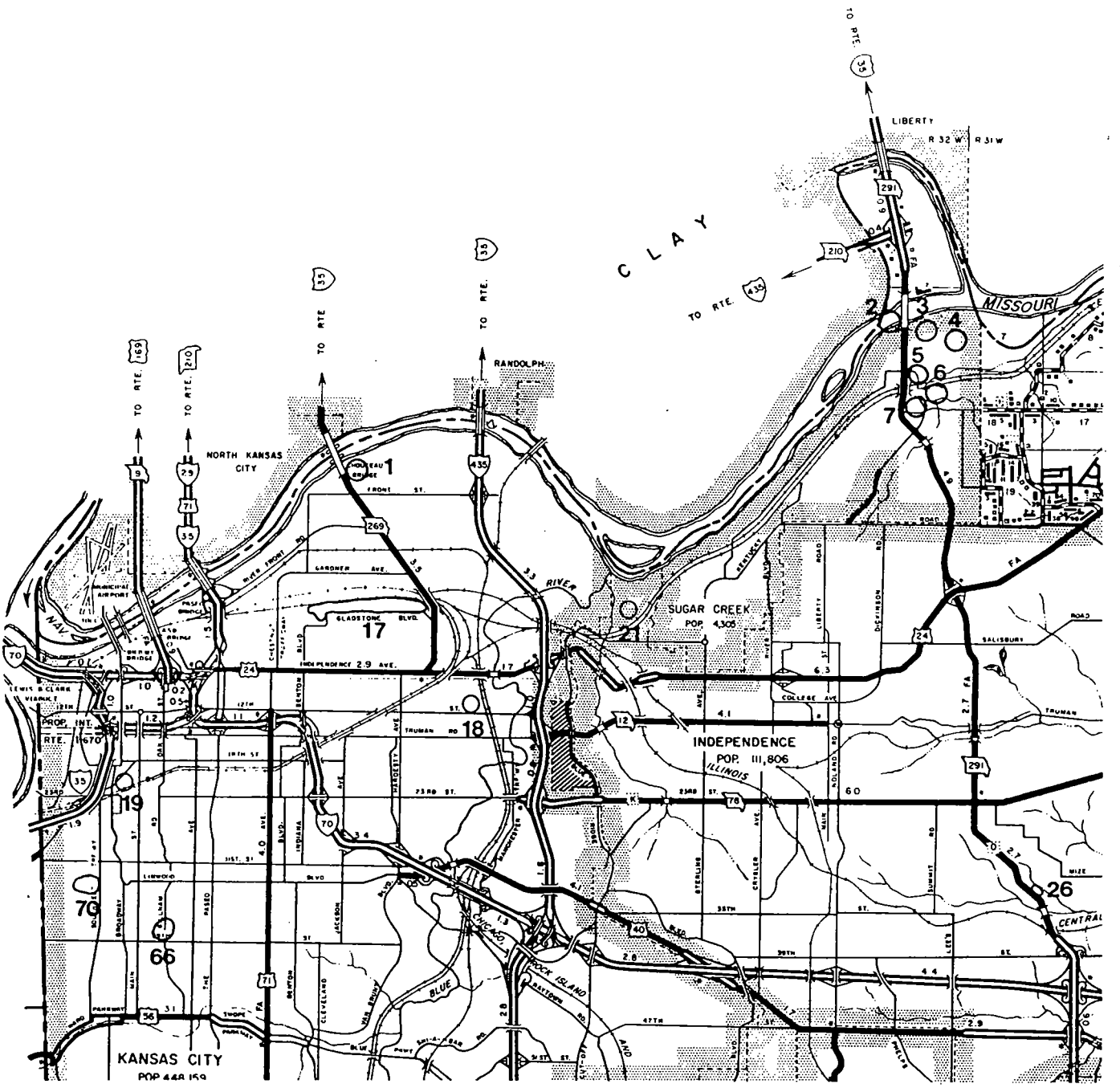
CLAY CO.

PNFS No.	Site Name and Location	Cat.	Status	Natural Feature and Comments
7	---------- Kearney SW Quad. T53N R32W Sec. 28	II	U	Endangered Species Site: Circus cyaneus. 1982 nest site. Not searched for in this inventory.
8	---------- Kearney Quad. T53N R31W Sec. 26	II	U	Endangered Species Site: Fundulus zebrinus. 1941 record. Not searched for in this inventory.
9	---------- Missouri City Quad. T50N R31W Sec. 3	II	N	Watch List Species Site: Alopecuris aequalis. 1985 record. Not relocated in this inventory.
10	---------- Liberty Quad. T50N R32W Sec. 11	II	N	Status Undetermined Species: Spermophilus franklinii. 1985 record. Not relocated in this inventory.
11	---------- Liberty Quad. T50N R32W Sec. 9	II	U	Endangered Species Site: Aster brachyactis. 1895 record. Not relocated in this inventory. Habitat heavily disturbed.
12	---------- Nashua Quad. T53N R33W Sec. 34	I	R	Potential Glade: Eroding slope. Grazed with numerous exotics.
13	---------- Nashua Quad. T53N R33W Sec. 25	I	R	Potential Glade: Not a glade. Exposed limestone and shale at bend in Wilkerson Creek.
14	---------- North Kansas City Quad. T51N R32W Sec. 18	I	R	Potential Wetland: Site damaged by construction activity.
15	---------- North Kansas City Quad. T50N R32W Sec. 18	I	N	Mesic Forest: Grade B, ca. 4.0 acres, in larger grade C forest. Light grazing in past.

CLAY CO.

PNFS No.	Site Name and Location	Cat.	Status	Natural Feature and Comments
24	---------- Kearney Quad. T52N R31W Sec. 14	I	R	Potential Wetland: Not a wetland. Grazed pasture between streams.
25	---------- Excelsior Springs Quad. T52N R30W Sec. 23	I	R	Forest: Select logged & grazed, young to mature second growth forest.
26	---------- Excelsior Springs Quad. T51N R30W Sec. 2	I	R	Forest: Past logging & quarrying evident.
27	---------- Excelsior Springs Quad. T51N R30W Sec. 2	II	U	Watch List Species: Carex lacustris. 1974 record. Not relocated in this inventory.
28	Kansas City, Mo. Kansas City Quad. T50N R33W Sec. 27	I	N	Sand Bar: Sparsely vegetated. Just below the confluence of the Missouri and Kansas Rivers.
		II	U	Endangered Species Site: Ranunculus cymbalaria. 1895 record. Not relocated in this inventory.
29	---------- Lawson Quad. T54N R30W Sec. 36	I	R	Railroad Prairie: Railroad right-of-way dominated by weedy non-native species.
30	---------- Lawson Quad. T54N R30W Sec. 2	I	R	Railroad Prairie: Railroad right-of-way dominated by weedy, non-native species.
31	---------- Holt Quad. T53N R30W Sec. 9 & Sec. 10	I	R	Forest: Heavily grazed, young to middle aged second growth forest.

JACKSON CO. NORTHWEST



JACKSON CO.

PNFS No.	Site Name and Location	Cat.	Status	Natural Feature and Comments
1	---------- North Kansas City Quad. T50N R33W	II	U	Endangered Species Site: Juncus balticus var. littoralis. 1894 record. Not relocated in this inventory. Incomplete location data.
2	---------- Liberty Quad. T50N R32W Sec. 11	II	U	Rare Species Site: Hybopsis meeki. 1945 record. Not searched for in this inventory.
3	---------- Liberty Quad. T50N R32W Sec. 12	II	U	Endangered Species Site: Eragrostis reptans. 1930 record. Not relocated in this inventory.
4	---------- Liberty Quad. T50N R32W Sec. 12	II	U	Status Undetermined Species Site: Potentilla nicolletii. 1935 record. Not relocated in this inventory.
5	Courtney Liberty Quad. T50N R32W Sec. 13			Rare / Endangered, Watch List, , Status Undetermined, and Possibly Extirpated Species Site:
				Possibly Extirpated Species:
		II	U	Dracopsis amplexicaulis. 1906 record.
		II	U	Epilobium leptophyllum. 1891 record.
		II	U	Carex sartwellii. 1870 record.
		II	U	Juncus alpinus var. fuscescens. 1897 record.
		II	U	Chenopodium strictum var. glaucophyllum. 1929 record.
				Endangered Species:
		II	U	Specularia holzingeri. 1912 record.
		II	U	Bergia texana. 1897 record.
		II	U	Euphorbia geyeri. 1934 record.
		II	U	Lycopus asper. 1933 record.
		II	U	Monarda punctata var. occidentalis. 1915 record.

Eisenberg Fill Site
(alias: Leo Eisenberg's Propety)
MOD985768175
PA/SI Reference 40

RARE AND ENDANGERED SPECIES CHECKLIST OF MISSOURI

December 1994
Missouri Department of Conservation
Natural Heritage Database

CONTENTS

Introduction.....2

How to use the checklist.....2

Definitions.....3

Species, status, and taxonomic authorities.....4

- Lichens.....4
- Hornworts and liverworts.....5
- Mosses.....5
- Ferns and fern allies.....8
- Flowering plants.....9
- Flatworms.....20
- Mollusks.....20
- Arachnids.....22
- Crustaceans.....22
- Millipedes.....23
- Insects.....23
- Fish.....25
- Amphibians.....27
- Reptiles.....28
- Birds.....29
- Mammals.....30

For more information.....31

Flowering Plants

SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS
Acalypha deamii	Large seeded mercury		SU
Agalinis auriculata	Auriculate false foxglove	C2	R
Agalinis heterophylla	Prairie false foxglove		E
Agalinis purpurea	Purple false foxglove		WL
Agalinis skinneriana	A false foxglove	C2	WL
Agalinis viridis	Green false foxglove		E
Agrimonia gryposepala	Tall agrimony		SU
Allium burdickii	Wild leek		R
Alopecurus aequalis	Floating foxtail grass		R
Amianthium muscitoxicum	Fly poison		R
Amsonia ciliata var *filifolia*	Ciliate blue star		WL
Anemone cylindrica	Thimbleweed		WL
Anemone quinquefolia	Wood anemone		E
Arabis glabra	Tower mustard		E
Arabis missouriensis var *deamii*	Deam's rock cress	C2	SU
Aralia nudicaulis	Wild sarsaparilla		R
Arenaria lateriflora	Grove sandwort		SU
Aristida adscensionis	Sixweeks three-awn		WL
Aristida desmantha	Curly three-awn		SU
Aristida lanosa	Woollyleaf three-awn		R
Armoracia lacustris	Lake cress	3C	SU
Aronia melanocarpa	Black chokeberry		E
Artemisia dracunculus ssp *glauca*	A wormwood		EXT
Asclepias meadii	Mead's milkweed	T	E
Aster brachyactis	Rayless alkali aster		EXT
Aster dumosus var *strictior*	Tradescant aster		R
Aster fragilis var *fragilis*	Small white aster		E
Aster furcatus	Forked aster	C2	WL
Aster macrophyllus	Big-leaved aster		E
Aster pubentior	Flat-topped white aster		E
Aster subulatus var *ligulatus*	Saltmarsh aster		E
Astragalus lotiflorus	Low milk vetch		WL
Bartonia paniculata	Screwstem		E
Bartonia virginica	Yellow bartonia		SU
Berberis canadensis	American barberry		R
Bergia texana	Bergia		E
Berula erecta	Cut-leaved water-parsnip		E
Bidens laevis	A beggar's tick		EXT
Boltonia decurrens	Decurrent false aster	T	E
Bouteloua gracilis	Blue grama		SU
Bouteloua hirsuta	Hairy grama		R

Fish

SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS
Acipenser fulvescens	Lake sturgeon	C2	E
Alosa alabamae	Alabama shad		R
Amblyopsis rosae	Ozark cavefish	T	E
Ameiurus nebulosus	Brown bullhead		R
Carpiodes velifer	Highfin carpsucker		R
Centrarchus macropterus	Flier		WL
Chologaster agassizi	Spring cavefish		E
Cottus bairdi	Mottled sculpin		SU
Crystallaria asprella	Crystal darter	C2	E
Cycleptus elongatus	Blue sucker	C2	WL
Cyprinella camura	Bluntface shiner		WL
Erimyzon sucetta	Lake chubsucker		R
Esox lucius	Northern pike		R
Etheostoma clara	Western sand darter		WL
Etheostoma cragini	Arkansas darter	C1	R
Etheostoma fusiforme	Swamp darter		E
Etheostoma histrio	Harlequin darter		E
Etheostoma microperca	Least darter		WL
Etheostoma nianguae	Niangua darter	T	E
Etheostoma parvipinne	Goldstripe darter		E
Etheostoma vivax	Scaly sand darter		WL
Etheostoma whipplei	Redfin darter		E
Fundulus chrysotus	Golden topminnow		EXT
Fundulus dispar	Starhead topminnow		WL
Fundulus sciadicus	Plains topminnow	C2	SU
Fundulus zebrinus	Plains killifish		R
Hiodon tergisus	Mooneye		R
Hybognathus hankinsoni	Brassy minnow		R
Hybognathus hayi	Cypress minnow		E
Hybognathus nuchalis	Mississippi silvery minnow		WL
Ichthyomyzon gagei	Southern brook lamprey		R
Lampetra appendix	American brook lamprey		R
Lepisosteus spatula	Alligator gar		R
Lepomis symmetricus	Bantam sunfish		R
Macrhybopsis gelida	Sturgeon chub	C2	R
Macrhybopsis meeki	Sicklefin chub	C2	R
Mugil cephalus	Striped mullet		R
Notropis amnis	Pallid shiner		EXT
Notropis buccatus	Silverjaw minnow		WL
Notropis buchanani	Ghost shiner		WL
Notropis chalybaeus	Ironcolor shiner		WL
Notropis heterolepis	Blacknose shiner		R
Notropis maculatus	Taillight shiner		E
Notropis ozarcanus	Ozark shiner	C2	SU
Notropis sabinae	Sabine shiner		E
Notropis topeka	Topeka shiner	C1	SU
Noturus eleutherus	Mountain madtom		E
Noturus flavater	Checkered madtom		WL

Eisenberg Fill Site
(alias: Leo Eisenberg's Property)
MOD985768175
PA/SI Reference 41

DEPARTMENT OF NATURAL RESOURCES
Division of Environmental Quality

TELEPHONE OR CONFERENCE RECORD

FILE: Eisenberg Fill Superfund Technical File

DATE: June 15, 1995

TELEPHONE:

Incoming ( )
Outgoing (X)

CONFERENCE:

Field ( )
Office ( )

SUBJECT: Water supply information about Jackson County Water District #2.

PERSONS INVOLVED:

NAME	REPRESENTING
Misty Whittle	MDNR/HWP/ SPF
Mr. Bud Fitzwater (816)353-5550	Jackson County Water District #2, Director

SUMMARY OF CONVERSATION:
On June 15, 1995, I phoned Jackson County Water District #2, to inquire about their drinking water system. Mr. Fitzwater informed me that the district was serving 12,500 people and the city received approximately 60% of their water from Kansas City, MO.

ACTION TAKEN:

I informed Julie Bloss, Site Evaluation Unit, Hazardous Waste Program, Superfund Section of the above conversation.

FINAL RESULTS:

Information supplied to Julie Bloss, who will take final action.

Misty Whittle
Misty Whittle
Hazardous Waste Program

MW:

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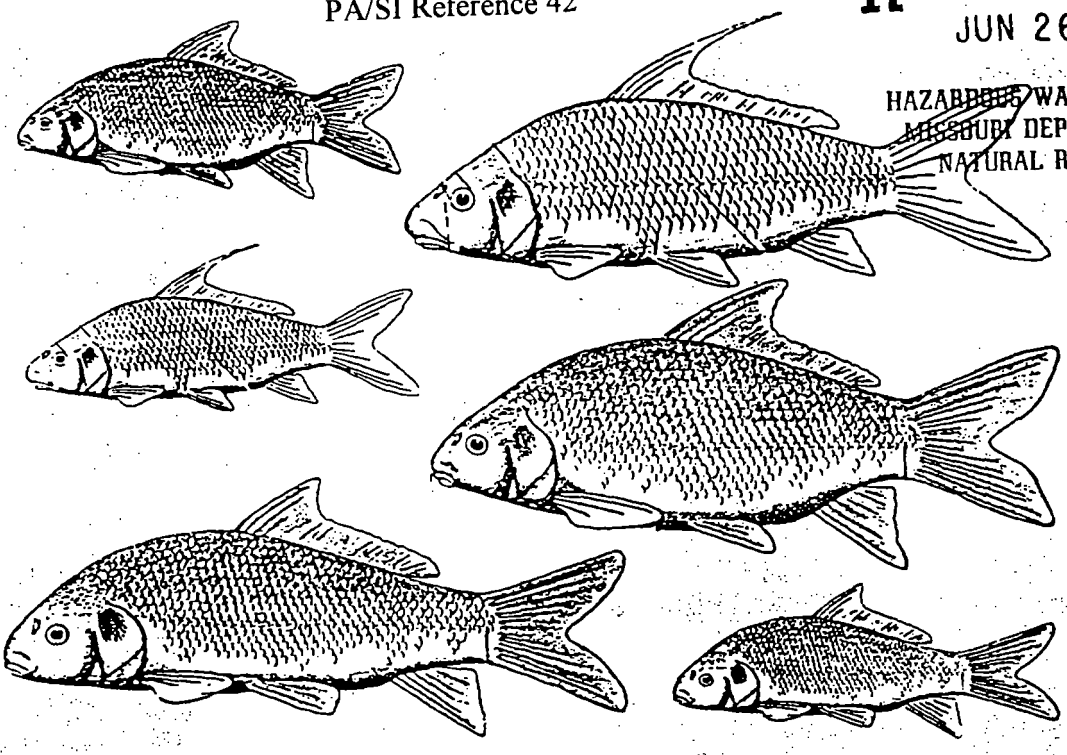
MOD985768175
PA/SI Reference 42

RECEIVED
JUN 26 1995
HAZARDOUS WASTE PROGRAM
MISSOURI DEPARTMENT OF
NATURAL RESOURCES



Missouri Commercial Fish Harvest 1993

by
John W. Robinson

Missouri Department of Conservation
January 1995

FINAL REPORT

MISSOURI'S COMMERCIAL FISHERY HARVEST, 1993

Missouri Department of Conservation

Jerry J. Presley, Director

Kenneth M. Babcock, Assistant Director

Alvin J. Brand, Federal Aid Coordinator

James P. Fry, Fisheries Division Chief

Prepared by: John W. Robinson — 1/5/95
Fisheries Research Biologist — Date

Approved by: Thomas L. Russell — 1-6-95
Fisheries Research Supervisor — Date

Approved by: Gary D. Novinger — 1-6-95
Assistant Fisheries Division Chief - Research — Date

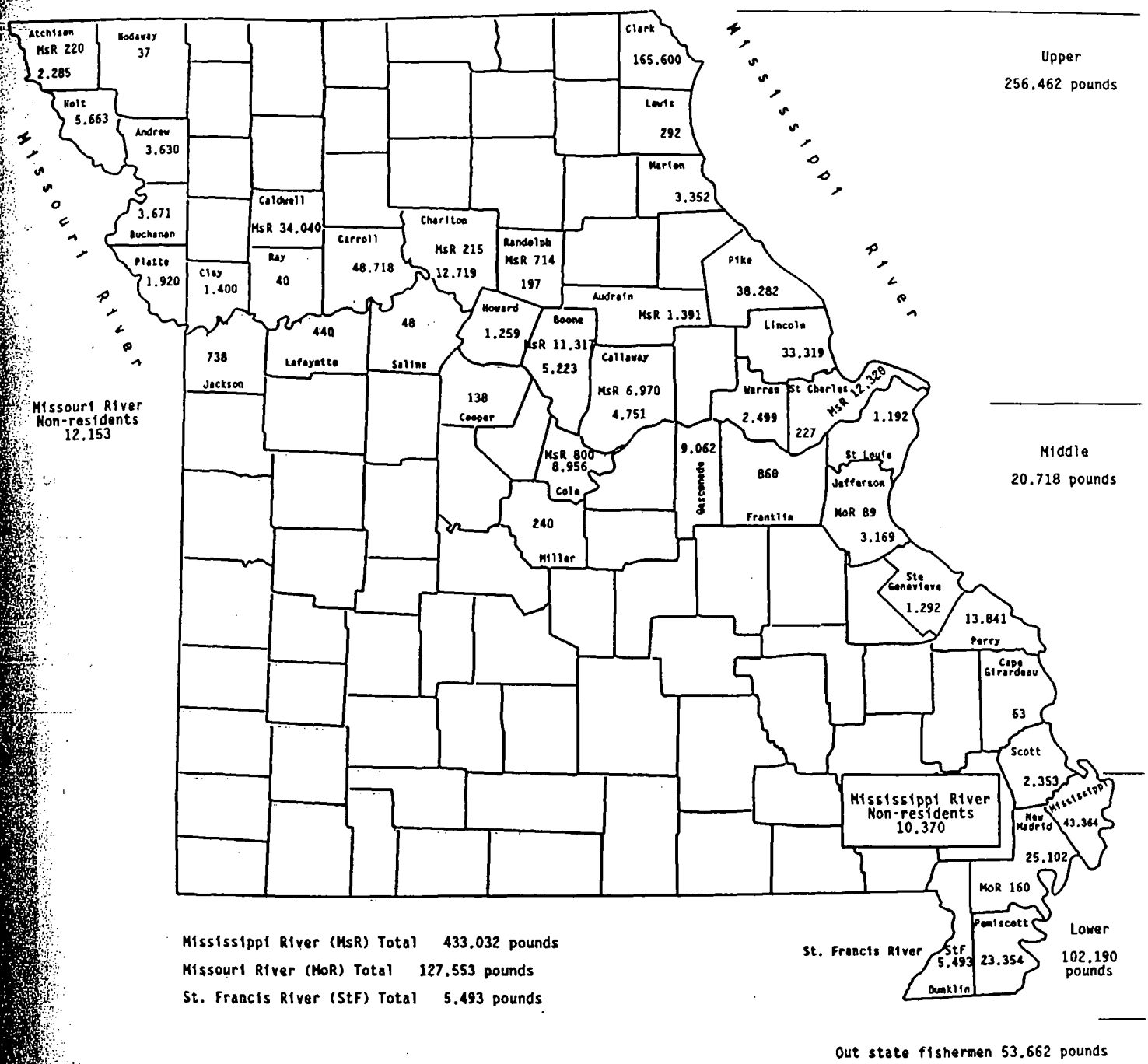


Figure 1. The reported harvest of commercial fishes (in pounds) by county and river fished, 1993.

KANSAS CITY, MO.-KANS.

Eisenberg Fill Site
(alias: Leo Eisenberg's Property)
MOD985768175
PA/SI Reference 43

TES TO THE USER

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Italics were developed specifically for NATIONAL
ETLANDS INVENTORY mapping.
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U.S. DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

Prepared by National Wetlands Inventory

Base map provided by the United States Geological Survey.

1994

AERIAL PHOTOGRAPHY

6/ /86	DATE: 11/ /83
1:58 000	SCALE: 1:58 000
CIR	TYPE: CIR

NE — SYSTEM

2 — INTERTIDAL — SUBSYSTEM

ATIC BED	RF — REEF	SB — STREAMBED	RS — ROCKY SHORE	US — UNCONSOLIDATED SHORE	EM — EMERGENT	SS — SCRUB-SHRUB	FO — FORESTED	CLASS
ascular Vascular *Submergent* *Surface*	2 Mollusc 3 Worm	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic	1 Bedrock 2 Rubble	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic	1 Persistent 2 Nonpersistent	1 Broad-Leaved Deciduous 2 Needle-Leaved Deciduous 3 Broad-Leaved Evergreen 4 Needle-Leaved Evergreen 5 Dead 6 *Deciduous* 7 *Evergreen*	1 Broad-Leaved Deciduous 2 Needle-Leaved Deciduous 3 Broad-Leaved Evergreen 4 Needle-Leaved Evergreen 5 Dead 6 *Deciduous* 7 *Evergreen*	Subclass

TRINE — SYSTEM

2 — LITTORAL — SUBSYSTEM

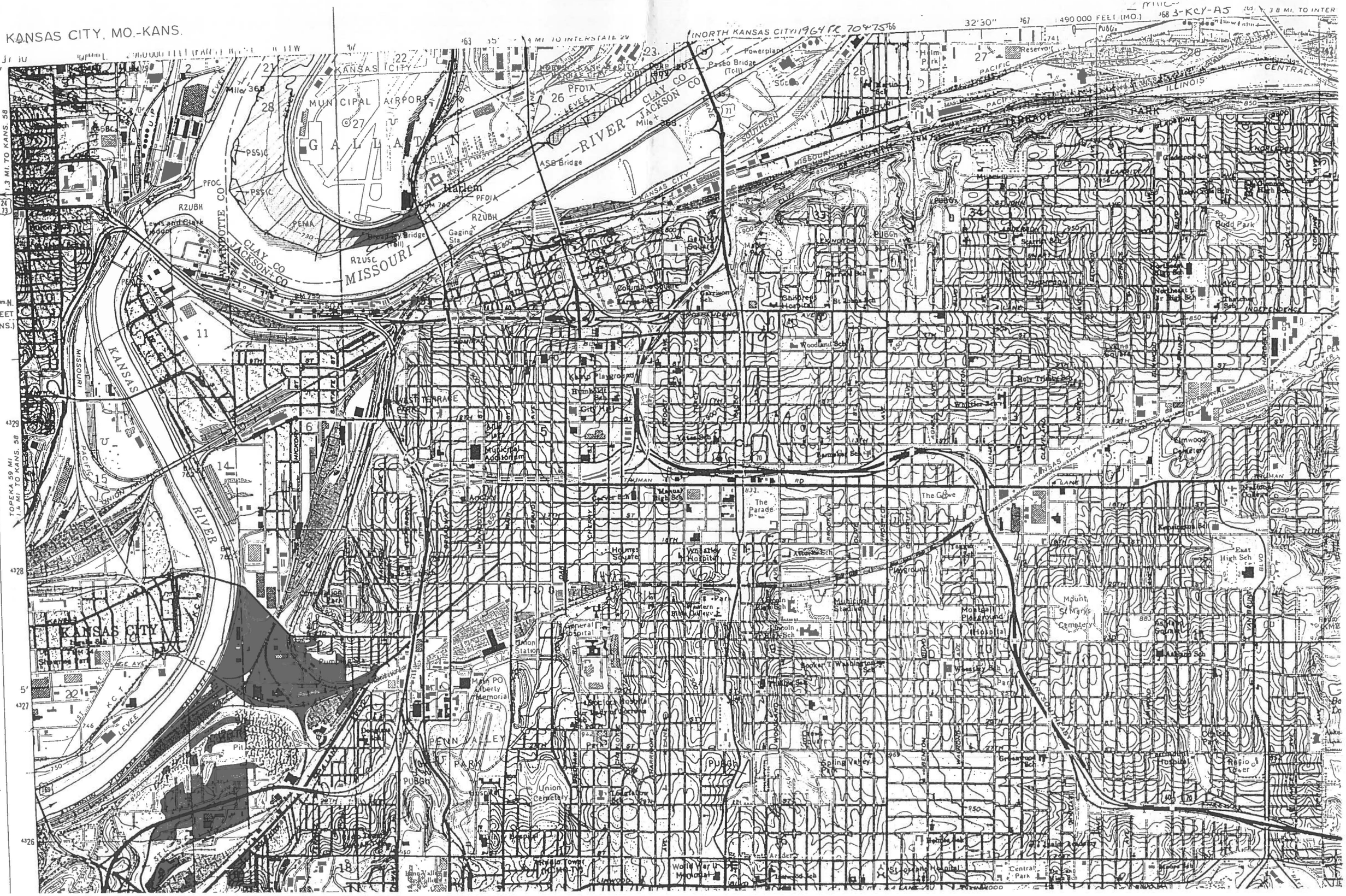
K TOM	UB — UNCONSOLIDATED BOTTOM	AB — AQUATIC BED	RS — ROCKY SHORE	US — UNCONSOLIDATED SHORE	EM — EMERGENT	OW — *OPEN WATER/ Unknown Bottom*	CLASS
	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic	1 Algal 2 Aquatic Moss 3 Rooted Vascular 4 Floating Vascular 5 *Unknown Submergent* 6 *Unknown Surface*	1 Bedrock 2 Rubble	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic 5 Vegetated	2 Nonpersistent		Subclass

MODIFIERS

describe wetland and deepwater habitats one or more of the water regime, water chemistry,
the class or lower level in the hierarchy. The farmed modifier may also be applied to the ecological system

	WATER CHEMISTRY			SOIL	SPECIAL MODIFIERS	
	Coastal Halinity	Inland Salinity	pH Modifiers for all Fresh Water			
rary-Tidal nal-Tidal ermanent-Tidal nent-Tidal wn	1 Hyperhaline 2 Euhaline 3 Mixohaline *(Brackish)* 4 Polyhaline 5 Mesohaline 6 Oligohaline 0 Fresh	7 Hypersaline 8 Eusaline 9 Mixosaline 0 Fresh	a Acid t Circumneutral i Alkaline	g Organic n Mineral	b *Beaver* d *Partially Drained/Ditched* f Farmed	h *Diked/Impounded* r Artificial Substrate s *Spoil* x Excavated

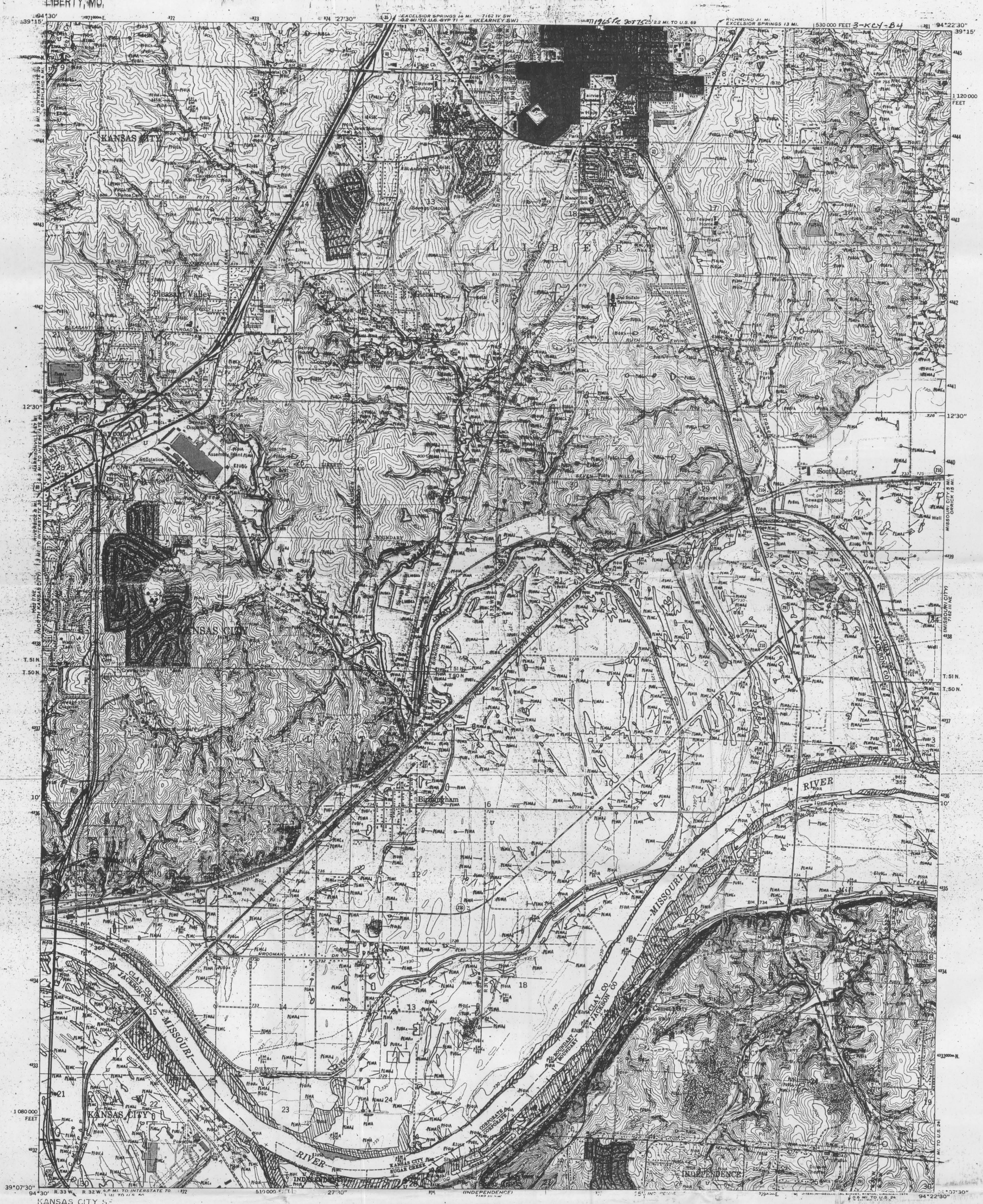
KANSAS CITY, MO.-KANS.



NATIONAL WETLANDS INVENTORY

UNITED STATES DEPARTMENT OF THE INTERIOR

LIBERTY, MO.



KANSAS CITY SE

KANSAS CITY

LIBERTY, MO.

SCALE 1:24 000

1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 KILOMETER

1 acre | 5 acres | 10 acres | 20 acres | 40 acres

ACREAGE GUIDE

For information on availability of NWI maps, call 1-800-USA-MAPS.

Regional Director (ARDE) Region III
U.S. Fish and Wildlife Service
Federal Bldg., Ft. Snelling (AD/BSP)
Twin Cities, Minnesota 55111

SPECIAL NOTE

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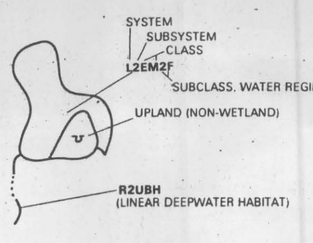
SYMBOLOGY EXAMPLE



U Primarily represents **upland** areas, but may include unclassified wetlands such as man-modified areas, non photo-identifiable areas and/or unintentional omissions.

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AERIAL PHOTOGRAPHY

DATE:	5 / / 83	/ /
SCALE:	1:58 000	
TYPE:	CIR	

Eisenberg Fill Site
(alias: Leo Eisenberg's Property)
MOD985768175
PA/SI Reference 43

U.S. DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

Prepared by National Wetlands Inventory

Base map provided by the United States Geological Survey.

1993

SYSTEM: M — MARINE

SUBSYSTEM: 1 — SUBTIDAL; 2 — INTERTIDAL

CLASS	RB — ROCK BOTTOM	UB — UNCONSOLIDATED BOTTOM	AB — AQUATIC BED	RF — REEF	OW — *OPEN WATER/ Unknown Bottom*	AB — AQUATIC BED	RF — REEF	RS — ROCKY SHORE	US — UNCONSOLIDATED SHORE
Subclass	1 Bedrock 2 Rubble	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic	1 Algal 3 Rooted Vascular 5 *Unknown Submergent*	1 Coral 3 Worm		1 *Algal* 3 Rooted Vascular 5 *Unknown Submergent*	1 Coral 3 Worm	1 Bedrock 2 Rubble	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic

SYSTEM: E — ESTUARINE

SUBSYSTEM: 1 — SUBTIDAL; 2 — INTERTIDAL

CLASS	RB — ROCK BOTTOM	UB — UNCONSOLIDATED BOTTOM	AB — AQUATIC BED	RF — REEF	OW — *OPEN WATER/ Unknown Bottom*	AB — AQUATIC BED	RF — REEF	SB — STREAMBED	RS — ROCKY SHORE	US — UNCONSOLIDATED SHORE	EM — EMERGENT	SS — SCRUB-SHRUB	FO — FORESTED
Subclass	1 Bedrock 2 Rubble	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic	1 Algal 3 Rooted Vascular 4 Floating Vascular 5 *Unknown Submergent* 6 *Unknown Surface*	2 Mollusc 3 Worm		1 Algal 3 Rooted Vascular 4 Floating Vascular 5 *Unknown Submergent* 6 *Unknown Surface*	2 Mollusc 3 Worm	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic	1 Bedrock 2 Rubble	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic	1 Persistent 2 Nonpersistent	1 Broad-Leaved Deciduous 2 Needle-Leaved Deciduous 3 Broad-Leaved Evergreen 4 Needle-Leaved Evergreen 5 Dead 6 *Deciduous* 7 *Evergreen*	1 Broad-Leaved Deciduous 2 Needle-Leaved Deciduous 3 Broad-Leaved Evergreen 4 Needle-Leaved Evergreen 5 Dead 6 *Deciduous* 7 *Evergreen*

SYSTEM: R — RIVERINE

SUBSYSTEM: 1 — TIDAL; 2 — LOWER PERENNIAL; 3 — UPPER PERENNIAL; 4 — INTERMITTENT; 5 — *UNKNOWN PERENNIAL*

CLASS	RB — ROCK BOTTOM	UB — UNCONSOLIDATED BOTTOM	*SB — STREAMBED	AB — AQUATIC BED	RS — ROCKY SHORE	US — UNCONSOLIDATED SHORE	**EM — EMERGENT	OW — *OPEN WATER/ Unknown Bottom*
Subclass	1 Bedrock 2 Rubble	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic	1 Bedrock 2 Rubble 3 Cobble-Gravel 4 Sand 5 Mud 6 Organic 7 Vegetated	1 Algal 2 Aquatic Moss 3 Rooted Vascular 4 Floating Vascular 5 *Unknown Submergent* 6 *Unknown Surface*	1 Bedrock 2 Rubble	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic 5 Vegetated	2 Nonpersistent	

*STREAMBED is limited to TIDAL and INTERMITTENT SUBSYSTEMS, and comprises the only CLASS in the INTERMITTENT SUBSYSTEM.
**EMERGENT is limited to TIDAL and LOWER PERENNIAL SUBSYSTEMS.

SYSTEM: L — LACUSTRINE

SUBSYSTEM: 1 — LIMNETIC; 2 — LITTORAL

CLASS	RB — ROCK BOTTOM	UB — UNCONSOLIDATED BOTTOM	AB — AQUATIC BED	OW — *OPEN WATER/ Unknown Bottom*	RB — ROCK BOTTOM	UB — UNCONSOLIDATED BOTTOM	AB — AQUATIC BED	RS — ROCKY SHORE	US — UNCONSOLIDATED SHORE	EM — EMERGENT	OW — *OPEN WATER/ Unknown Bottom*
Subclass	1 Bedrock 2 Rubble	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic	1 Algal 2 Aquatic Moss 3 Rooted Vascular 4 Floating Vascular 5 *Unknown Submergent* 6 *Unknown Surface*		1 Bedrock 2 Rubble	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic	1 Algal 2 Aquatic Moss 3 Rooted Vascular 4 Floating Vascular 5 *Unknown Submergent* 6 *Unknown Surface*	1 Bedrock 2 Rubble	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic 5 Vegetated	2 Nonpersistent	

SYSTEM: P — PALUSTRINE

CLASS	RB — ROCK BOTTOM	UB — UNCONSOLIDATED BOTTOM	AB — AQUATIC BED	US — UNCONSOLIDATED SHORE	ML — MOSS-LICHEN	EM — EMERGENT	SS — SCRUB-SHRUB	FO — FORESTED	OW — *OPEN WATER/ Unknown Bottom*
Subclass	1 Bedrock 2 Rubble	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic	1 Algal 2 Aquatic Moss 3 Rooted Vascular 4 Floating Vascular 5 *Unknown Submergent* 6 *Unknown Surface*	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic 5 Vegetated	1 Moss 2 Lichen	1 Persistent 2 Nonpersistent	1 Broad-Leaved Deciduous 2 Needle-Leaved Deciduous 3 Broad-Leaved Evergreen 4 Needle-Leaved Evergreen 5 Dead 6 *Deciduous* 7 *Evergreen*	1 Broad-Leaved Deciduous 2 Needle-Leaved Deciduous 3 Broad-Leaved Evergreen 4 Needle-Leaved Evergreen 5 Dead 6 *Deciduous* 7 *Evergreen*	

MODIFIERS

In order to more adequately describe wetland and deepwater habitats one or more of the water regime, water chemistry, soil, or special modifiers may be applied at the class or lower level in the hierarchy. The farmed modifier may also be applied to the ecological system.

WATER REGIME

Non-Tidal		Tidal	
A Temporarily Flooded	H Permanently Flooded	K *Artificially Flooded*	*S Temporary-Tidal
B Saturated	J Intermittently Flooded	L Subtidal	*R Seasonal-Tidal
C Seasonally Flooded	*K Artificially Flooded	M Irregularly Exposed	*T Semipermanent-Tidal
D *Seasonally Flooded/ Well Drained*	W Intermittently Flooded/Temporary	N Regularly Flooded	*V Permanent-Tidal
E *Seasonally Flooded/ Saturated*	Y Saturated/Semipermanent/ Seasonal	P Irregularly Flooded	U *Unknown*
F Semipermanently Flooded	Z Intermittently Exposed/Permanent		
G Intermittently Exposed	U *Unknown*		

*These water regimes are only used in tidally influenced, freshwater systems.

WATER CHEMISTRY

Coastal Halinity	Inland Salinity	pH Modifiers for all Fresh Water
1 Hyperhaline	7 Hypersaline	a Acid
2 Euhaline	8 Eusaline	t Circumneutral
3 Mixohaline (*Brackish*)	9 Miosaline	i Alkaline
4 Polyhaline	0 Fresh	
5 Mesohaline		
6 Oligohaline		
0 Fresh		

SOIL

g Organic
n Mineral

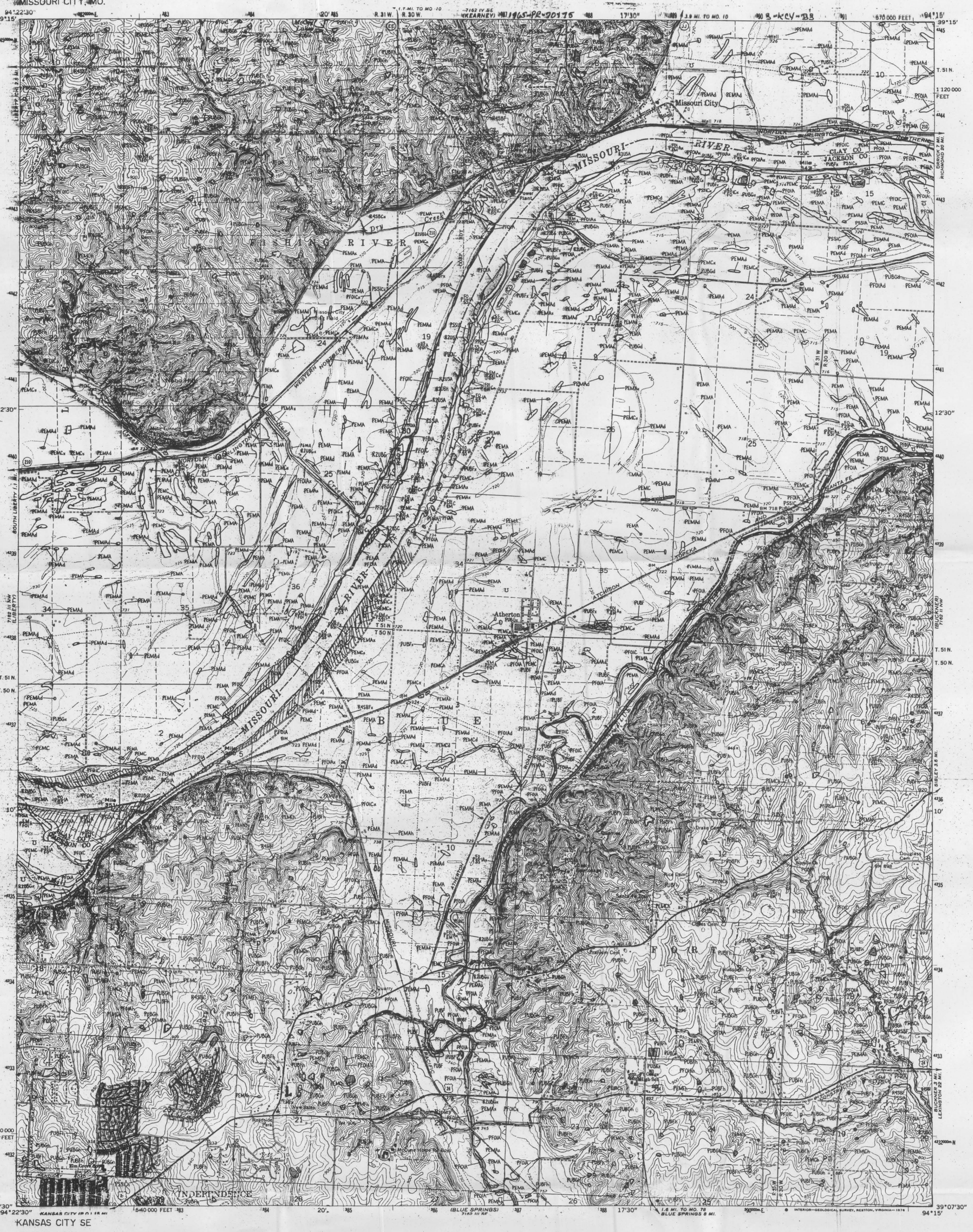
SPECIAL MODIFIERS

b *Beaver*
d *Partially Drained/Ditched*
f Farmed
h *Diked/Impounded*
r Artificial Substrate
s *Spoil*
x Excavated

NATIONAL WETLANDS INVENTORY

UNITED STATES DEPARTMENT OF THE INTERIOR

MISSOURI CITY, MO.



KANSAS CITY SE

KANSAS CITY

MISSOURI CITY, MO.

SCALE 1:24 000

1 MILE — 1000 0 1000 2000 3000 4000 5000 6000 7000 FEET — 1 KILOMETER

1 acre — 5 acres — 10 acres — 20 acres — 40 acres

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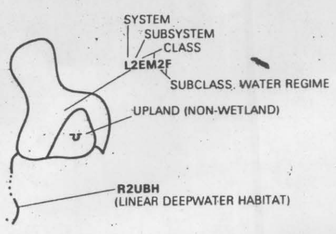

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Eisenberg Fill Site
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PA/SI Reference 43

U.S. DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

Prepared by National Wetlands Inventory

Base map provided by the United States Geological Survey.

1993

SYSTEM: M — MARINE
- SUBSYSTEM 1 — SUBTIDAL
  - CLASS: RB — ROCK BOTTOM; UB — UNCONSOLIDATED BOTTOM; AB — AQUATIC BED; RF — REEF; OW — *OPEN WATER/ Unknown Bottom*
  - Subclass: 1 Bedrock, 2 Rubble; 1 Cobble-Gravel, 2 Sand, 3 Mud, 4 Organic; 1 Algal, 3 Rooted Vascular, 5 *Unknown Submergent*; 1 Coral, 3 Worm
- SUBSYSTEM 2 — INTERTIDAL
  - CLASS: AB — AQUATIC BED; RF — REEF; RS — ROCKY SHORE; US — UNCONSOLIDATED SHORE
  - Subclass: 1 Algal, 3 Rooted Vascular, 5 *Unknown Submergent*; 1 Coral, 3 Worm; 1 Bedrock, 2 Rubble; 1 Cobble-Gravel, 2 Sand, 3 Mud, 4 Organic

SYSTEM: E — ESTUARINE
- SUBSYSTEM 1 — SUBTIDAL
  - CLASS: RB — ROCK BOTTOM; UB — UNCONSOLIDATED BOTTOM; AB — AQUATIC BED; RF — REEF; OW — *OPEN WATER/ Unknown Bottom*
  - Subclass: 1 Bedrock, 2 Rubble; 1 Cobble-Gravel, 2 Sand, 3 Mud, 4 Organic; 1 Algal, 3 Rooted Vascular, 4 Floating Vascular, 5 *Unknown Submergent*, 6 *Unknown Surface*; 2 Mollusc, 3 Worm
- SUBSYSTEM 2 — INTERTIDAL
  - CLASS: AB — AQUATIC BED; RF — REEF; SB — STREAMBED; RS — ROCKY SHORE; US — UNCONSOLIDATED SHORE; EM — EMERGENT; SS — SCRUB-SHRUB; FO — FORESTED
  - Subclass: 1 Algal, 3 Rooted Vascular, 4 Floating Vascular, 5 *Unknown Submergent*, 6 *Unknown Surface*; 2 Mollusc, 3 Worm; 1 Cobble-Gravel, 2 Sand, 3 Mud, 4 Organic; 1 Bedrock, 2 Rubble; 1 Cobble-Gravel, 2 Sand, 3 Mud, 4 Organic; 1 Persistent, 2 Nonpersistent; 1 Broad-Leaved Deciduous, 2 Needle-Leaved Deciduous, 3 Broad-Leaved Evergreen, 4 Needle-Leaved Evergreen, 5 Dead, 6 *Deciduous*, 7 *Evergreen*; 1 Broad-Leaved Deciduous, 2 Needle-Leaved Deciduous, 3 Broad-Leaved Evergreen, 4 Needle-Leaved Evergreen, 5 Dead, 6 *Deciduous*, 7 *Evergreen*

SYSTEM: R — RIVERINE
- SUBSYSTEM 1 — TIDAL
  - CLASS: RB — ROCK BOTTOM; UB — UNCONSOLIDATED BOTTOM
  - Subclass: 1 Bedrock, 2 Rubble; 1 Cobble-Gravel, 2 Sand, 3 Mud, 4 Organic
- SUBSYSTEM 2 — LOWER PERENNIAL
  - CLASS: *SB — STREAMBED; AB — AQUATIC BED; RS — ROCKY SHORE; US — UNCONSOLIDATED SHORE; **EM — EMERGENT
  - Subclass: 1 Bedrock, 2 Rubble, 3 Cobble-Gravel, 4 Sand, 5 Mud, 6 Organic, 7 Vegetated; 1 Algal, 2 Aquatic Moss, 3 Rooted Vascular, 4 Floating Vascular, 5 *Unknown Submergent*, 6 *Unknown Surface*; 1 Bedrock, 2 Rubble; 1 Cobble-Gravel, 2 Sand, 3 Mud, 4 Organic, 5 Vegetated; 2 Nonpersistent
- SUBSYSTEM 3 — UPPER PERENNIAL
- SUBSYSTEM 4 — INTERMITTENT
- SUBSYSTEM 5 — *UNKNOWN PERENNIAL*
  - CLASS: OW — *OPEN WATER/ Unknown Bottom*

*STREAMBED is limited to TIDAL and INTERMITTENT SUBSYSTEMS, and comprises the only CLASS in the INTERMITTENT SUBSYSTEM.
**EMERGENT is limited to TIDAL and LOWER PERENNIAL SUBSYSTEMS.

SYSTEM: L — LACUSTRINE
- SUBSYSTEM 1 — LIMNETIC
  - CLASS: RB — ROCK BOTTOM; UB — UNCONSOLIDATED BOTTOM; AB — AQUATIC BED; OW — *OPEN WATER/ Unknown Bottom*
  - Subclass: 1 Bedrock, 2 Rubble; 1 Cobble-Gravel, 2 Sand, 3 Mud, 4 Organic; 1 Algal, 2 Aquatic Moss, 3 Rooted Vascular, 4 Floating Vascular, 5 *Unknown Submergent*, 6 *Unknown Surface*
- SUBSYSTEM 2 — LITTORAL
  - CLASS: RB — ROCK BOTTOM; UB — UNCONSOLIDATED BOTTOM; AB — AQUATIC BED; RS — ROCKY SHORE; US — UNCONSOLIDATED SHORE; EM — EMERGENT; OW — *OPEN WATER/ Unknown Bottom*
  - Subclass: 1 Bedrock, 2 Rubble; 1 Cobble-Gravel, 2 Sand, 3 Mud, 4 Organic; 1 Algal, 2 Aquatic Moss, 3 Rooted Vascular, 4 Floating Vascular, 5 *Unknown Submergent*, 6 *Unknown Surface*; 1 Bedrock, 2 Rubble; 1 Cobble-Gravel, 2 Sand, 3 Mud, 4 Organic, 5 Vegetated; 2 Nonpersistent

SYSTEM: P — PALUSTRINE
- CLASS: RB — ROCK BOTTOM; UB — UNCONSOLIDATED BOTTOM; AB — AQUATIC BED; US — UNCONSOLIDATED SHORE; ML — MOSS-LICHEN; EM — EMERGENT; SS — SCRUB-SHRUB; FO — FORESTED; OW — *OPEN WATER/ Unknown Bottom*
- Subclass: 1 Bedrock, 2 Rubble; 1 Cobble-Gravel, 2 Sand, 3 Mud, 4 Organic; 1 Algal, 2 Aquatic Moss, 3 Rooted Vascular, 4 Floating Vascular, 5 *Unknown Submergent*, 6 *Unknown Surface*; 1 Cobble-Gravel, 2 Sand, 3 Mud, 4 Organic, 5 Vegetated; 1 Moss, 2 Lichen; 1 Persistent, 2 Nonpersistent; 1 Broad-Leaved Deciduous, 2 Needle-Leaved Deciduous, 3 Broad-Leaved Evergreen, 4 Needle-Leaved Evergreen, 5 Dead, 6 *Deciduous*, 7 *Evergreen*; 1 Broad-Leaved Deciduous, 2 Needle-Leaved Deciduous, 3 Broad-Leaved Evergreen, 4 Needle-Leaved Evergreen, 5 Dead, 6 *Deciduous*, 7 *Evergreen*

MODIFIERS

In order to more adequately describe wetland and deepwater habitats one or more of the water regime, water chemistry, soil, or special modifiers may be applied at the class or lower level in the hierarchy. The farmed modifier may also be applied to the ecological system.

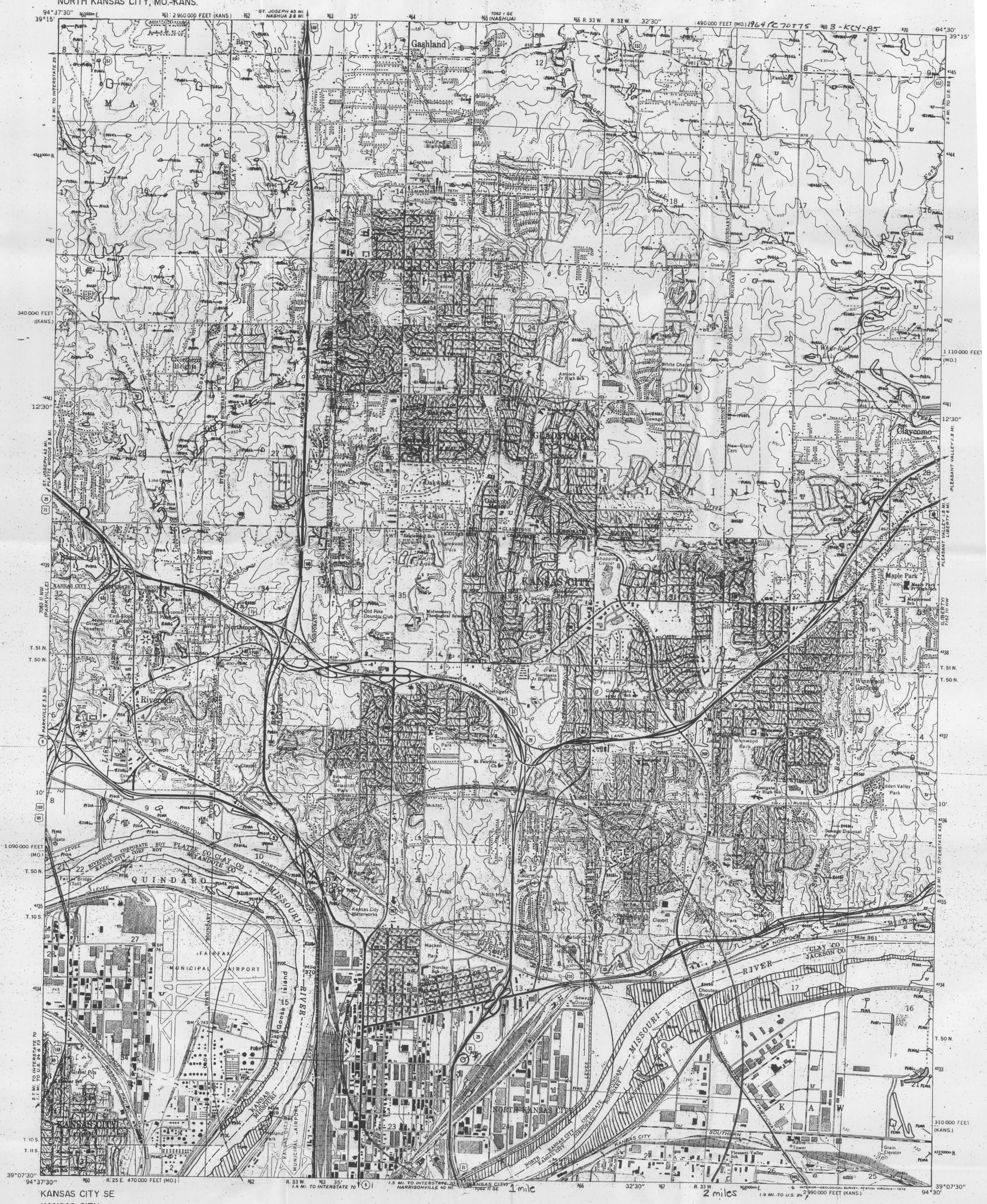
WATER REGIME		WATER CHEMISTRY		SOIL	SPECIAL MODIFIERS
Non-Tidal	Tidal	Coastal Halinity	Inland Salinity		
A Temporarily Flooded	H Permanently Flooded	1 Hyperhaline	7 Hypersaline	g Organic	b *Beaver*
B Saturated	U Intermittently Flooded	2 Euhaline	8 Eusaline	n Mineral	d *Partially Drained/Ditched*
C Seasonally Flooded	K Artificially Flooded	3 Mixohaline *(Brackish)*	9 Mixosaline		f Farmed
D *Seasonally Flooded/ Well Drained*	W Intermittently Flooded/Temporary	4 Polyhaline	0 Fresh		h *Diked/Impounded*
E *Seasonally Flooded/ Saturated*	Y Saturated/Semipermanent/ Seasonal	5 Mesohaline			r Artificial Substrate
F Semipermanently Flooded	Z Intermittently Exposed/Permanent	6 Oligohaline			s *Spoil*
G Intermittently Exposed	U *Unknown*	0 Fresh			x Excavated
	*K Artificially Flooded				
	*L Subtidal				
	*M Irregularly Exposed				
	*N Regularly Flooded				
	*P Irregularly Flooded				
	*S Temporary-Tidal				
	*R Seasonal-Tidal				
	*T Semipermanent-Tidal				
	*V Permanent-Tidal				
	*U *Unknown*				

*These water regimes are only used in tidally influenced, freshwater systems.

NATIONAL WETLANDS INVENTORY

UNITED STATES DEPARTMENT OF THE INTERIOR

NORTH KANSAS CITY, MO.-KANS.



KANSAS CITY SE
KANSAS CITY

NORTH KANSAS CITY, MO.-KANS.

SCALE 1:24 000

1 MILE — 1000 0 1000 2000 3000 4000 5000 6000 7000 FEET — 1 KILOMETER

1 acre · 5 acres · 10 acres · 20 acres · 40 acres

ACREAGE GUIDE

For information on availability of NWI maps, call 1-80Q-USA-MAPS.

Regional Director (ARDE) Region III
U.S. Fish and Wildlife Service
Federal Bldg., Ft. Snelling (AD/BSP)
Twin Cities, Minnesota 55111

Regional Director (ARDE) Region VI
U.S. Fish and Wildlife Service
P.O. Box 2548, Denver Federal Center
Denver, Colorado 80225

SPECIAL NOTE

This document was prepared primarily by stereoscopic analysis of high altitude aerial photographs. Wetlands were identified on the photographs based on vegetation, visible hydrology, and geography in accordance with **Classification of Wetlands and Deepwater Habitats of the United States** (FWS/OBS - 79/31 December 1979). The aerial photographs typically reflect conditions during the specific year and season when they were taken. In addition, there is a margin of error inherent in the use of the aerial photographs. Thus, a detailed on the ground and historical analysis of a single site may result in a revision of the wetland boundaries established through photographic interpretation. In addition, some small wetlands and those obscured by dense forest cover may not be included on this document.

Federal, State and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, State or local government or to establish the geographical scope of the regulatory programs of government agencies. **Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, State or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.**

SYMBOLOGY EXAMPLE

SYSTEM
SUBSYSTEM
CLASS
L2EM2F
SUBCLASS. WATER REGIME
UPLAND (NON-WETLAND)
R2UBH
(LINEAR DEEPWATER HABITAT)

U Primarily represents **upland** areas, but may include unclassified wetlands such as man-modified areas, non photo-identifiable areas and/or unintentional omissions.

NOTES TO THE USER

- Subsystems, Classes, Subclasses, and Water Regimes in *Italics* were developed specifically for NATIONAL WETLANDS INVENTORY mapping.
- Some areas designated as R4SB, R4SBW, OR R4SBJ (INTERMITTENT STREAMS) may not meet the definition of wetland.
- This map uses the class Unconsolidated Shore (US). On earlier NWI maps that class was designated Beach/Bar (BB), or Flat (FL). Subclasses remain the same in both versions.

AERIAL PHOTOGRAPHY

DATE:	6/ /86	11/ /83
SCALE:	1:58 000	1:58 000
TYPE:	CIR	CIR

Eisenberg Fill S
(alias: Leo Eise
MOD98576817
PA/SI Referen

U.S. DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

Prepared by National Wetlands Inventory

Base map provided by the United States Geological Survey.

1994

SYSTEM: M — MARINE

SUBSYSTEM: 1 — SUBTIDAL

CLASS	RB — ROCK BOTTOM	UB — UNCONSOLIDATED BOTTOM	AB — AQUATIC BED	RF — REEF	OW — *OPEN WATER/ Unknown Bottom*
Subclass	1 Bedrock 2 Rubble	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic	1 Algal 3 Rooted Vascular 5 *Unknown Submergent*	1 Coral 3 Worm	

SUBSYSTEM: 2 — INTERTIDAL

CLASS	AB — AQUATIC BED	RF — REEF	RS — ROCKY SHORE	US — UNCONSOLIDATED SHORE
Subclass	1 Algal 3 Rooted Vascular 5 *Unknown Submergent*	1 Coral 3 Worm	1 Bedrock 2 Rubble	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic

SYSTEM: E — ESTUARINE

SUBSYSTEM: 1 — SUBTIDAL

CLASS	RB — ROCK BOTTOM	UB — UNCONSOLIDATED BOTTOM	AB — AQUATIC BED	RF — REEF	OW — *OPEN WATER/ Unknown Bottom*
Subclass	1 Bedrock 2 Rubble	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic	1 Algal 3 Rooted Vascular 4 Floating Vascular 5 *Unknown Submergent* 6 *Unknown Surface*	2 Mollusc 3 Worm	

SUBSYSTEM: 2 — INTERTIDAL

CLASS	AB — AQUATIC BED	RF — REEF	SB — STREAMBED	RS — ROCKY SHORE	US — UNCONSOLIDATED SHORE	EM — EMERGENT	SS — SCRUB-SHRUB	FO — FORESTED
Subclass	1 Algal 3 Rooted Vascular 4 Floating Vascular 5 *Unknown Submergent* 6 *Unknown Surface*	2 Mollusc 3 Worm	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic	1 Bedrock 2 Rubble	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic	1 Persistent 2 Nonpersistent	1 Broad-Leaved Deciduous 2 Needle-Leaved Deciduous 3 Broad-Leaved Evergreen 4 Needle-Leaved Evergreen 5 Dead 6 *Deciduous* 7 *Evergreen*	1 Broad-Leaved Deciduous 2 Needle-Leaved Deciduous 3 Broad-Leaved Evergreen 4 Needle-Leaved Evergreen 5 Dead 6 *Deciduous* 7 *Evergreen*

SYSTEM: R — RIVERINE

SUBSYSTEM: 1 — TIDAL

CLASS	RB — ROCK BOTTOM	UB — UNCONSOLIDATED BOTTOM	*SB — STREAMBED	AB — AQUATIC BED	RS — ROCKY SHORE	US — UNCONSOLIDATED SHORE	**EM — EMERGENT
Subclass	1 Bedrock 2 Rubble	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic	1 Bedrock 2 Rubble 3 Cobble-Gravel 4 Sand 5 Mud 6 Organic 7 Vegetated	1 Algal 2 Aquatic Moss 3 Rooted Vascular 4 Floating Vascular 5 *Unknown Submergent* 6 *Unknown Surface*	1 Bedrock 2 Rubble	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic 5 Vegetated	2 Nonpersistent

SUBSYSTEM: 2 — LOWER PERENNIAL · 3 — UPPER PERENNIAL · 4 — INTERMITTENT · 5 — *UNKNOWN PERENNIAL*

CLASS	RB — ROCK BOTTOM	UB — UNCONSOLIDATED BOTTOM	AB — AQUATIC BED	RS — ROCKY SHORE	US — UNCONSOLIDATED SHORE	**EM — EMERGENT	OW — *OPEN WATER/ Unknown Bottom*
Subclass	1 Bedrock 2 Rubble	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic	1 Algal 2 Aquatic Moss 3 Rooted Vascular 4 Floating Vascular 5 *Unknown Submergent* 6 *Unknown Surface*	1 Bedrock 2 Rubble	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic 5 Vegetated	2 Nonpersistent	

*STREAMBED is limited to TIDAL and INTERMITTENT SUBSYSTEMS, and comprises the only CLASS in the INTERMITTENT SUBSYSTEM.
**EMERGENT is limited to TIDAL and LOWER PERENNIAL SUBSYSTEMS.

SYSTEM: L — LACUSTRINE

SUBSYSTEM: 1 — LIMNETIC

CLASS	RB — ROCK BOTTOM	UB — UNCONSOLIDATED BOTTOM	AB — AQUATIC BED	OW — *OPEN WATER/ Unknown Bottom*
Subclass	1 Bedrock 2 Rubble	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic	1 Algal 2 Aquatic Moss 3 Rooted Vascular 4 Floating Vascular 5 *Unknown Submergent* 6 *Unknown Surface*	

SUBSYSTEM: 2 — LITTORAL

CLASS	RB — ROCK BOTTOM	UB — UNCONSOLIDATED BOTTOM	AB — AQUATIC BED	RS — ROCKY SHORE	US — UNCONSOLIDATED SHORE	EM — EMERGENT	OW — *OPEN WATER/ Unknown Bottom*
Subclass	1 Bedrock 2 Rubble	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic	1 Algal 2 Aquatic Moss 3 Rooted Vascular 4 Floating Vascular 5 *Unknown Submergent* 6 *Unknown Surface*	1 Bedrock 2 Rubble	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic 5 Vegetated	2 Nonpersistent	

SYSTEM: P — PALUSTRINE

CLASS	RB — ROCK BOTTOM	UB — UNCONSOLIDATED BOTTOM	AB — AQUATIC BED	US — UNCONSOLIDATED SHORE	ML — MOSS-LICHEN	EM — EMERGENT	SS — SCRUB-SHRUB	FO — FORESTED	OW — *OPEN WATER/ Unknown Bottom*
Subclass	1 Bedrock 2 Rubble	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic	1 Algal 2 Aquatic Moss 3 Rooted Vascular 4 Floating Vascular 5 *Unknown Submergent* 6 *Unknown Surface*	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic 5 Vegetated	1 Moss 2 Lichen	1 Persistent 2 Nonpersistent	1 Broad-Leaved Deciduous 2 Needle-Leaved Deciduous 3 Broad-Leaved Evergreen 4 Needle-Leaved Evergreen 5 Dead 6 *Deciduous* 7 *Evergreen*	1 Broad-Leaved Deciduous 2 Needle-Leaved Deciduous 3 Broad-Leaved Evergreen 4 Needle-Leaved Evergreen 5 Dead 6 *Deciduous* 7 *Evergreen*	

MODIFIERS

In order to more adequately describe wetland and deepwater habitats one or more of the water regime, water chemistry, soil, or special modifiers may be applied at the class or lower level in the hierarchy. The farmed modifier may also be applied to the ecological system.

WATER REGIME		WATER CHEMISTRY			SOIL	SPECIAL MODIFIERS
Non-Tidal	Tidal	Coastal Halinity	Inland Salinity	pH Modifiers for all Fresh Water		
A Temporarily Flooded B Saturated C Seasonally Flooded D *Seasonally Flooded/ Well Drained* E *Seasonally Flooded/ Saturated* F Semipermanently Flooded G Intermittently Exposed H Permanently Flooded J Intermittently Flooded K Artificially Flooded W Intermittently Flooded/Temporary X Saturated/Semipermanent/ Seasonal Z Intermittently Exposed/Permanent U *Unknown*	K *Artificially Flooded* L Subtidal M Irregularly Exposed N Regularly Flooded P Irregularly Flooded *S Temporary-Tidal *R Seasonal-Tidal *T Semipermanent-Tidal *V Permanent-Tidal U *Unknown* *These water regimes are only used in tidally influenced, freshwater systems.	0 Hyperhaline 1 Euhaline 2 Mixohaline *(Brackish)* 4 Polyhaline 5 Mesohaline 6 Oligohaline 0 Fresh	7 Hypersaline 8 Eusaline 9 Mixosaline 0 Fresh	e Acid t Circumneutral i Alkaline	o Organic m Mineral	b *Beaver* d *Partially Drained/Ditched* f Farmed h *Diked/Impounded* r Artificial Substrate s *Spoil* x Excavated

Eisenberg Fill Site
(alias: Leo Eisenberg's Property)
MOD985768175
PA/SI Reference 44

STATE OF MISSOURI

Mel Carnahan, Governor • David A. Shorr, Director

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM
RESULTS OF SAMPLE ANALYSES

Sample Number: 95-0637
Lab Number: 95-D571

Reported To: JOE BOLAND
Affiliation: RCRA
Project Code: 3658/3378

Report Date: 6/26/95
Date Collected: 4/27/95
Date Received: 4/28/95

Sample Collected by: JOE BOLAND, RCRA
Sampling Location: EISENBERG SITE, 16TH STREET, NORTH KANSAS CITY, MO; GRAB, SOIL, HOLE #1, 0-2', MO-KAN RENTAL PROPERTY

Analysis Performed	Results		Analyzed	Method
Silver, Total	< 2,500	ug/kg	6/13/95	200.7
Arsenic, Total	3,290	ug/kg	5/23/95	206.2
Barium, Total	98,800	ug/kg	6/13/95	200.7
Cadmium, Total	< 500	ug/kg	6/13/95	200.7
Chromium, Total	10,200	ug/kg	6/13/95	200.7
Mercury, Total	< 100	ug/kg	5/11/95	245.1
Lead, Total	18,300	ug/kg	6/13/95	239.2
Selenium, Total	< 500	ug/kg	5/23/95	270.2
Vanadium, Total	61,500	ug/kg	6/13/95	200.7
BNA Results:				
Phenol	< 1,400	ug/kg	5/19/95	8270
bis(-2-Chloroethyl)Ether	< 1,400	ug/kg	5/19/95	8270
2-Chlorophenol	< 3,500	ug/kg	5/19/95	8270
1,3-Dichlorobenzene	< 1,400	ug/kg	5/19/95	8270
1,4-Dichlorobenzene	< 1,400	ug/kg	5/19/95	8270
N-nitrosodimethylamine	< 1,400	ug/kg	5/19/95	8270
1,2-Dichlorobenzene	< 1,400	ug/kg	5/19/95	8270
2-Methylphenol	< 1,400	ug/kg	5/19/95	8270
bis(2-Chloroisopropyl)Eth	< 1,400	ug/kg	5/19/95	8270
4-Methylphenol	< 1,400	ug/kg	5/19/95	8270
N-Nitro-Di-n-Propylamine	< 1,400	ug/kg	5/19/95	8270
Hexachloroethane	< 1,400	ug/kg	5/19/95	8270
Nitrobenzene	< 1,400	ug/kg	5/19/95	8270
Isophorone	< 1,400	ug/kg	5/19/95	8270

Lab Number: 95-D571
Sample Number: 95-0637
June 26, 1995

Analysis Performed	Results		Analyzed	Method
2-Nitrophenol	< 1,400	ug/kg	5/19/95	8270
2,4-Dimethylphenol	< 1,400	ug/kg	5/19/95	8270
Benzoic Acid	< 1,400	ug/kg	5/19/95	8270
bis(2-Chloroethoxy)Methan	< 1,400	ug/kg	5/19/95	8270
2,4-Dichlorophenol	< 1,400	ug/kg	5/19/95	8270
1,2,4-Trichlorobenzene	< 1,400	ug/kg	5/19/95	8270
Naphthalene	< 1,400	ug/kg	5/19/95	8270
4-Chloroaniline	< 3,500	ug/kg	5/19/95	8270
Hexachlorobutadiene	< 1,400	ug/kg	5/19/95	8270
4-Chloro-3-Methylphenol	< 3,500	ug/kg	5/19/95	8270
2-Methylnaphthalene	< 1,400	ug/kg	5/19/95	8270
Hexachlorocyclopentadiene	< 1,400	ug/kg	5/19/95	8270
2,4,6-Trichlorophenol	< 1,400	ug/kg	5/19/95	8270
2,4,5-Trichlorophenol	< 3,500	ug/kg	5/19/95	8270
2-Chloronaphthalene	< 1,400	ug/kg	5/19/95	8270
2-Nitroaniline	< 3,500	ug/kg	5/19/95	8270
Dimethylphthalate	< 1,400	ug/kg	5/19/95	8270
Acenaphthylene	< 1,400	ug/kg	5/19/95	8270
2,6-Dinitrotoluene	< 1,400	ug/kg	5/19/95	8270
3-Nitroaniline	< 3,500	ug/kg	5/19/95	8270
Acenaphthene	< 1,400	ug/kg	5/19/95	8270
2,4-Dinitrophenol	< 3,500	ug/kg	5/19/95	8270
4-Nitrophenol	< 3,500	ug/kg	5/19/95	8270
Dibenzofuran	< 1,400	ug/kg	5/19/95	8270
2,4-Dinitrotoluene	< 1,400	ug/kg	5/19/95	8270
Diethylphthalate	< 1,400	ug/kg	5/19/95	8270
4-Chlorophenyl-phenylethe	< 1,400	ug/kg	5/19/95	8270
Fluorene	< 1,400	ug/kg	5/19/95	8270
4-Nitroaniline	< 3,500	ug/kg	5/19/95	8270
4,6-Dinitro-2-Methylpheno	< 3,500	ug/kg	5/19/95	8270
N-Nitrosodiphenylamine	< 1,400	ug/kg	5/19/95	8270
4-Bromophenyl-phenylether	< 1,400	ug/kg	5/19/95	8270
Hexachlorobenzene	< 1,400	ug/kg	5/19/95	8270
Pentachlorophenol	< 3,500	ug/kg	5/19/95	8270
Phenanthrene	< 1,400	ug/kg	5/19/95	8270
Anthrancene	< 1,400	ug/kg	5/19/95	8270
Di-n-Butylphthalate	< 1,400	ug/kg	5/19/95	8270
Fluoranthene	< 1,400	ug/kg	5/19/95	8270
Comment: Detected at 580 ug/kg				
Pyrene	< 1,400	ug/kg	5/19/95	8270
Comment: Detected at 530 ug/kg				
Butylbenzylphthalate	< 1,400	ug/kg	5/19/95	8270
3-3'-Dichlorobenzidine	< 3,500	ug/kg	5/19/95	8270
Benzo(a)anthracene	< 1,400	ug/kg	5/19/95	8270
Chrysene	< 1,400	ug/kg	5/19/95	8270
bis(2-ethylhexyl)phthalat	< 1,400	ug/kg	5/19/95	8270
Di-n-Octylphthalate	< 1,400	ug/kg	5/19/95	8270
Benzo(b)fluoranthene	< 1,400	ug/kg	5/19/95	8270

Lab Number: 95-D571
Sample Number: 95-0637
June 26, 1995

Analysis Performed	Results		Analyzed	Method
Benzo(k)fluoranthene	< 1,400	ug/kg	5/19/95	8270
Benzo(a)pyrene	< 1,400	ug/kg	5/19/95	8270
Indeno(1,2,3-cd)pyrene	< 1,400	ug/kg	5/19/95	8270
Dibenz(a,h)anthracene	< 1,400	ug/kg	5/19/95	8270
Benzo(g,h,i)perylene	< 1,400	ug/kg	5/19/95	8270

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

Douglas N. Edwards for

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

c: JULIE BLOSS, HWP

STATE OF MISSOURI
Mel Carnahan, Governor • David A. Shear, Director
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM
RESULTS OF SAMPLE ANALYSES

Sample Number: 95-0638
Lab Number: 95-D572

Reported To: JOE BOLAND
Affiliation: RCRA
Project Code: 3658/3378

Report Date: 7/10/95
Date Collected: 4/27/95
Date Received: 4/28/95

Sample Collected by: JOE BOLAND, RCRA
Sampling Location: EISENBERG FILL SITE, 16TH ST., NORTH KANSAS CITY, MO; MO-KAN RENTAL PROPERTY, GRAB, SOIL, HOLE #2, 0-2'

Analysis Performed	Results		Analyzed	Method
Silver, Total	< 2,500	ug/kg	6/13/95	200.7
Arsenic, Total	< 2,500	ug/kg	5/23/95	206.2
Barium, Total	224,000	ug/kg	6/13/95	200.7
Cadmium, Total	4,060	ug/kg	6/13/95	200.7
Chromium, Total	30,900	ug/kg	6/13/95	200.7
Mercury, Total	< 100	ug/kg	5/11/95	245.1
Lead, Total	132,000	ug/kg	6/13/95	239.2
Selenium, Total	< 500	ug/kg	5/23/95	270.2
Vanadium, Total	125,000	ug/kg	6/13/95	200.7
Lead, TCLP	< 2,500	ug/L	6/27/95	239.2
BNA Results:				
Phenol	< 1,400	ug/kg	5/19/95	8270
Comment: Detected at 120 ug/kg				
bis(-2-Chloroethyl)Ether	< 1,400	ug/kg	5/19/95	8270
2-Chlorophenol	< 3,500	ug/kg	5/19/95	8270
1,3-Dichlorobenzene	< 1,400	ug/kg	5/19/95	8270
1,4-Dichlorobenzene	< 1,400	ug/kg	5/19/95	8270
N-nitrosodimethylamine	< 1,400	ug/kg	5/19/95	8270
1,2-Dichlorobenzene	< 1,400	ug/kg	5/19/95	8270
2-Methylphenol	< 1,400	ug/kg	5/19/95	8270
bis(2-Chloroisopropyl)Eth	< 1,400	ug/kg	5/19/95	8270
4-Methylphenol	< 1,400	ug/kg	5/19/95	8270
N-Nitro-Di-n-Propylamine	< 1,400	ug/kg	5/19/95	8270
Hexachloroethane	< 1,400	ug/kg	5/19/95	8270

Lab Number: 95-D572
Sample Number: 95-0638
July 10, 1995

Analysis Performed	Results		Analyzed	Method
Nitrobenzene	< 1,400	ug/kg	5/19/95	8270
Isophorone	< 1,400	ug/kg	5/19/95	8270
2-Nitrophenol	< 1,400	ug/kg	5/19/95	8270
2,4-Dimethylphenol	< 1,400	ug/kg	5/19/95	8270
Benzoic Acid	< 1,400	ug/kg	5/19/95	8270
bis(2-Chloroethoxy)Methan	< 1,400	ug/kg	5/19/95	8270
2,4-Dichlorophenol	< 1,400	ug/kg	5/19/95	8270
1,2,4-Trichlorobenzene	< 1,400	ug/kg	5/19/95	8270
Naphthalene	< 1,400	ug/kg	5/19/95	8270
4-Chloroaniline	< 3,500	ug/kg	5/19/95	8270
Hexachlorobutadiene	< 1,400	ug/kg	5/19/95	8270
4-Chloro-3-Methylphenol	< 3,500	ug/kg	5/19/95	8270
2-Methylnaphthalene	< 1,400	ug/kg	5/19/95	8270
Hexachlorocyclopentadiene	< 1,400	ug/kg	5/19/95	8270
2,4,6-Trichlorophenol	< 1,400	ug/kg	5/19/95	8270
2,4,5-Trichlorophenol	< 3,500	ug/kg	5/19/95	8270
2-Chloronaphthalene	< 1,400	ug/kg	5/19/95	8270
2-Nitroaniline	< 3,500	ug/kg	5/19/95	8270
Dimethylphthalate	< 1,400	ug/kg	5/19/95	8270
Acenaphthylene	< 1,400	ug/kg	5/19/95	8270
2,6-Dinitrotoluene	< 1,400	ug/kg	5/19/95	8270
3-Nitroaniline	< 3,500	ug/kg	5/19/95	8270
Acenaphthene	< 1,400	ug/kg	5/19/95	8270
Comment: Detected at 620 ug/kg				
2,4-Dinitrophenol	< 3,500	ug/kg	5/19/95	8270
4-Nitrophenol	< 3,500	ug/kg	5/19/95	8270
Dibenzofuran	< 1,400	ug/kg	5/19/95	8270
Comment: Detected at 930 ug/kg				
2,4-Dinitrotoluene	< 1,400	ug/kg	5/19/95	8270
Diethylphthalate	< 1,400	ug/kg	5/19/95	8270
4-Chlorophenyl-phenylethe	< 1,400	ug/kg	5/19/95	8270
Fluorene	< 1,400	ug/kg	5/19/95	8270
Comment: Detected at 1000 ug/kg				
4-Nitroaniline	< 3,500	ug/kg	5/19/95	8270
4,6-Dinitro-2-Methylpheno	< 3,500	ug/kg	5/19/95	8270
N-Nitrosodiphenylamine	< 1,400	ug/kg	5/19/95	8270
4-Bromophenyl-phenylether	< 1,400	ug/kg	5/19/95	8270
Hexachlorobenzene	< 1,400	ug/kg	5/19/95	8270
Pentachlorophenol	< 3,500	ug/kg	5/19/95	8270
Phenanthrene	13,000	ug/kg	5/19/95	8270
Anthrancene	5,100	ug/kg	5/19/95	8270
Di-n-Butylphthalate	< 1,400	ug/kg	5/19/95	8270
Fluoranthene	21,000	ug/kg	5/19/95	8270
Pyrene	9,800	ug/kg	5/19/95	8270
Butylbenzylphthalate	< 1,400	ug/kg	5/19/95	8270
3-3'-Dichlorobenzidine	< 3,500	ug/kg	5/19/95	8270
Benzo(a)anthracene	6,900	ug/kg	5/19/95	8270
Chrysene	< 1,400	ug/kg	5/19/95	8270

Lab Number: 95-D572
Sample Number: 95-0638
July 10, 1995

Analysis Performed	Results		Analyzed	Method
bis(2-ethylhexyl)phthalat	< 1,400	ug/kg	5/19/95	8270
Di-n-Octylphthalate	< 1,400	ug/kg	5/19/95	8270
Benzo(b)fluoranthene	< 1,400	ug/kg	5/19/95	8270
Benzo(k)fluoranthene	< 1,400	ug/kg	5/19/95	8270
Benzo(a)pyrene	< 1,400	ug/kg	5/19/95	8270
Indeno(1,2,3-cd)pyrene	< 1,400	ug/kg	5/19/95	8270
Dibenz(a,h)anthracene	< 1,400	ug/kg	5/19/95	8270
Benzo(g,h,i)perylene	< 1,400	ug/kg	5/19/95	8270

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

c: JULIE BLOSS, HWP

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM
RESULTS OF SAMPLE ANALYSES

Sample Number: 95-0639
Lab Number: 95-D573

Reported To: JOE BOLAND
Affiliation: RCRA
Project Code: 3658/3378

Report Date: 6/14/95
Date Collected: 4/27/95
Date Received: 4/28/95

Sample Collected by: JOE BOLAND, RCRA
Sampling Location: EISENBERG FILL SITE, 16TH ST., NORTH KANSAS CITY, MO; GRAB,
Sample Description: SURFACE WATER FROM DRAINAGE DITCH AT PUMPHOUSE

Analysis Performed	Results		Analyzed	Method
pH	6.00		4/27/95	150.1
Comment: Analyzed in field				
Silver, Total	< 10	ug/L	5/12/95	200.7
Arsenic, Total	< 5	ug/L	5/12/95	206.2
Barium, Total	24.4	ug/L	5/12/95	200.7
Cadmium, Total	< 2	ug/L	5/12/95	200.7
Chromium, Total	7.32	ug/L	5/12/95	200.7
Mercury, Total	< 0.2	ug/L	5/11/95	245.1
Lead, Total	< 5	ug/L	5/12/95	239.2
Selenium, Total	< 5	ug/L	5/12/95	270.2
Vanadium, Total	< 10	ug/L	5/12/95	200.7
BNA Results:				
Phenol	< 2	ug/L	5/25/95	8270
bis(-2-Chloroethyl)Ether	< 2	ug/L	5/25/95	8270
2-Chlorophenol	< 5	ug/L	5/25/95	8270
1,3-Dichlorobenzene	< 2	ug/L	5/25/95	8270
1,4-Dichlorobenzene	< 2	ug/L	5/25/95	8270
N-nitrosodimethylamine	< 2	ug/L	5/25/95	8270
1,2-Dichlorobenzene	< 2	ug/L	5/25/95	8270
2-Methylphenol	< 2	ug/L	5/25/95	8270
bis(2-Chloroisopropyl)Eth	< 2	ug/L	5/25/95	8270
4-Methylphenol	< 2	ug/L	5/25/95	8270
N-Nitro-Di-n-Propylamine	< 2	ug/L	5/25/95	8270
Hexachloroethane	< 2	ug/L	5/25/95	8270

Lab Number: 95-D573
Sample Number: 95-0639
June 14, 1995

Analysis Performed	Results		Analyzed	Method
Nitrobenzene	< 2	ug/L	5/25/95	8270
Isophorone	< 2	ug/L	5/25/95	8270
2-Nitrophenol	< 2	ug/L	5/25/95	8270
2,4-Dimethylphenol	< 2	ug/L	5/25/95	8270
Benzoic Acid	< 2	ug/L	5/25/95	8270
bis(2-Chloroethoxy)Methan	< 2	ug/L	5/25/95	8270
2,4-Dichlorophenol	< 2	ug/L	5/25/95	8270
1,2,4-Trichlorobenzene	< 2	ug/L	5/25/95	8270
Naphthalene	< 2	ug/L	5/25/95	8270
4-Chloroaniline	< 5	ug/L	5/25/95	8270
Hexachlorobutadiene	< 2	ug/L	5/25/95	8270
4-Chloro-3-Methylphenol	< 5	ug/L	5/25/95	8270
2-Methylnaphthalene	< 2	ug/L	5/25/95	8270
Hexachlorocyclopentadiene	< 2	ug/L	5/25/95	8270
2,4,6-Trichlorophenol	< 2	ug/L	5/25/95	8270
2,4,5-Trichlorophenol	< 5	ug/L	5/25/95	8270
2-Chloronaphthalene	< 2	ug/L	5/25/95	8270
2-Nitroaniline	< 5	ug/L	5/25/95	8270
Dimethylphthalate	< 2	ug/L	5/25/95	8270
Acenaphthylene	< 2	ug/L	5/25/95	8270
2,6-Dinitrotoluene	< 2	ug/L	5/25/95	8270
3-Nitroaniline	< 5	ug/L	5/25/95	8270
Acenaphthene	< 2	ug/L	5/25/95	8270
2,4-Dinitrophenol	< 5	ug/L	5/25/95	8270
4-Nitrophenol	< 5	ug/L	5/25/95	8270
Dibenzofuran	< 2	ug/L	5/25/95	8270
2,4-Dinitrotoluene	< 2	ug/L	5/25/95	8270
Diethylphthalate	< 2	ug/L	5/25/95	8270
4-Chlorophenyl-phenylethe	< 2	ug/L	5/25/95	8270
Fluorene	< 2	ug/L	5/25/95	8270
4-Nitroaniline	< 5	ug/L	5/25/95	8270
4,6-Dinitro-2-Methylpheno	< 5	ug/L	5/25/95	8270
N-Nitrosodiphenylamine	< 2	ug/L	5/25/95	8270
4-Bromophenyl-phenylether	< 2	ug/L	5/25/95	8270
Hexachlorobenzene	< 2	ug/L	5/25/95	8270
Pentachlorophenol	< 5	ug/L	5/25/95	8270
Phenanthrene	< 2	ug/L	5/25/95	8270
Anthrancene	< 2	ug/L	5/25/95	8270
Di-n-Butylphthalate	< 2	ug/L	5/25/95	8270
Fluoranthene	< 2	ug/L	5/25/95	8270
Pyrene	< 2	ug/L	5/25/95	8270
Butylbenzylphthalate	< 2	ug/L	5/25/95	8270
3-3'-Dichlorobenzidine	< 5	ug/L	5/25/95	8270
Benzo(a)anthracene	< 2	ug/L	5/25/95	8270
Chrysene	< 2	ug/L	5/25/95	8270
bis(2-ethylhexyl)phthalat	2.50	ug/L	5/25/95	8270
Di-n-Octylphthalate	< 2	ug/L	5/25/95	8270
Benzo(b)fluoranthene	< 2	ug/L	5/25/95	8270

Lab Number: 95-D573
Sample Number: 95-0639
June 14, 1995

Analysis Performed	Results		Analyzed	Method
Benzo(k)fluoranthene	< 2	ug/L	5/25/95	8270
Benzo(a)pyrene	< 2	ug/L	5/25/95	8270
Indeno(1,2,3-cd)pyrene	< 2	ug/L	5/25/95	8270
Dibenz(a,h)anthracene	< 2	ug/L	5/25/95	8270
Benzo(g,h,i)perylene	< 2	ug/L	5/25/95	8270

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

c: JULIE BLOSS, HWP

STATE OF MISSOURI
Mel Carnahan, Governor • David A. Shorr, Director
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM
RESULTS OF SAMPLE ANALYSES

Sample Number: 95-0640
Lab Number: 95-D574

Reported To: JOE BOLAND
Affiliation: RCRA
Project Code: 3658/3378

Report Date: 6/26/95
Date Collected: 4/27/95
Date Received: 4/28/95

Sample Collected by: JOE BOLAND, RCRA
Sampling Location: EISENBERG FILL SITE, 16TH ST., NORTH KANSAS CITY, MO; GRAB,
Sample Description: SOIL, BACKGROUND FROM HIGHWAY EXIT RAMP, 0-2'

Analysis Performed	Results		Analyzed	Method
Silver, Total	< 2,500	ug/kg	6/13/95	200.7
Arsenic, Total	10,500	ug/kg	5/23/95	206.2
Barium, Total	241,000	ug/kg	6/13/95	200.7
Cadmium, Total	1,030	ug/kg	6/13/95	200.7
Chromium, Total	19,800	ug/kg	6/13/95	200.7
Mercury, Total	< 100	ug/kg	5/11/95	245.1
Lead, Total	32,500	ug/kg	6/13/95	239.2
Selenium, Total	< 500	ug/kg	5/23/95	270.2
Vanadium, Total	142,000	ug/kg	6/13/95	200.7
BNA Results:				
Phenol	< 150	ug/kg	5/19/95	8270
bis(-2-Chloroethyl)Ether	< 150	ug/kg	5/19/95	8270
2-Chlorophenol	< 350	ug/kg	5/19/95	8270
1,3-Dichlorobenzene	< 150	ug/kg	5/19/95	8270
1,4-Dichlorobenzene	< 150	ug/kg	5/19/95	8270
N-nitrosodimethylamine	< 150	ug/kg	5/19/95	8270
1,2-Dichlorobenzene	< 150	ug/kg	5/19/95	8270
2-Methylphenol	< 150	ug/kg	5/19/95	8270
bis(2-Chloroisopropyl)Eth	< 150	ug/kg	5/19/95	8270
4-Methylphenol	< 150	ug/kg	5/19/95	8270
N-Nitro-Di-n-Propylamine	< 150	ug/kg	5/19/95	8270
Hexachloroethane	< 150	ug/kg	5/19/95	8270
Nitrobenzene	< 150	ug/kg	5/19/95	8270
Isophorone	< 150	ug/kg	5/19/95	8270

Lab Number: 95-D574
Sample Number: 95-0640
June 26, 1995

Analysis Performed	Results		Analyzed	Method
2-Nitrophenol	< 150	ug/kg	5/19/95	8270
2,4-Dimethylphenol	< 150	ug/kg	5/19/95	8270
Benzoic Acid	< 150	ug/kg	5/19/95	8270
bis(2-Chloroethoxy)Methan	< 150	ug/kg	5/19/95	8270
2,4-Dichlorophenol	< 150	ug/kg	5/19/95	8270
1,2,4-Trichlorobenzene	< 150	ug/kg	5/19/95	8270
Naphthalene	< 150	ug/kg	5/19/95	8270
4-Chloroaniline	< 350	ug/kg	5/19/95	8270
Hexachlorobutadiene	< 150	ug/kg	5/19/95	8270
4-Chloro-3-Methylphenol	< 350	ug/kg	5/19/95	8270
2-Methylnaphthalene	< 150	ug/kg	5/19/95	8270
Hexachlorocyclopentadiene	< 150	ug/kg	5/19/95	8270
2,4,6-Trichlorophenol	< 150	ug/kg	5/19/95	8270
2,4,5-Trichlorophenol	< 350	ug/kg	5/19/95	8270
2-Chloronaphthalene	< 150	ug/kg	5/19/95	8270
2-Nitroaniline	< 350	ug/kg	5/19/95	8270
Dimethylphthalate	< 150	ug/kg	5/19/95	8270
Acenaphthylene	< 150	ug/kg	5/19/95	8270
2,6-Dinitrotoluene	< 150	ug/kg	5/19/95	8270
3-Nitroaniline	< 350	ug/kg	5/19/95	8270
Acenaphthene	< 150	ug/kg	5/19/95	8270
2,4-Dinitrophenol	< 350	ug/kg	5/19/95	8270
4-Nitrophenol	< 350	ug/kg	5/19/95	8270
Dibenzofuran	< 150	ug/kg	5/19/95	8270
2,4-Dinitrotoluene	< 150	ug/kg	5/19/95	8270
Diethylphthalate	< 150	ug/kg	5/19/95	8270
4-Chlorophenyl-phenylethe	< 150	ug/kg	5/19/95	8270
Fluorene	< 150	ug/kg	5/19/95	8270
4-Nitroaniline	< 350	ug/kg	5/19/95	8270
4,6-Dinitro-2-Methylpheno	< 350	ug/kg	5/19/95	8270
N-Nitrosodiphenylamine	< 150	ug/kg	5/19/95	8270
4-Bromophenyl-phenylether	< 150	ug/kg	5/19/95	8270
Hexachlorobenzene	< 150	ug/kg	5/19/95	8270
Pentachlorophenol	< 350	ug/kg	5/19/95	8270
Phenanthrene	< 150	ug/kg	5/19/95	8270
Anthrancene	< 150	ug/kg	5/19/95	8270
Di-n-Butylphthalate	< 150	ug/kg	5/19/95	8270
Fluoranthene	< 150	ug/kg	5/19/95	8270
Comment: Detected at 100 ug/kg				
Pyrene	< 150	ug/kg	5/19/95	8270
Comment: Detected at 73 ug/kg				
Butylbenzylphthalate	< 150	ug/kg	5/19/95	8270
3-3'-Dichlorobenzidine	< 350	ug/kg	5/19/95	8270
Benzo(a)anthracene	< 150	ug/kg	5/19/95	8270
Chrysene	< 150	ug/kg	5/19/95	8270
bis(2-ethylhexyl)phthalat	< 150	ug/kg	5/19/95	8270
Di-n-Octylphthalate	< 150	ug/kg	5/19/95	8270
Benzo(b)fluoranthene	< 150	ug/kg	5/19/95	8270

Lab Number: 95-D574
Sample Number: 95-0640
June 26, 1995

Analysis Performed	Results		Analyzed	Method
Benzo(k)fluoranthene	< 150	ug/kg	5/19/95	8270
Benzo(a)pyrene	< 150	ug/kg	5/19/95	8270
Indeno(1,2,3-cd)pyrene	< 150	ug/kg	5/19/95	8270
Dibenz(a,h)anthracene	< 150	ug/kg	5/19/95	8270
Benzo(g,h,i)perylene	< 150	ug/kg	5/19/95	8270

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

Douglas N. Edwards for
James H. Long, Director
Environmental Services Program
Division of Environmental Quality

c: JULIE BLOSS, HWP

STATE OF MISSOURI
Mel Carnahan, Governor • David A. Shorr, Director
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM
RESULTS OF SAMPLE ANALYSES

Sample Number: 95-0641
Lab Number: 95-D575

Reported To: JOE BOLAND
Affiliation: RCRA
Project Code: 3658/3378

Report Date: 6/22/95
Date Collected: 4/27/95
Date Received: 4/28/95

Sample Collected by: JOE BOLAND, RCRA
Sampling Location: EISENBERG FILL SITE, 16TH ST., NORTH KANSAS CITY, MO; GRAB, SURFACE WATER FROM DRAINAGE NEAR HIGHWAY EXIT RAMP

Analysis Performed	Results		Analyzed	Method
pH	6.00		4/27/95	150.1
Comment: Analyzed in field				
Silver, Total	< 10	ug/L	5/12/95	200.7
Arsenic, Total	< 5	ug/L	5/12/95	206.2
Barium, Total	56.9	ug/L	5/12/95	200.7
Cadmium, Total	< 2	ug/L	5/12/95	200.7
Chromium, Total	20.2	ug/L	5/12/95	200.7
Mercury, Total	< 0.2	ug/L	5/11/95	245.1
Lead, Total	< 5	ug/L	5/12/95	239.2
Selenium, Total	< 5	ug/L	5/12/95	270.2
Vanadium, Total	< 10	ug/L	5/12/95	200.7
BNA Results:				
Phenol	< 2	ug/L	6/16/95	8270
bis(-2-Chloroethyl)Ether	< 2	ug/L	6/16/95	8270
2-Chlorophenol	< 5	ug/L	6/16/95	8270
1,3-Dichlorobenzene	< 2	ug/L	6/16/95	8270
1,4-Dichlorobenzene	< 2	ug/L	6/16/95	8270
N-nitrosodimethylamine	< 2	ug/L	6/16/95	8270
1,2-Dichlorobenzene	< 2	ug/L	6/16/95	8270
2-Methylphenol	< 2	ug/L	6/16/95	8270
bis(2-Chloroisopropyl)Eth	< 2	ug/L	6/16/95	8270
4-Methylphenol	< 2	ug/L	6/16/95	8270
N-Nitro-Di-n-Propylamine	< 2	ug/L	6/16/95	8270
Hexachloroethane	< 2	ug/L	6/16/95	8270

Lab Number: 95-D575
Sample Number: 95-0641
June 22, 1995

Analysis Performed	Results		Analyzed	Method
Nitrobenzene	< 2	ug/L	6/16/95	8270
Isophorone	< 2	ug/L	6/16/95	8270
2-Nitrophenol	< 2	ug/L	6/16/95	8270
2,4-Dimethylphenol	< 2	ug/L	6/16/95	8270
Benzoic Acid	< 2	ug/L	6/16/95	8270
bis(2-Chloroethoxy)Methan	< 2	ug/L	6/16/95	8270
2,4-Dichlorophenol	< 2	ug/L	6/16/95	8270
1,2,4-Trichlorobenzene	< 2	ug/L	6/16/95	8270
Naphthalene	< 2	ug/L	6/16/95	8270
4-Chloroaniline	< 5	ug/L	6/16/95	8270
Hexachlorobutadiene	< 2	ug/L	6/16/95	8270
4-Chloro-3-Methylphenol	< 5	ug/L	6/16/95	8270
2-Methylnaphthalene	< 2	ug/L	6/16/95	8270
Hexachlorocyclopentadiene	< 2	ug/L	6/16/95	8270
2,4,6-Trichlorophenol	< 2	ug/L	6/16/95	8270
2,4,5-Trichlorophenol	< 5	ug/L	6/16/95	8270
2-Chloronaphthalene	< 2	ug/L	6/16/95	8270
2-Nitroaniline	< 5	ug/L	6/16/95	8270
Dimethylphthalate	< 2	ug/L	6/16/95	8270
Acenaphthylene	< 2	ug/L	6/16/95	8270
2,6-Dinitrotoluene	< 2	ug/L	6/16/95	8270
3-Nitroaniline	< 5	ug/L	6/16/95	8270
Acenaphthene	< 2	ug/L	6/16/95	8270
2,4-Dinitrophenol	< 5	ug/L	6/16/95	8270
4-Nitrophenol	< 5	ug/L	6/16/95	8270
Dibenzofuran	< 2	ug/L	6/16/95	8270
2,4-Dinitrotoluene	< 2	ug/L	6/16/95	8270
Diethylphthalate	< 2	ug/L	6/16/95	8270
4-Chlorophenyl-phenylethe	< 2	ug/L	6/16/95	8270
Fluorene	< 2	ug/L	6/16/95	8270
4-Nitroaniline	< 5	ug/L	6/16/95	8270
4,6-Dinitro-2-Methylpheno	< 5	ug/L	6/16/95	8270
N-Nitrosodiphenylamine	< 2	ug/L	6/16/95	8270
4-Bromophenyl-phenylether	< 2	ug/L	6/16/95	8270
Hexachlorobenzene	< 2	ug/L	6/16/95	8270
Pentachlorophenol	< 5	ug/L	6/16/95	8270
Phenanthrene	< 2	ug/L	6/16/95	8270
Anthrancene	< 2	ug/L	6/16/95	8270
Di-n-Butylphthalate	< 2	ug/L	6/16/95	8270
Comment: Detected at 0.86 ug/L				
Fluoranthene	< 2	ug/L	6/16/95	8270
Pyrene	< 2	ug/L	6/16/95	8270
Butylbenzylphthalate	< 2	ug/L	6/16/95	8270
3-3'-Dichlorobenzidine	< 5	ug/L	6/16/95	8270
Benzo(a)anthracene	< 2	ug/L	6/16/95	8270
Chrysene	< 2	ug/L	6/16/95	8270
bis(2-ethylhexyl)phthalat	30.0	ug/L	6/16/95	8270
Di-n-Octylphthalate	< 2	ug/L	6/16/95	8270

Lab Number: 95-D575
Sample Number: 95-0641
June 22, 1995

Analysis Performed	Results		Analyzed	Method
Benzo(b)fluoranthene	< 2	ug/L	6/16/95	8270
Benzo(k)fluoranthene	< 2	ug/L	6/16/95	8270
Benzo(a)pyrene	< 2	ug/L	6/16/95	8270
Indeno(1,2,3-cd)pyrene	< 2	ug/L	6/16/95	8270
Dibenz(a,h)anthracene	< 2	ug/L	6/16/95	8270
Benzo(g,h,i)perylene	< 2	ug/L	6/16/95	8270

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

c: JULIE BLOSS, HWP

STATE OF MISSOURI
Mel Carnahan, Governor • David A. Shorr, Director
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM
RESULTS OF SAMPLE ANALYSES

Sample Number: 95-0642
Lab Number: 95-D576

Reported To: JOE BOLAND
Affiliation: RCRA
Project Code: 3658/3378

Report Date: 7/10/95
Date Collected: 4/27/95
Date Received: 4/28/95

Sample Collected by: JOE BOLAND, RCRA
Sampling Location: EISENBERG FILL SITE, 16TH ST., NORTH KANSAS CITY, MO; GRAB,
Sample Description: SEDIMENT FROM DRAINAGE DITCH NEAR HIGHWAY EXIT RAMP

Analysis Performed	Results		Analyzed	Method
Silver, Total	< 2,500	ug/kg	6/13/95	200.7
Arsenic, Total	< 2,500	ug/kg	5/23/95	206.2
Barium, Total	204,000	ug/kg	6/13/95	200.7
Cadmium, Total	3,560	ug/kg	6/13/95	200.7
Chromium, Total	48,200	ug/kg	6/13/95	200.7
Mercury, Total	< 100	ug/kg	5/11/95	245.1
Lead, Total	167,000	ug/kg	6/13/95	239.2
Selenium, Total	531	ug/kg	5/23/95	270.2
Vanadium, Total	163,000	ug/kg	6/13/95	200.7
Lead, TCLP	< 2,500	ug/L	6/27/95	239.2
BNA Results:				
Phenol	< 1,400	ug/kg	5/19/95	8270
bis(-2-Chloroethyl)Ether	< 1,400	ug/kg	5/19/95	8270
2-Chlorophenol	< 3,500	ug/kg	5/19/95	8270
1,3-Dichlorobenzene	< 1,400	ug/kg	5/19/95	8270
1,4-Dichlorobenzene	< 1,400	ug/kg	5/19/95	8270
N-nitrosodimethylamine	< 1,400	ug/kg	5/19/95	8270
1,2-Dichlorobenzene	< 1,400	ug/kg	5/19/95	8270
2-Methylphenol	< 1,400	ug/kg	5/19/95	8270
bis(2-Chloroisopropyl)Eth	< 1,400	ug/kg	5/19/95	8270
4-Methylphenol	< 1,400	ug/kg	5/19/95	8270
N-Nitro-Di-n-Propylamine	< 1,400	ug/kg	5/19/95	8270
Hexachloroethane	< 1,400	ug/kg	5/19/95	8270
Nitrobenzene	< 1,400	ug/kg	5/19/95	8270

Lab Number: 95-D576
Sample Number: 95-0642
July 10, 1995

Analysis Performed	Results		Analyzed	Method
Isophorone	< 1,400	ug/kg	5/19/95	8270
2-Nitrophenol	< 1,400	ug/kg	5/19/95	8270
2,4-Dimethylphenol	< 1,400	ug/kg	5/19/95	8270
Benzoic Acid	< 1,400	ug/kg	5/19/95	8270
bis(2-Chloroethoxy)Methan	< 1,400	ug/kg	5/19/95	8270
2,4-Dichlorophenol	< 1,400	ug/kg	5/19/95	8270
1,2,4-Trichlorobenzene	< 1,400	ug/kg	5/19/95	8270
Naphthalene	< 1,400	ug/kg	5/19/95	8270
4-Chloroaniline	< 3,500	ug/kg	5/19/95	8270
Hexachlorobutadiene	< 1,400	ug/kg	5/19/95	8270
4-Chloro-3-Methylphenol	< 3,500	ug/kg	5/19/95	8270
2-Methylnaphthalene	< 1,400	ug/kg	5/19/95	8270
Hexachlorocyclopentadiene	< 1,400	ug/kg	5/19/95	8270
2,4,6-Trichlorophenol	< 1,400	ug/kg	5/19/95	8270
2,4,5-Trichlorophenol	< 3,500	ug/kg	5/19/95	8270
2-Chloronaphthalene	< 1,400	ug/kg	5/19/95	8270
2-Nitroaniline	< 3,500	ug/kg	5/19/95	8270
Dimethylphthalate	< 1,400	ug/kg	5/19/95	8270
Acenaphthylene	< 1,400	ug/kg	5/19/95	8270
2,6-Dinitrotoluene	< 1,400	ug/kg	5/19/95	8270
3-Nitroaniline	< 3,500	ug/kg	5/19/95	8270
Acenaphthene	< 1,400	ug/kg	5/19/95	8270
2,4-Dinitrophenol	< 3,500	ug/kg	5/19/95	8270
4-Nitrophenol	< 3,500	ug/kg	5/19/95	8270
Dibenzofuran	< 1,400	ug/kg	5/19/95	8270
2,4-Dinitrotoluene	< 1,400	ug/kg	5/19/95	8270
Diethylphthalate	< 1,400	ug/kg	5/19/95	8270
4-Chlorophenyl-phenylethe	< 1,400	ug/kg	5/19/95	8270
Fluorene	< 1,400	ug/kg	5/19/95	8270
4-Nitroaniline	< 3,500	ug/kg	5/19/95	8270
4,6-Dinitro-2-Methylpheno	< 3,500	ug/kg	5/19/95	8270
N-Nitrosodiphenylamine	< 1,400	ug/kg	5/19/95	8270
4-Bromophenyl-phenylether	< 1,400	ug/kg	5/19/95	8270
Hexachlorobenzene	< 1,400	ug/kg	5/19/95	8270
Pentachlorophenol	< 3,500	ug/kg	5/19/95	8270
Phenanthrene	< 1,400	ug/kg	5/19/95	8270
Anthrancene	< 1,400	ug/kg	5/19/95	8270
Di-n-Butylphthalate	< 1,400	ug/kg	5/19/95	8270
Fluoranthene	< 1,400	ug/kg	5/19/95	8270
Pyrene	< 1,400	ug/kg	5/19/95	8270
Butylbenzylphthalate	< 1,400	ug/kg	5/19/95	8270
3-3'-Dichlorobenzidine	< 3,500	ug/kg	5/19/95	8270
Benzo(a)anthracene	< 1,400	ug/kg	5/19/95	8270
Chrysene	< 1,400	ug/kg	5/19/95	8270
bis(2-ethylhexyl)phthalat	570,000	ug/kg	5/19/95	8270
Di-n-Octylphthalate	180,000	ug/kg	5/19/95	8270
Benzo(b)fluoranthene	< 1,400	ug/kg	5/19/95	8270
Benzo(k)fluoranthene	< 1,400	ug/kg	5/19/95	8270

Lab Number: 95-D576
Sample Number: 95-0642
July 10, 1995

Analysis Performed	Results		Analyzed	Method
Benzo(a)pyrene	< 1,400	ug/kg	5/19/95	8270
Indeno(1,2,3-cd)pyrene	< 1,400	ug/kg	5/19/95	8270
Dibenz(a,h)anthracene	< 1,400	ug/kg	5/19/95	8270
Benzo(g,h,i)perylene	< 1,400	ug/kg	5/19/95	8270

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

c: JULIE BLOSS, HWP

STATE OF MISSOURI
Mel Carnahan, Governor • David A. Shorr, Director
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM
RESULTS OF SAMPLE ANALYSES

Sample Number: 95-0643
Lab Number: 95-D577

Reported To: JOE BOLAND
Affiliation: RCRA
Project Code: 3658/3378

Report Date: 7/10/95
Date Collected: 4/27/95
Date Received: 4/28/95

Sample Collected by: JOE BOLAND, RCRA
Sampling Location: EISENBERG FILL SITE, 16TH ST., NORTH KANSAS CITY, MO; GRAB, SEDIMENT FROM DRAINAGE DITCH AT PUMPHOUSE

Analysis Performed	Results		Analyzed	Method
Silver, Total	< 2,500	ug/kg	6/13/95	200.7
Arsenic, Total	12,000	ug/kg	5/23/95	206.2
Barium, Total	311,000	ug/kg	6/13/95	200.7
Cadmium, Total	11,900	ug/kg	6/13/95	200.7
Chromium, Total	108,000	ug/kg	6/13/95	200.7
Mercury, Total	< 100	ug/kg	5/11/95	245.1
Lead, Total	743,000	ug/kg	6/13/95	239.2
Selenium, Total	2,940	ug/kg	5/23/95	270.2
Vanadium, Total	123,000	ug/kg	6/13/95	200.7
Chromium, TCLP	< 2,500	ug/L	6/27/95	200.7
Lead, TCLP	< 2,500	ug/L	6/27/95	239.2
BNA Results:				
Phenol	< 1,400	ug/kg	5/19/95	8270
bis(-2-Chloroethyl)Ether	< 1,400	ug/kg	5/19/95	8270
2-Chlorophenol	< 3,500	ug/kg	5/19/95	8270
1,3-Dichlorobenzene	< 1,400	ug/kg	5/19/95	8270
1,4-Dichlorobenzene	< 1,400	ug/kg	5/19/95	8270
N-nitrosodimethylamine	< 1,400	ug/kg	5/19/95	8270
1,2-Dichlorobenzene	< 1,400	ug/kg	5/19/95	8270
2-Methylphenol	< 1,400	ug/kg	5/19/95	8270
bis(2-Chloroisopropyl)Eth	< 1,400	ug/kg	5/19/95	8270
4-Methylphenol	< 1,400	ug/kg	5/19/95	8270
N-Nitro-Di-n-Propylamine	< 1,400	ug/kg	5/19/95	8270
Hexachloroethane	< 1,400	ug/kg	5/19/95	8270

Lab Number: 95-D577
Sample Number: 95-0643
July 10, 1995

Analysis Performed	Results		Analyzed	Method
Nitrobenzene	< 1,400	ug/kg	5/19/95	8270
Isophorone	< 1,400	ug/kg	5/19/95	8270
2-Nitrophenol	< 1,400	ug/kg	5/19/95	8270
2,4-Dimethylphenol	< 1,400	ug/kg	5/19/95	8270
Benzoic Acid	< 1,400	ug/kg	5/19/95	8270
bis(2-Chloroethoxy)Methan	< 1,400	ug/kg	5/19/95	8270
2,4-Dichlorophenol	< 1,400	ug/kg	5/19/95	8270
1,2,4-Trichlorobenzene	< 1,400	ug/kg	5/19/95	8270
Naphthalene	< 1,400	ug/kg	5/19/95	8270
4-Chloroaniline	< 3,500	ug/kg	5/19/95	8270
Hexachlorobutadiene	< 1,400	ug/kg	5/19/95	8270
4-Chloro-3-Methylphenol	< 3,500	ug/kg	5/19/95	8270
2-Methylnaphthalene	< 1,400	ug/kg	5/19/95	8270
Hexachlorocyclopentadiene	< 1,400	ug/kg	5/19/95	8270
2,4,6-Trichlorophenol	< 1,400	ug/kg	5/19/95	8270
2,4,5-Trichlorophenol	< 3,500	ug/kg	5/19/95	8270
2-Chloronaphthalene	< 1,400	ug/kg	5/19/95	8270
2-Nitroaniline	< 3,500	ug/kg	5/19/95	8270
Dimethylphthalate	< 1,400	ug/kg	5/19/95	8270
Acenaphthylene	< 1,400	ug/kg	5/19/95	8270
2,6-Dinitrotoluene	< 1,400	ug/kg	5/19/95	8270
3-Nitroaniline	< 3,500	ug/kg	5/19/95	8270
Acenaphthene	< 1,400	ug/kg	5/19/95	8270
Comment: Detected at 150 ug/kg				
2,4-Dinitrophenol	< 3,500	ug/kg	5/19/95	8270
4-Nitrophenol	< 3,500	ug/kg	5/19/95	8270
Dibenzofuran	< 1,400	ug/kg	5/19/95	8270
2,4-Dinitrotoluene	< 1,400	ug/kg	5/19/95	8270
Diethylphthalate	< 1,400	ug/kg	5/19/95	8270
4-Chlorophenyl-phenylethe	< 1,400	ug/kg	5/19/95	8270
Fluorene	< 1,400	ug/kg	5/19/95	8270
4-Nitroaniline	< 3,500	ug/kg	5/19/95	8270
4,6-Dinitro-2-Methylpheno	< 3,500	ug/kg	5/19/95	8270
N-Nitrosodiphenylamine	< 1,400	ug/kg	5/19/95	8270
4-Bromophenyl-phenylether	< 1,400	ug/kg	5/19/95	8270
Hexachlorobenzene	< 1,400	ug/kg	5/19/95	8270
Pentachlorophenol	< 3,500	ug/kg	5/19/95	8270
Phenanthrene	4,800	ug/kg	5/19/95	8270
Anthrancene	< 1,400	ug/kg	5/19/95	8270
Comment: Detected at 1200 ug/kg				
Di-n-Butylphthalate	< 1,400	ug/kg	5/19/95	8270
Fluoranthene	6,100	ug/kg	5/19/95	8270
Pyrene	4,700	ug/kg	5/19/95	8270
Butylbenzylphthalate	< 1,400	ug/kg	5/19/95	8270
Comment: Detected at 1100 ug/kg				
3-3'-Dichlorobenzidine	< 3,500	ug/kg	5/19/95	8270
Benzo(a)anthracene	2,100	ug/kg	5/19/95	8270
Chrysene	2,800	ug/kg	5/19/95	8270

Lab Number: 95-D577
Sample Number: 95-0643
July 10, 1995

Analysis Performed	Results		Analyzed	Method
bis(2-ethylhexyl)phthalat	< 1,400	ug/kg	5/19/95	8270
Di-n-Octylphthalate	< 1,400	ug/kg	5/19/95	8270
Benzo(b)fluoranthene	< 1,400	ug/kg	5/19/95	8270
Benzo(k)fluoranthene	< 1,400	ug/kg	5/19/95	8270
Benzo(a)pyrene	< 1,400	ug/kg	5/19/95	8270
Indeno(1,2,3-cd)pyrene	< 1,400	ug/kg	5/19/95	8270
Dibenz(a,h)anthracene	< 1,400	ug/kg	5/19/95	8270
Benzo(g,h,i)perylene	< 1,400	ug/kg	5/19/95	8270

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

c: JULIE BLOSS, HWP

STATE OF MISSOURI
Mel Carnahan, Governor • David A. Shorr, Director
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-176

ENVIRONMENTAL SERVICES PROGRAM
RESULTS OF SAMPLE ANALYSES

Sample Number: 95-0644
Lab Number: 95-D578

Reported To: JOE BOLAND
Affiliation: RCRA
Project Code: 3658/3378

Report Date: 6/30/95
Date Collected: 4/27/95
Date Received: 4/28/95

Sample Collected by: JOE BOLAND, RCRA
Sampling Location: EISENBERG FILL SITE, 16TH ST., NORTH KANSAS CITY, MO; GRAB,
Sample Description: FILL MATERIAL ON NORTH SIDE OF MO-KAN AREA

Analysis Performed	Results		Analyzed	Method
Silver, Total	< 2,500	ug/kg	6/13/95	200.7
Arsenic, Total	6,180	ug/kg	5/23/95	206.2
Barium, Total	25,900	ug/kg	6/13/95	200.7
Cadmium, Total	< 500	ug/kg	6/13/95	200.7
Chromium, Total	33,500	ug/kg	6/13/95	200.7
Mercury, Total	< 100	ug/kg	5/11/95	245.1
Lead, Total	14,300	ug/kg	6/13/95	239.2
Selenium, Total	2,790	ug/kg	5/23/95	270.2
Vanadium, Total	209,000	ug/kg	6/13/95	200.7
BNA Results:				
Phenol	< 140	ug/kg	6/19/95	8270
bis(-2-Chloroethyl)Ether	< 140	ug/kg	6/19/95	8270
2-Chlorophenol	< 350	ug/kg	6/19/95	8270
1,3-Dichlorobenzene	< 140	ug/kg	6/19/95	8270
1,4-Dichlorobenzene	< 140	ug/kg	6/19/95	8270
N-nitrosodimethylamine	< 140	ug/kg	6/19/95	8270
1,2-Dichlorobenzene	< 140	ug/kg	6/19/95	8270
2-Methylphenol	< 140	ug/kg	6/19/95	8270
bis(2-Chloroisopropyl)Eth	< 140	ug/kg	6/19/95	8270
4-Methylphenol	< 140	ug/kg	6/19/95	8270
N-Nitro-Di-n-Propylamine	< 140	ug/kg	6/19/95	8270
Hexachloroethane	< 140	ug/kg	6/19/95	8270
Nitrobenzene	< 140	ug/kg	6/19/95	8270
Isophorone	< 140	ug/kg	6/19/95	8270

Lab Number: 95-D578
Sample Number: 95-0644
June 30, 1995

Analysis Performed	Results		Analyzed	Method
2-Nitrophenol	< 140	ug/kg	6/19/95	8270
2,4-Dimethylphenol	< 140	ug/kg	6/19/95	8270
Benzoic Acid	< 140	ug/kg	6/19/95	8270
bis(2-Chloroethoxy)Methan	< 140	ug/kg	6/19/95	8270
2,4-Dichlorophenol	< 140	ug/kg	6/19/95	8270
1,2,4-Trichlorobenzene	< 140	ug/kg	6/19/95	8270
Naphthalene	< 140	ug/kg	6/19/95	8270
Comment: Detected at 35 ug/kg				
4-Chloroaniline	< 350	ug/kg	6/19/95	8270
Hexachlorobutadiene	< 140	ug/kg	6/19/95	8270
4-Chloro-3-Methylphenol	< 350	ug/kg	6/19/95	8270
2-Methylnaphthalene	< 140	ug/kg	6/19/95	8270
Comment: Detected at 82 ug/kg				
Hexachlorocyclopentadiene	< 140	ug/kg	6/19/95	8270
2,4,6-Trichlorophenol	< 140	ug/kg	6/19/95	8270
2,4,5-Trichlorophenol	< 350	ug/kg	6/19/95	8270
2-Chloronaphthalene	< 140	ug/kg	6/19/95	8270
2-Nitroaniline	< 350	ug/kg	6/19/95	8270
Dimethylphthalate	< 140	ug/kg	6/19/95	8270
Acenaphthylene	< 140	ug/kg	6/19/95	8270
2,6-Dinitrotoluene	< 140	ug/kg	6/19/95	8270
3-Nitroaniline	< 350	ug/kg	6/19/95	8270
Acenaphthene	< 140	ug/kg	6/19/95	8270
2,4-Dinitrophenol	< 350	ug/kg	6/19/95	8270
4-Nitrophenol	< 350	ug/kg	6/19/95	8270
Dibenzofuran	< 140	ug/kg	6/19/95	8270
Comment: Detected at 24 ug/kg				
2,4-Dinitrotoluene	< 140	ug/kg	6/19/95	8270
Diethylphthalate	< 140	ug/kg	6/19/95	8270
4-Chlorophenyl-phenylethe	< 140	ug/kg	6/19/95	8270
Fluorene	< 140	ug/kg	6/19/95	8270
4-Nitroaniline	< 350	ug/kg	6/19/95	8270
4,6-Dinitro-2-Methylpheno	< 350	ug/kg	6/19/95	8270
N-Nitrosodiphenylamine	< 140	ug/kg	6/19/95	8270
4-Bromophenyl-phenylether	< 140	ug/kg	6/19/95	8270
Hexachlorobenzene	< 140	ug/kg	6/19/95	8270
Pentachlorophenol	< 350	ug/kg	6/19/95	8270
Phenanthrene	< 140	ug/kg	6/19/95	8270
Comment: Detected at 86 ug/kg				
Anthrancene	< 140	ug/kg	6/19/95	8270
Di-n-Butylphthalate	< 140	ug/kg	6/19/95	8270
Fluoranthene	< 140	ug/kg	6/19/95	8270
Pyrene	< 140	ug/kg	6/19/95	8270
Butylbenzylphthalate	< 140	ug/kg	6/19/95	8270
3-3'-Dichlorobenzidine	< 350	ug/kg	6/19/95	8270
Benzo(a)anthracene	< 140	ug/kg	6/19/95	8270
Chrysene	< 140	ug/kg	6/19/95	8270
bis(2-ethylhexyl)phthalat	< 140	ug/kg	6/19/95	8270

Lab Number: 95-D578
Sample Number: 95-0644
June 30, 1995

Analysis Performed	Results		Analyzed	Method
Di-n-Octylphthalate	< 140	ug/kg	6/19/95	8270
Benzo(b)fluoranthene	< 140	ug/kg	6/19/95	8270
Benzo(k)fluoranthene	< 140	ug/kg	6/19/95	8270
Benzo(a)pyrene	< 140	ug/kg	6/19/95	8270
Indeno(1,2,3-cd)pyrene	< 140	ug/kg	6/19/95	8270
Dibenz(a,h)anthracene	< 140	ug/kg	6/19/95	8270
Benzo(g,h,i)perylene	< 140	ug/kg	6/19/95	8270

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

c: JULIE BLOSS, HWP

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM
RESULTS OF SAMPLE ANALYSES

Sample Number: 95-0645
Lab Number: 95-D579

Reported To: JOE BOLAND
Affiliation: RCRA
Project Code: 3658/3378

Report Date: 6/22/95
Date Collected: 4/27/95
Date Received: 4/28/95

Sample Collected by: JOE BOLAND, RCRA
Sampling Location: EISENBERG SITE, 16TH AVENUE,
Sample Description: NORTH KANSAS CITY, MO; BLANK

Analysis Performed	Results		Analyzed	Method
BNA Results:				
Phenol	< 2	ug/L	6/16/95	8270
bis(-2-Chloroethyl)Ether	< 2	ug/L	6/16/95	8270
2-Chlorophenol	< 5	ug/L	6/16/95	8270
1,3-Dichlorobenzene	< 2	ug/L	6/16/95	8270
1,4-Dichlorobenzene	< 2	ug/L	6/16/95	8270
N-nitrosodimethylamine	< 2	ug/L	6/16/95	8270
1,2-Dichlorobenzene	< 2	ug/L	6/16/95	8270
2-Methylphenol	< 2	ug/L	6/16/95	8270
bis(2-Chloroisopropyl)Eth	< 2	ug/L	6/16/95	8270
4-Methylphenol	< 2	ug/L	6/16/95	8270
N-Nitro-Di-n-Propylamine	< 2	ug/L	6/16/95	8270
Hexachloroethane	< 2	ug/L	6/16/95	8270
Nitrobenzene	< 2	ug/L	6/16/95	8270
Isophorone	< 2	ug/L	6/16/95	8270
2-Nitrophenol	< 2	ug/L	6/16/95	8270
2,4-Dimethylphenol	< 2	ug/L	6/16/95	8270
Benzoic Acid	< 2	ug/L	6/16/95	8270
bis(2-Chloroethoxy)Methan	< 2	ug/L	6/16/95	8270
2,4-Dichlorophenol	< 2	ug/L	6/16/95	8270
1,2,4-Trichlorobenzene	< 2	ug/L	6/16/95	8270
Naphthalene	< 2	ug/L	6/16/95	8270
4-Chloroaniline	< 5	ug/L	6/16/95	8270
Hexachlorobutadiene	< 2	ug/L	6/16/95	8270
4-Chloro-3-Methylphenol	< 5	ug/L	6/16/95	8270
2-Methylnaphthalene	< 2	ug/L	6/16/95	8270

Lab Number: 95-D579
Sample Number: 95-0645
June 22, 1995

Analysis Performed	Results		Analyzed	Method
Hexachlorocyclopentadiene	< 2	ug/L	6/16/95	8270
2,4,6-Trichlorophenol	< 2	ug/L	6/16/95	8270
2,4,5-Trichlorophenol	< 5	ug/L	6/16/95	8270
2-Chloronaphthalene	< 2	ug/L	6/16/95	8270
2-Nitroaniline	< 5	ug/L	6/16/95	8270
Dimethylphthalate	< 2	ug/L	6/16/95	8270
Acenaphthylene	< 2	ug/L	6/16/95	8270
2,6-Dinitrotoluene	< 2	ug/L	6/16/95	8270
3-Nitroaniline	< 5	ug/L	6/16/95	8270
Acenaphthene	< 2	ug/L	6/16/95	8270
2,4-Dinitrophenol	< 5	ug/L	6/16/95	8270
4-Nitrophenol	< 5	ug/L	6/16/95	8270
Dibenzofuran	< 2	ug/L	6/16/95	8270
2,4-Dinitrotoluene	< 2	ug/L	6/16/95	8270
Diethylphthalate	< 2	ug/L	6/16/95	8270
4-Chlorophenyl-phenylethe	< 2	ug/L	6/16/95	8270
Fluorene	< 2	ug/L	6/16/95	8270
4-Nitroaniline	< 5	ug/L	6/16/95	8270
4,6-Dinitro-2-Methylpheno	< 5	ug/L	6/16/95	8270
N-Nitrosodiphenylamine	< 2	ug/L	6/16/95	8270
4-Bromophenyl-phenylether	< 2	ug/L	6/16/95	8270
Hexachlorobenzene	< 2	ug/L	6/16/95	8270
Pentachlorophenol	< 5	ug/L	6/16/95	8270
Phenanthrene	< 2	ug/L	6/16/95	8270
Anthrancene	< 2	ug/L	6/16/95	8270
Di-n-Butylphthalate	< 2	ug/L	6/16/95	8270
Fluoranthene	< 2	ug/L	6/16/95	8270
Pyrene	< 2	ug/L	6/16/95	8270
Butylbenzylphthalate	< 2	ug/L	6/16/95	8270
3-3'-Dichlorobenzidine	< 5	ug/L	6/16/95	8270
Benzo(a)anthracene	< 2	ug/L	6/16/95	8270
Chrysene	< 2	ug/L	6/16/95	8270
bis(2-ethylhexyl)phthalat	30.0	ug/L	6/16/95	8270
Di-n-Octylphthalate	< 2	ug/L	6/16/95	8270
Benzo(b)fluoranthene	< 2	ug/L	6/16/95	8270
Benzo(k)fluoranthene	< 2	ug/L	6/16/95	8270
Benzo(a)pyrene	< 2	ug/L	6/16/95	8270
Indeno(1,2,3-cd)pyrene	< 2	ug/L	6/16/95	8270
Dibenz(a,h)anthracene	< 2	ug/L	6/16/95	8270
Benzo(g,h,i)perylene	< 2	ug/L	6/16/95	8270

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

c: JULIE BLOSS, HWP

UPDATE
UPDATE
UPDATE

Toxicological Profile for

Eisenberg Fill Site
(alias: Leo Eisenberg's Property)
MOD985768175
PA/SI Reference 45

LEAD

U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry

TP-92/12

Federal Recycling Program Printed on Recycled Paper

TOXICOLOGICAL PROFILE FOR LEAD

Prepared by:

Clement International Corporation
Under Contract No. 205-88-0608

Prepared for:

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry

April 1993

CONTENTS

FOREWORD v

CONTRIBUTORS vii

LIST OF FIGURES xiii

LIST OF TABLES xv

1. PUBLIC HEALTH STATEMENT 1
   1.1 WHAT IS LEAD? 1
   1.2 WHAT HAPPENS TO LEAD WHEN IT ENTERS THE ENVIRONMENT? 2
   1.3 HOW MIGHT I BE EXPOSED TO LEAD? 3
   1.4 HOW CAN LEAD ENTER AND LEAVE MY BODY? 5
   1.5 HOW CAN LEAD AFFECT MY HEALTH? 6
   1.6 IS THERE A MEDICAL TEST TO DETERMINE WHETHER I HAVE BEEN EXPOSED TO LEAD? 6
   1.7 WHAT RECOMMENDATIONS HAS THE FEDERAL GOVERNMENT MADE TO PROTECT HUMAN HEALTH? 7
   1.8 WHERE CAN I GET MORE INFORMATION? 8

2. HEALTH EFFECTS 9
   2.1 INTRODUCTION 9
   2.2 DISCUSSION OF HEALTH EFFECTS BY ROUTE OF EXPOSURE 9
      2.2.1 Effects in Humans Based on Blood Lead Levels 10
         2.2.1.1 Death 11
         2.2.1.2 Systemic Effects 20
         2.2.1.3 Immunological Effects 36
         2.2.1.4 Neurological Effects 37
         2.2.1.5 Developmental Effects 47
         2.2.1.6 Reproductive Effects 53
         2.2.1.7 Genotoxic Effects 55
         2.2.1.8 Cancer 56
      2.2.2 Inhalation Exposure 57
         2.2.2.1 Death 57
         2.2.2.2 Systemic Effects 57
         2.2.2.3 Immunological Effects 61
         2.2.2.4 Neurological Effects 62
         2.2.2.5 Developmental Effects 62
         2.2.2.6 Reproductive Effects 62
         2.2.2.7 Genotoxic Effects 62
         2.2.2.8 Cancer 62
      2.2.3 Oral Exposure 63
         2.2.3.1 Death 63
         2.2.3.2 Systemic Effects 63
         2.2.3.3 Immunological Effects 84
         2.2.3.4 Neurological Effects 86
         2.2.3.5 Developmental Effects 91
         2.2.3.6 Reproductive Effects 94

2.2.3.7 Genotoxic Effects . . . 95
2.2.3.8 Cancer . . . 96
2.2.4 Dermal Exposure . . . 97
2.2.4.1 Death . . . 97
2.2.4.2 Systemic Effects . . . 97
2.2.4.3 Immunological Effects . . . 97
2.2.4.4 Neurological Effects . . . 97
2.2.4.5 Developmental Effects . . . 97
2.2.4.6 Reproductive Effects . . . 97
2.2.4.7 Genotoxic Effects . . . 97
2.2.4.8 Cancer . . . 97
2.3 TOXICOKINETICS . . . 97
2.3.1 Absorption . . . 97
2.3.1.1 Inhalation Exposure . . . 97
2.3.1.2 Oral Exposure . . . 98
2.3.1.3 Dermal Exposure . . . 99
2.3.2 Distribution . . . 99
2.3.3 Metabolism . . . 106
2.3.4 Excretion . . . 106
2.4 RELEVANCE TO PUBLIC HEALTH . . . 107
2.5 BIOMARKERS OF EXPOSURE AND EFFECT . . . 128
2.5.1 Biomarkers Used to Identify or Quantify Exposure to Lead . . . 129
2.5.2 Biomarkers Used to Characterize Effects Caused by Lead . . . 132
2.6 INTERACTIONS WITH OTHER CHEMICALS . . . 134
2.7 POPULATIONS THAT ARE UNUSUALLY SUSCEPTIBLE . . . 140
2.8 METHODS FOR REDUCING TOXIC EFFECTS . . . 142
2.8.1 Reducing Peak Absorption Following Exposure . . . 142
2.8.2 Reducing Body Burden . . . 143
2.8.3 Interfering with the Mechanism of Action for Toxic Effects . . . 144
2.9 ADEQUACY OF THE DATABASE . . . 144
2.9.1 Existing Information on Health Effects of Lead . . . 144
2.9.2 Identification of Data Needs . . . 145
2.8.3 On-going Studies . . . 154

3. CHEMICAL AND PHYSICAL INFORMATION . . . 165
3.1 CHEMICAL IDENTITY . . . 165
3.2 PHYSICAL AND CHEMICAL PROPERTIES . . . 165

4. PRODUCTION, IMPORT, USE, AND DISPOSAL . . . 175
4.1 PRODUCTION . . . 175
4.2 IMPORT/EXPORT . . . 175
4.3 USE . . . 175
4.4 DISPOSAL . . . 179

5. POTENTIAL FOR HUMAN EXPOSURE . . . 181
5.1 OVERVIEW . . . 181
5.2 RELEASES TO THE ENVIRONMENT . . . 181
5.2.1 Air . . . 183
5.2.2 Water . . . 18[illegible]
5.2.3 Soil . . . 187

ENVIRONMENTAL FATE 188
5.3.1 Transport and Partitioning 188
5.3.2 Transformation and Degradation 190
5.3.2.1 Air 190
5.3.2.2 Water 191
5.3.2.3 Soil 191
5.4 LEVELS MONITORED OR ESTIMATED IN THE ENVIRONMENT 192
5.4.1 Air 192
5.4.2 Water 192
5.4.3 Soil 193
5.4.4 Other Environmental Media 194
5.5 GENERAL POPULATION AND OCCUPATIONAL EXPOSURE 196
5.6 POPULATIONS WITH POTENTIALLY HIGH EXPOSURES 201
5.7 ADEQUACY OF THE DATABASE 202
5.7.1 Identification of Data Needs 202
5.7.2 On-going Studies 204

6. ANALYTICAL METHODS 205
6.1 BIOLOGICAL MATERIALS 205
6.2 ENVIRONMENTAL SAMPLES 212
6.3 ADEQUACY OF THE DATABASE 219
6.3.1 Identification of Data Needs 219
6.3.2 On-going Studies 220

7. REGULATIONS AND ADVISORIES 221

8. REFERENCES 229

9. GLOSSARY 305

APPENDICES

A. USER'S GUIDE A-1

B. ACRONYMS, ABBREVIATIONS, AND SYMBOLS B-1

C. PEER REVIEW C-1

1. PUBLIC HEALTH STATEMENT

This Statement was prepared to give you information about lead and to emphasize the human health effects that may result from exposure to it. The Environmental Protection Agency (EPA) has identified 1,300 sites on its National Priorities List (NPL). Lead has been found in at least 922 of these sites. However, we do not know how many of the 1,300 NPL sites have been evaluated for lead. As EPA evaluates more sites, the number of sites at which lead is found may change. This information is important for you to know because lead may cause harmful health effects and because these sites are potential or actual sources of human exposure to lead.

When a chemical is released from a large area, such as an industrial plant, or from a container, such as a drum or bottle, it enters the environment as a chemical emission. This emission, which is also called a release, does not always lead to exposure. You can be exposed to a chemical only when you come into contact with the chemical. You may be exposed to it in the environment by breathing, eating, or drinking substances containing the chemical or from skin contact with it.

If you are exposed to a hazardous chemical such as lead, several factors will determine whether harmful health effects will occur and what the type and severity of those health effects will be. These factors include the dose (how much), the duration (how long), the route or pathway by which you are exposed (breathing, eating, drinking, or skin contact), the other chemicals to which you are exposed, and your individual characteristics such as age, sex, nutritional status, family traits, life style, and state of health.

1.1 WHAT IS LEAD?

Lead is a naturally occurring bluish-gray metal found in small amounts in the earth's crust. It has no characteristic taste or smell. Metallic lead does not dissolve in water and does not burn. Some natural and man-made substances contain lead, but do not look like lead in its metallic form. Some of these substances can burn.

Lead has many different uses. Its most important use is in the production of some types of batteries. Other uses include the production of ammunition, in some kinds of metal products (such as sheet lead, solder, and pipes) and in ceramic glazes. Some chemicals containing lead, such as tetraethyl lead and tetramethyl lead, are used as gasoline additives. However, the use of these lead-containing chemicals in gasoline is much less than it used to be because the last producer of these additives in the United States stopped making them in early 1991. Other chemicals containing lead are used in paint. The amount of lead added to paints and ceramic products, caulking, gasoline additives, and solder has also been reduced in recent years because of lead's harmful effects in

humans and animals. However, the use of lead in ammunition and roofing has actually increased in recent years. Lead is also used for radiation shields for protection against X-rays and in a large variety of medical (electronic ceramic parts of ultrasound machines, intravenous pumps, fetal monitors, and other surgical equipment), scientific (circuit boards for computers and other electronic circuitry), and military equipment (jet turbine engine blades, military tracking systems).

Most lead used by industry comes from mined ores ("primary") or from recycled scrap metal or batteries ("secondary"). Human activities (such as use of "leaded" gasoline) have spread lead and substances that contain lead to all parts of the environment. For example, lead is in air, drinking water, rivers, lakes, oceans, dust, and soil. Lead is also in plants and animals that humans may eat. Please see Chapter 3 for more information on the physical and chemical properties of lead. Chapter 4 contains more information on the production and use of lead.

1.2 WHAT HAPPENS TO LEAD WHEN IT ENTERS THE ENVIRONMENT?

Lead occurs naturally in the environment. However, most of the lead dispersed throughout the environment comes from human activities. Before the use of leaded gasoline was limited, most of the lead released into the U.S. environment came from car exhaust. Since the EPA has limited the use of leaded gasoline, the amount of lead released into the air has decreased. In 1979, cars released 94.6 million kilograms (kg) of lead into the air in the United States. In contrast, in 1989 cars released only 2.2 million kg to the air. Other sources of lead released to the air include burning fuel, such as coal or oil, industrial processes, and burning solid waste.

The release of lead to air is now less than the release of lead to soil. Most of the lead in inner city soils comes from landfills and leaded paint. Landfills contain waste from lead ore mining, ammunition manufacturing, and from other industrial activities such as battery production. Very little lead goes directly into water.

Higher levels of lead from car exhausts can be measured near roadways. Very low levels of lead from car exhausts are found at distances of 25 meters (about 80 feet) from the road edge. However, once lead goes into the atmosphere, it may travel thousands of miles if the lead particles are small or if the lead compounds are volatile. Lead is removed from the air by rain as well as by particles falling to the ground or into surface water. Once lead deposits on soil, it usually sticks to soil particles. Small amounts of lead may enter rivers, lakes, and streams when soil particles are displaced by rainwater. Lead may remain stuck to soil particles in water for many years. Movement of lead from soil particles into underground water or drinking water is unlikely unless the water is acidic or "soft."

[illegible] chemicals that contain lead are broken down by sunlight, air, and water to [illegible] forms of lead. Lead compounds in water may combine with different chemicals [illegible] on the acidity and temperature of the water. The lead atom cannot be broken [illegible]

[illegible] levels of lead may build up in plants and animals from areas where air, water, or soil [illegible] contaminated with lead. If animals eat contaminated plants or animals, most of the [illegible] that they eat will pass through their bodies. It is the small amount absorbed that [illegible] cause harmful effects. Chapters 4 and 5 contain more information on the environmental fate of lead.

1.3 HOW MIGHT I BE EXPOSED TO LEAD?

People living near hazardous waste sites can be exposed to lead and chemicals that contain lead by breathing air, drinking water, eating foods, or swallowing or touching dust or dirt that contains lead. For people who do not live near hazardous waste sites, most exposure to lead occurs by eating foods that contain lead, occupationally in brass/bronze foundries, or in areas where leaded paints exist. Foods such as fruits, vegetables, meats, grains, seafood, soft drinks, and wine may have lead in them. Cigarettes also contain small amounts of lead. In general, very little lead is in drinking water. More than 99% of all drinking water contains less than 0.005 part of lead per million parts of water (ppm). However, the amount of lead taken into your body through drinking water can be higher in communities with acidic water supplies. Acidic water can make the lead found in lead pipes, solder, and brass faucets enter water. Eating lead-based paint chips or dust is another way you can be exposed to lead. These two latter routes are particularly relevant to children in lower-income urbanized populations. For occupationally exposed individuals, the predominant route of exposure is the inhalation of lead particles.

Exposure to gasoline additives that contain lead can happen while you are pumping leaded gasoline, from sniffing leaded gasoline, and possibly during the use of some do-it-yourself fuel additives. For people who are exposed to lead at work, the largest source of exposure comes from breathing air that contains lead. Breathing or swallowing dust and dirt that has lead in it is another way you can be exposed to lead. Children, especially those who are preschool age, can have a lot of lead exposure because they put many things into their mouths. Their hands, toys, and other items may have lead-containing dirt on them. In some cases, children swallow nonfood items such as paint chips and dirt ("pica"). These items may contain very large amounts of lead, particularly in and around older houses that were painted with lead-based paint. The paint in these houses often chips off and mixes with dust and dirt. Some old paint (when it is dry) is 5-40% lead. Skin contact with dust and dirt containing lead occurs every day. However,

not much lead can get into your body through your skin. During normal use of lead-containing products, very little lead gets on your skin.

The burning of gasoline has been the single largest source (90%) of lead in the atmosphere since the 1920s. A lot less lead in the air comes from gasoline now because EPA reduced the amount of lead that can be used in gasoline. Less than 35% of the lead released to the air now comes from gasoline. Other sources of lead in the air include releases to the air from industries involved in iron and steel production, lead-acid-battery manufacturing, brass foundries, and manufacturing of tetraethyl and tetramethyl lead, the latter two being very volatile. Lead released into air may also come from burning of solid waste, windblown dust, volcanoes, exhaust from workroom air, burning or weathering of lead-painted surfaces, and cigarette smoke.

Sources of lead in drinking water include lead that can come out of lead pipes, faucets, and solder used in plumbing. Lead-containing plumbing may be found in public drinking water systems, in houses, apartment buildings, and public buildings. Sources of lead in surface water or sediment include deposits of lead-containing dust from the atmosphere, waste water from industries that handle lead (primarily iron and steel industries and lead producers), and urban runoff.

Sources of lead in food and beverages include deposition of lead-containing dust from the atmosphere on crops and during food processing and uptake of lead from soil by plants. Lead may also enter foods when foods are put into improperly glazed pottery and ceramic dishes and leaded-crystal glassware. Illegal whiskey made using stills that contain lead-soldered parts (such as truck radiators) may also contain lead. The potential for exposure to lead in canned food from lead-soldered containers is greatly reduced because the content of lead in canned foods has decreased 87% from 1980 to 1988. Lead may also be released from soldered joints in kettles used to boil water for beverages.

Sources of lead in dust and soil include deposition of atmospheric lead and weathering and deterioration of lead-based paint. Lead in dust may also come from windblown soil. Disposal of lead in municipal and hazardous waste dump sites also adds lead to soil.

Exposure to lead occurs in many jobs. People employed in lead smelting and refining industries, brass/bronze foundries, rubber products and plastics industries, soldering, steel welding and cutting operations, battery manufacturing plants, and alkyl lead manufacturing industries may be exposed to lead. People who work at gasoline stations, in construction work, and at do-it-yourself renovations, or who work at municipal waste incinerators, pottery and ceramics industries, radiator repair shops, and other industries that use lead solder may also be exposed. Between 0.5 and 1.5 million workers are exposed to lead in the workplace; in California alone over 200,000 workers are exposed to lead. Families

may be exposed to elevated levels of lead when workers bring home lead dust work clothes. You may also be exposed to lead in the home if you work with glass as a hobby, or if you are involved in home renovation that involves the of old lead-based paint. Chapter 5 contains further information on sources of to lead.

HOW CAN LEAD ENTER AND LEAVE MY BODY?

Some of the lead that enters your body comes from breathing in lead dust or chemicals that contain lead. Once this lead gets into your lungs, it goes quickly to other parts of the body in your blood.

You may swallow a lot of lead by eating food and drinking liquids that contain it. Most of the lead that enters your body comes through swallowing, even though very little of the amount you swallow actually enters your blood and other parts of your body. The amount that gets into your body from your stomach partially depends on when you ate your last meal. It also depends on how old you are and how well the lead particles you ate dissolved in your stomach juices. Experiments in adult volunteers showed that the amount of lead that got into the body from the stomach was only about 6% in adults who had just eaten. In adults who had not eaten for a day, about 60–80% of the lead from the stomach got into their blood. On the other hand, 50% of the lead swallowed by children enters the blood and other body parts even if their stomachs are full.

Frequent skin contact with lead in the form of lead-containing dusts and soil can result in children swallowing lead through hand-to-mouth behavior. In adults, only a small portion of the lead will pass through your skin and enter your body if it is not washed off after skin contact. More lead can pass through your skin if it is damaged. Certain types of lead compounds, however, may penetrate your skin.

Shortly after lead gets into your body, lead travels in the blood to the "soft tissues," (such as the liver, kidneys, lungs, brain, spleen, muscles, and heart). After several weeks most of the lead then moves into your bones and teeth. In adults, about 94% of the total amount of lead in the body is contained in their bones and teeth. Children, on the other hand, have only about 73% of the lead in their bodies stored in their bones. The rest is in their soft tissues and blood. Part of the lead can stay in your bones for decades. Part of the lead can leave your bones and may reenter your blood and organs at a later time.

Your body does not change lead atoms into any other form. Once it is taken in and distributed to your organs, the lead that is not stored in your bones leaves your body in your urine or your feces. About 99% of the amount of lead that you take into your body

will leave in your waste within a couple of weeks, but only about 32% of the lead taken into the body of children will leave in the waste. For more information on how lead can enter and leave your body, please refer to Chapter 2.

1.5 HOW CAN LEAD AFFECT MY HEALTH?

Exposure to lead can be particularly dangerous for unborn children because of their great sensitivity during development. Exposure to lead can also be dangerous for young children because they swallow more lead through normal mouthing activity, take more of the lead that they swallow into their bodies, and are more sensitive to its effects. Unborn children can be exposed to lead through their mothers. This may cause premature births, smaller babies, and decreased mental ability in the infant. Lead exposure may also decrease intelligence quotient (IQ) scores and reduce the growth of young children. These effects have been seen more often following exposure to high levels of lead, than following exposure to low levels of lead.

In adults, lead exposure may decrease reaction time and possibly affect the memory. Lead exposure may also cause weakness in your fingers, wrists, or ankles. Lead exposure may increase blood pressure in middle-aged men. It is not known whether lead has an effect on blood pressure in women. Lead exposure may also cause anemia, a disorder of the blood. The connection between the occurrence of these effects and low lead exposures is not certain. At high levels of exposure, lead can severely damage the brain and kidneys in adults or children. In addition, high levels of exposure to lead may cause abortion and damage the male reproductive system (the organs responsible for sperm production). The effects of lead are the same regardless of whether it enters the body through breathing or swallowing.

Kidney tumors have developed in rats and mice given large doses of lead. We have no proof that lead causes cancer in humans. Furthermore, the animal studies have been criticized by a panel of EPA scientists because of the very high doses used, among other things, and should not be used to predict what may happen in humans. The Department of Health and Human Services has determined that lead acetate and lead phosphate may reasonably be anticipated to be carcinogens based on these studies in animals, but that there is inadequate evidence for the carcinogenicity of these lead compounds in humans. Please see Chapter 2 for more information on the health effects of lead.

1.6 IS THERE A MEDICAL TEST TO DETERMINE WHETHER I HAVE BEEN EXPOSED TO LEAD?

The amount of lead in the blood can be measured to determine if exposure to lead has occurred. This test can give a rough measure of how much lead one has been exposed

Eisenberg Fill Site
(alias: Leo Eisenberg's Property)
MOD985768175
PA/SI Reference 46

Toxicological Profile for

SELENIUM

Draft for Public Comment

Update

Comment Period Ends: February 21, 1995

U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry

DRAFT

TOXICOLOGICAL PROFILE FOR SELENIUM

Prepared by:

Sciences International, Inc.
Under Subcontract to:

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CONTENTS

UPDATE STATEMENT iii

FOREWORD v

CONTRIBUTORS vii

PEER REVIEW ix

LIST OF FIGURES xv

LIST OF TABLES xvii

1. PUBLIC HEALTH STATEMENT 1
   1.1 WHAT IS SELENIUM? 1
   1.2 WHAT HAPPENS TO SELENIUM WHEN IT ENTERS THE ENVIRONMENT? 3
   1.3 HOW MIGHT I BE EXPOSED TO SELENIUM? 5
   1.4 HOW CAN SELENIUM ENTER AND LEAVE MY BODY? 6
   1.5 HOW CAN SELENIUM AFFECT MY HEALTH? 7
   1.6 IS THERE A MEDICAL TEST TO DETERMINE WHETHER I HAVE BEEN EXPOSED TO SELENIUM? 10
   1.7 WHAT RECOMMENDATIONS HAS THE FEDERAL GOVERNMENT MADE TO PROTECT HUMAN HEALTH? 11
   1.8 WHERE CAN I GET MORE INFORMATION? 12

2. HEALTH EFFECTS 13
   2.1 INTRODUCTION 13
   2.2 DISCUSSION OF HEALTH EFFECTS BY ROUTE OF EXPOSURE 14
      2.2.1 Inhalation Exposure 16
         2.2.1.1 Death 16
         2.2.1.2 Systemic Effects 19
         2.2.1.3 Immunological and Lymphoreticular Effects 23
         2.2.1.4 Neurological Effects 23
         2.2.1.5 Reproductive Effects 23
         2.2.1.6 Developmental Effects 24
         2.2.1.7 Genotoxic Effects 24
         2.2.1.8 Cancer 24
      2.2.2 Oral Exposure 25
         2.2.2.1 Death 25
         2.2.2.2 Systemic Effects 40
         2.2.2.3 Immunological and Lymphoreticular Effects 49
         2.2.2.4 Neurological Effects 50
         2.2.2.5 Reproductive Effects 52
         2.2.2.6 Developmental Effects 54
         2.2.2.7 Genotoxic Effects 56
         2.2.2.8 Cancer 57

2.2.3 Dermal Exposure 63
2.2.3.1 Death 63
2.2.3.2 Systemic Effects 63
2.2.3.3 Immunological and Lymphoreticular Effects 64
2.2.3.4 Neurological Effects 64
2.2.3.5 Reproductive Effects 64
2.2.3.6 Developmental Effects 64
2.2.3.7 Genotoxic Effects 64
2.2.3.8 Cancer 64
2.3 TOXICOKINETICS 66
2.3.1 Absorption 67
2.3.1.1 Inhalation Exposure 67
2.3.1.2 Oral Exposure 67
2.3.1.3 Dermal Exposure 69
2.3.2 Distribution 69
2.3.2.1 Inhalation Exposure 70
2.3.2.2 Oral Exposure 70
2.3.2.3 Dermal Exposure 71
2.3.2.4 Other Routes of Exposure 71
2.3.3 Metabolism 72
2.3.4 Excretion 75
2.3.4.1 Inhalation Exposure 78
2.3.4.2 Oral Exposure 78
2.3.4.3 Dermal Exposure 79
2.3.4.4 Other Routes of Exposure 79
2.4 MECHANISMS OF ACTION 81
2.5 RELEVANCE TO PUBLIC HEALTH 82
2.6 BIOMARKERS OF EXPOSURE AND EFFECT 93
2.6.1 Biomarkers Used to Identify or Quantify Exposure to Selenium 94
2.6.2 Biomarkers Used to Characterize Effects Caused by Selenium 100
2.7 INTERACTIONS WITH OTHER SUBSTANCES 100
2.8 POPULATIONS THAT ARE UNUSUALLY SUSCEPTIBLE 104
2.9 METHODS FOR REDUCING TOXIC EFFECTS 105
2.9.1 Reducing Peak Absorption Following Exposure 105
2.9.2 Reducing Body Burden 106
2.9.3 Interfering with the Mechanism of Action for Toxic Effects 106
2.10 ADEQUACY OF THE DATABASE 107
2.10.1 Existing Information on Health Effects of Selenium 108
2.10.2 Identification of Data Needs 111
2.10.3 On-going Studies 118

3. CHEMICAL AND PHYSICAL INFORMATION 121
3.1 CHEMICAL IDENTITY 121
3.2 PHYSICAL AND CHEMICAL PROPERTIES 121

4. PRODUCTION, IMPORT/EXPORT, USE, AND DISPOSAL 131
4.1 PRODUCTION 131
4.2 IMPORT/EXPORT 133

4.3 USE 133
4.4 DISPOSAL 135

5. POTENTIAL FOR HUMAN EXPOSURE 137
5.1 OVERVIEW 137
5.2 RELEASES TO THE ENVIRONMENT 138
5.2.1 Air 138
5.2.2 Water 142
5.2.3 Soil 142
5.3 ENVIRONMENTAL FATE 143
5.3.1 Transport and Partitioning 143
5.3.2 Transformation and Degradation 146
5.3.2.1 Air 146
5.3.2.2 Water 146
5.3.2.3 Sediment and Soil 147
5.4 LEVELS MONITORED OR ESTIMATED IN THE ENVIRONMENT 148
5.4.1 Air 148
5.4.2 Water 149
5.4.3 Sediment and Soil 150
5.4.4 Other Environmental Media 151
5.5 GENERAL POPULATION AND OCCUPATIONAL EXPOSURE 154
5.6 POPULATIONS WITH POTENTIALLY HIGH EXPOSURES 155
5.7 ADEQUACY OF THE DATABASE 156
5.7.1 Identification of Data Needs 156
5.7.2 On-going Studies 159

6. ANALYTICAL METHODS 161
6.1 BIOLOGICAL MATERIALS 161
6.2 ENVIRONMENTAL SAMPLES 172
6.3 ADEQUACY OF THE DATABASE 173
6.3.1 Identification of Data Needs 174
6.3.2 On-going Studies 176

7. REGULATIONS AND ADVISORIES 177

8. REFERENCES 183

9. GLOSSARY 251

APPENDICES

A. USER'S GUIDE A-1

B. ACRONYMS, ABBREVIATIONS, AND SYMBOLS B-1

1. PUBLIC HEALTH STATEMENT

This statement was prepared to give you information about selenium and to emphasize the human health effects that may result from exposure to it. The Environmental Protection Agency (EPA) has identified 1,430 hazardous waste sites as the most serious in the nation. These sites make up the National Priorities List (NPL) and are the sites targeted for long-term federal cleanup activities. Selenium has been found in at least 409 of the sites on the NPL. However, the number of NPL sites evaluated for selenium is not known. As EPA evaluates more sites, the number of sites at which selenium is found may increase. This information is important because exposure to selenium may cause harmful health effects and because these sites are potential or actual sources of human exposure to selenium.

When a substance is released from a large area, such as an industrial plant, or from a container, such as a drum or bottle, it enters the environment. This release does not always lead to exposure. You can be exposed to a substance only when you come in contact with it. You may be exposed by breathing, eating, or drinking substances containing the substance or by skin contact with it.

If you are exposed to a substance such as selenium, many factors will determine whether harmful health effects will occur and what the type and severity of those health effects will be. These factors include the dose (how much), the duration (how long), the route or pathway by which you are exposed (breathing, eating, drinking, or skin contact), the other chemicals to which you are exposed, and your individual characteristics such as age, sex, nutritional status, family traits, lifestyle, and state of health.

1.1 WHAT IS SELENIUM?

Selenium is a naturally occurring, solid substance. It is widely but unevenly distributed in the earth's crust. It is commonly found in rocks and soil. Selenium, in its pure form of metallic

gray to black hexagonal crystals, is often referred to as elemental selenium or selenium dust. However, in the environment, selenium is not often found in this pure form. It is usually combined with other substances. Much of the selenium in rocks is combined with sulfide minerals or with silver, copper, lead, and nickel minerals.

In the environment, selenium combines with oxygen to form several substances. The most common are sodium selenite and sodium selenate. Pure sodium selenite and selenate are white or colorless crystals. Selenium sulfide is an insoluble, bright red-yellow powder that is used in anti-dandruff shampoos. When used in anti-dandruff shampoos, it is known by the common trade name Selsun Blue. Some selenium compounds are gases. Hydrogen selenide (also called selenium hydride) is a colorless gas with a disagreeable odor. Although other selenium forms may be in dust in the air, hydrogen selenide is probably the only gaseous selenium compound that might pose a health concern in occupational settings. Selenium dioxide is an industrially produced compound that easily dissolves in water to form selenious acid. Selenious acid can be found in gun blueing (a liquid solution used to clean the metal parts of a gun). In general, levels where you begin to smell or taste selenium compounds in air or water are not available. The only exception is for selenium dioxide. It has a sharp, sour odor that you can smell when its concentration in the air goes above about 0.0002 milligrams per cubic meter (mg/m^3). The odors of all other selenium compounds are either unknown or data are not available. Information on the taste of elemental selenium and all of its compounds is not available.

Plants easily take up selenate compounds from water and change them to organic selenium compounds such as selenomethionine (a transparent solid in pure form). Selenium is an essential nutrient for humans and animals, and both can use inorganic as well as organic selenium compounds. In the body, selenium helps prevent damage to tissues done by oxygen, (as does vitamin E). Selenium, however, harms people and animals when consumed in amounts not much higher than those needed for good nutrition.

The burning of coal—especially the fly ash that comes from burning coal—is the major man-made source of selenium in the environment. Elemental selenium is also commercially

processed, primarily as a by-product of copper refining. In 1984, U.S. production of primary refined selenium was approximately 254,000 kilograms (kg), but it declined over the next few years. More current production data are broken down by individual manufacturers in Chapter 4. Examples of uses for selenium and its compounds are some photographic devices (because of its semiconductor and photoelectric properties), plastics, paints, anti-dandruff shampoos, fungicides, and certain types of glass. Selenium is also used to prepare drugs and as a nutritional feed for poultry and livestock. For instance, in some European countries, sodium selenate is found in drenches (large doses of liquid medicine) as replacement therapy for cattle and sheep grazing on selenium-deficient soils. When selenium is found in vitamin and mineral supplements, it is usually listed on the content label as "selenium."

Selenium can exist at hazardous waste sites in many forms. However, specific forms have not been analyzed at sites where selenium is reported. At hazardous waste sites, you could be exposed to selenium by contact with the soil or water or by breathing the dust. Plants can also contribute to possible exposure by taking up selenium from the soil and water in areas of high concentration. The form selenium takes at any given time depends on the environmental conditions. This is further discussed in Chapters 2 and 5.

Chapter 3 has more information on the physical and chemical properties of selenium and its compounds. Chapter 4 provides more information on the sources and uses of selenium.

1.2 WHAT HAPPENS TO SELENIUM WHEN IT ENTERS THE ENVIRONMENT?

Although selenium occurs naturally in the environment, it also can be released by both natural and manufacturing processes. As an element, selenium cannot be created or destroyed. However, forms of selenium can be transformed (changed) in the environment. Weathering of rocks to soil may cause low levels of selenium in water or it may cause it to be taken up by plants and naturally released into the air. Volcanic eruptions are suspected of contributing to selenium in air, and soils in the areas around volcanos tend to have enriched amounts of selenium.

More commonly, selenium enters the air from burning coal or oil. Much selenium in air is bound to fly ash and to suspended particles. The elemental selenium that may be present in fossil fuels forms selenium dioxide during combustion (burning). Selenium dioxide can then form selenious acid with water or sweat. Selenium anhydride is released during the heating of copper, lead, and zinc ores when there is selenium in them. Hydrogen selenide decomposes rapidly in air to form elemental selenium and water, thus eliminating the danger from this compound for most people, except those who are exposed to it in their workplace.

Airborne particles of selenium, such as in coal ash, can settle on soil or surface water. Disposal of selenium in commercial products and waste could also contribute to selenium levels in soil. But the amount of selenium released to soil from fly ash and hazardous waste sites has not been measured. The forms and fate of selenium in soil depend largely on the acidity of the surroundings and its interaction with oxygen. In theory, at equilibrium with no oxygen present, deep soil selenium may be present as elemental selenium. In the absence of oxygen when the soil is acidic, the amount of biologically available selenium should be low. Elemental selenium that cannot dissolve in water and other insoluble forms of selenium (such as selenium sulfide and heavy metal selenides) are less mobile and will usually remain in the soil, posing less of a risk for exposure. Active agricultural or industrial processes may increase the amount of biologically available selenium by decreasing the acidity of the soil and increasing the oxygen and the soluble selenium compounds. Selenium compounds that can dissolve in water are very mobile. For example, selenates and selenites are water soluble, and thus mobile, so there is an increased chance of exposure to them. Irrigation drainage waters may result in increased selenium entering the surface water. Other factors that may affect the rates at which selenium moves through soil are temperature, moisture, time, season of year, concentration of water soluble selenium, organic matter content, and microbiological activity.

Some evidence indicates that selenium can be taken up in tissues of organisms ("bioaccumulate") and possibly increase in concentration ("biomagnify") in aquatic organisms as the selenium is passed up through the food chain. Selenium concentrations in aquatic organisms have been a problem as a result of irrigation runoff in some dry areas of the

United States. It is important to remember that selenium's behavior in the environment is largely affected by its surrounding conditions and by how it interacts with other compounds. For more information on the behavior and fate of selenium in the environment, refer to Chapters 4 and 5.

1.3 HOW MIGHT I BE EXPOSED TO SELENIUM?

People can be exposed to selenium in several ways and environments. They could be exposed to higher than normal levels of selenium at hazardous waste sites. At the present time, selenium has been identified at 409 of the 1,430 hazardous waste sites on the National Priorities List. Exposure occurs by coming into contact with locally grown food, water, soil, and air. Research shows that the most significant exposure to selenium comes from eating food, and less so, from water intake. For example, in certain areas of China, villagers used coal ash high in selenium to fertilize their crops. After many years, the vegetables from these areas, their main source of food, had large amounts of selenium. Selenium can also be washed from the soil at hazardous waste disposal sites into surface water or can flow into groundwater. Occasionally, water containing selenium may seep from abandoned uranium or coal mining areas into groundwater. This can eventually get into drinking water systems.

People may also be exposed to selenium from industrial sources. Humans are normally not exposed to large amounts of selenium in the air, unless selenium dust or volatile selenium compounds are formed in their workplace. Occupations in which humans may be exposed to selenium in the air are the metal industries, selenium-recovery processes, paint manufacturing, and special trades. Selenium dioxide and elemental selenium can be released into the air during the burning of coal and oil. In addition, irrigation runoff may cause high levels of selenium in fresh water and thus in some of the fish we eat.

Because selenium is naturally occurring and widespread, people are also exposed to low levels of selenium daily through food, water, and air. Estimates of the average intake of selenium from food for the U.S. population range from 0.071 to 0.152 milligrams of selenium per person per day (mg selenium/day). Generally, the levels in food in the United States are

enough to protect against diseases that may result from too little selenium. Most of the daily intake of selenium comes from eating grains, cereals, and meat. Measured amounts are between 0.003 and 0.1 parts per million (ppm, that is, one part of selenium in a million parts of food) in fruits, vegetables, and dairy products; between 0.03 and 1.3 ppm in many grains and wheat bread; and between 0.1 and 3.4 ppm in meat, fish, and seafood. Seafood and organ meats, such as liver and kidney, have the highest selenium levels of this group. Brazil nuts grown in areas with naturally high selenium soil concentrations have been shown to contain up to about 250 ppm of selenium. In some parts of the United States, especially in the western states, the soils naturally have high levels of selenium compounds. Some plants can build up selenium to levels that harm livestock feeding on them. In these areas, people could be exposed to too much selenium if they eat mostly locally grown grains and vegetables that have built up high levels of selenium. However, tests of people in western U.S. areas with high soil selenium levels show none of the negative health effects associated with selenium.

Low levels of selenium can also be found in drinking water. Most of the water sources tested in the United States have very low levels of selenium compared with levels found in food. Selenium levels are less than 0.01 ppm in 99.5% of drinking water sources tested. Less than 1% of the daily intake of selenium is estimated to come from drinking water.

For more information on how people can be exposed to selenium, see Chapter 5.

1.4 HOW CAN SELENIUM ENTER AND LEAVE MY BODY?

Selenium from the environment mainly enters the body when people eat food containing selenium. The human body easily absorbs the organic selenium compounds when eaten and makes them available where needed in the body. The selenium in drinking water is usually in the form of inorganic sodium selenate and sodium selenite: these are also easily absorbed in the digestive tract. The human body can change these inorganic selenium compounds into forms it can use. Airborne selenium may also enter the body through breathing.

The initial source of selenium may be hazardous waste sites, and it could enter the body through any of the above-mentioned routes. The exposure routes that are most important at a particular site depend on such things as whether vegetables are grown on soil in which selenium from the site has been deposited, whether water at the site contains selenium and is able to flow into drinking water supplies, and whether selenium dust blows into the air. As mentioned earlier, specific conditions at a site can greatly influence which selenium compounds form and whether they can move in the environment to places where people may be exposed. Therefore, it is important to know that the presence of selenium at a site does not necessarily mean that people are being exposed to it. Specific tests of locally grown food, drinking water, and air must be done to find out whether exposure is occurring. You should also be aware that selenium compounds, including those used in some medicated dandruff shampoos, are not easily absorbed through the skin.

Most of the selenium that enters the body is quickly excreted (leaves the body), usually within 24 hours. Beyond what the body needs, selenium leaves mainly in the urine, but also in feces and breath. Selenium in the urine increases as the amount of the exposure goes up. Selenium can build up in the human body, however, if exposure rates are very high or if exposure occurs over a long time. It builds up mostly in the liver and kidneys, but also in the blood, lungs, heart, and testes. In addition, selenium can build up in the nails and in hair, depending on time and amount of exposure. For more information on how selenium enters and leaves the human body, see Chapter 2.

1.5 HOW CAN SELENIUM AFFECT MY HEALTH?

The general public rarely breathes high levels of selenium, although some people may be exposed to selenium dust and airborne compounds in the workplace. Dizziness, fatigue, and irritation of mucous membranes have been reported in those exposed to high air levels of selenium in industrial settings. In extreme cases, fluid in the lungs (pulmonary edema) and severe bronchitis have been reported. The exposure levels when these effects may occur are not known.

The normal intake of selenium by eating food is enough to meet the daily recommended dietary allowance (RDA) of 0.055 and 0.070 mg/day for women and men, respectively, for this essential nutrient. This RDA is equivalent to an intake of 0.001 mg/kg/day for adults. However, as discussed in Section 2.5 of this profile, selenium compounds can be harmful at daily levels that are only somewhat higher than needed. The seriousness of the effects of excess selenium depends on how much is eaten and how often. Swallowing a large quantity of sodium selenate or sodium selenite (for example, part of a bottle of sodium selenate prepared for a flock of sheep, or more selenium supplement pills than are recommended for you) could be life-threatening without immediate treatment. Even if mildly excessive amounts of selenium are eaten over long periods of time, a variety of health effects could occur, including brittle hair and deformed nails. In extreme cases, people may lose feeling and control in arms and legs. These health effects were seen in several villages in China where people were exposed to foods high in selenium for months to years. The average estimated selenium intake in the villages where health effects were reported ranged from 0.0012 to 0.025 mg/kg/day. Note that the lower end of this range of selenium intake is essentially equal to the RDA. Therefore, selenium taken in at amounts only slightly higher than what is necessary for good health may cause harmful health effects. No human populations in the United States have been reported with symptoms of serious long-term selenium poisoning, including populations in the western part of the country where selenium levels are naturally high in the soil. Because most people in the United States eat foods produced in many different areas, overexposure to selenium in food is unlikely to occur.

Upon contact with human skin, selenium compounds have been reported to cause rashes and inflammation. Brief, acute exposure of the eyes to selenium dioxide may result in burning, irritation, and tearing. However, only people who work in industries that process or use selenium or selenium compounds are likely touch the high levels that cause irritation.

Some early studies with rats suggested that several selenium compounds may cause cancer. However, more recent and more thorough studies of laboratory animals and people show that most selenium compounds probably do not cause cancer. In fact, some epidemiologic studies of cancer among human populations suggest that lower than normal selenium levels in the

diet might increase the risk of cancer. But levels of selenium in the diet that are higher than normal have not been shown to reduce the risk of developing cancer. Taking high levels of selenium as supplements may just increase the risk of selenium poisoning.

Based on studies up to 1987, the International Agency for Research on Cancer (IARC) determined that selenium and selenium compounds are not classified as to their carcinogenicity to humans. However, since then the EPA has determined that one specific form of selenium, called selenium sulfide, is a probable human carcinogen. Selenium sulfide is the only selenium compound shown to be carcinogenic (cancer-causing) in animals. Rats and mice that developed cancer were fed selenium sulfide daily. It should be noted that selenium sulfide is not present in foods and is very different chemically from the organic and inorganic selenium compounds found in foods and in the environment. Also, if introduced into the environment, selenium sulfide does not dissolve readily in water and would probably bind tightly to the soil, further reducing any chance of exposure. Because selenium sulfide is not absorbed through the skin, the use of anti-dandruff shampoos is considered safe unless a person has open cuts or sores on the scalp or hands.

The relevance of the reproductive effects of selenium exposure in animals studied so far to the potential reproductive effects in humans is not known. This is also true for the effect of selenium on birth defects. Exposure to high levels of inorganic selenium compounds has been shown to cause birth defects in birds, but selenium compounds have not been shown to cause birth defects in humans or in other mammals. Because birds and mammals develop very differently, it is not surprising that some chemicals can cause effects in one group, but not in the other.

For more information on the health effects of selenium and selenium compounds in humans and animals, see Chapter 2.

1.6 IS THERE A MEDICAL TEST TO DETERMINE WHETHER I HAVE BEEN EXPOSED TO SELENIUM?

Selenium can be measured in the blood, urine, and nails of exposed individuals. However, since selenium is an essential nutrient, low levels of selenium are normally found in body tissues and urine. Tests for selenium are most useful for people who have recently been exposed to high levels. Samples of blood, urine, or nails can be properly collected in a physician's office and sent to a laboratory that has the special equipment needed to measure selenium. Urine can be used to determine short-term exposure. Because red blood cells last about 120 days before they are replaced by newly made red blood cells, the presence of selenium in red blood cells can show whether a person was exposed to selenium 120 days prior to testing, but not if exposed more than 120 days before testing. Toenail clippings can be used to determine longer-term exposure.

Many methods are available to measure selenium levels in human tissue and in the environment. However, none of the methods that are routinely available can measure/detect each selenium compound in one test. Also, these tests cannot determine the exact levels of selenium you may have been exposed to or predict whether or not health effects will occur.

In the United States, normal selenium concentration ranges have been reported in whole blood as 0.157–0.265 milligrams selenium per liter (mg selenium/L) (ppm) and in urine as 0.007–0.079 mg selenium/L (ppm). Other studies on average populations and those that have been exposed to higher levels, and their results may serve as a guideline. In China, the mean selenium concentration in the general population was 0.095 mg selenium/L (ppm) in whole blood and 0.026 mg selenium/L (ppm) in urine. In 350 healthy Italian subjects living in the same region of northern Italy, the mean selenium value in whole blood was 0.1075 mg selenium/L (ppm) and 0.0221 mg selenium/L (ppm) in urine. In a study done on ranchers who live in western South Dakota and eastern Wyoming where the soil is naturally high in selenium, the whole blood selenium concentration was 0.317 mg selenium/L (ppm), and the urine selenium concentration ranged from 0.010 mg selenium/L to 0.462 mg selenium/L

UPDATE
UPDATE
UPDATE

Toxicological Profile for

Eisenberg Fill Site
(alias: Leo Eisenberg's Property)
MOD985768175
PA/SI Reference 47

CADMIUM

U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry

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TOXICOLOGICAL PROFILE FOR CADMIUM

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CONTENTS

FOREWORD v

CONTRIBUTORS vii

LIST OF FIGURES xiii

LIST OF TABLES xv

1. PUBLIC HEALTH STATEMENT 1
   1.1 WHAT IS CADMIUM? 1
   1.2 WHAT HAPPENS TO CADMIUM WHEN IT ENTERS THE ENVIRONMENT? 2
   1.3 HOW MIGHT I BE EXPOSED TO CADMIUM? 2
   1.4 HOW CAN CADMIUM ENTER AND LEAVE MY BODY? 3
   1.5 HOW CAN CADMIUM AFFECT MY HEALTH? 3
   1.6 IS THERE A MEDICAL TEST TO DETERMINE WHETHER I HAVE BEEN EXPOSED TO CADMIUM? 4
   1.7 WHAT RECOMMENDATIONS HAS THE FEDERAL GOVERNMENT MADE TO PROTECT HUMAN HEALTH? 4
   1.8 WHERE CAN I GET MORE INFORMATION? 5

2. HEALTH EFFECTS 7
   2.1 INTRODUCTION 7
   2.2 DISCUSSION OF HEALTH EFFECTS BY ROUTE OF EXPOSURE 7
      2.2.1 Inhalation Exposure 8
         2.2.1.1 Death 8
         2.2.1.2 Systemic Effects 9
         2.2.1.3 Immunological Effects 20
         2.2.1.4 Neurological Effects 20
         2.2.1.5 Developmental Effects 20
         2.2.1.6 Reproductive Effects 21
         2.2.1.7 Genotoxic Effects 21
         2.2.1.8 Cancer 21
      2.2.2 Oral Exposure 22
         2.2.2.1 Death 23
         2.2.2.2 Systemic Effects 23
         2.2.2.3 Immunological Effects 43
         2.2.2.4 Neurological Effects 43
         2.2.2.5 Developmental Effects 44
         2.2.2.6 Reproductive Effects 44
         2.2.2.7 Genotoxic Effects 44
         2.2.2.8 Cancer 45
      2.2.3 Dermal Exposure 45
         2.2.3.1 Death 45
         2.2.3.2 Systemic Effects 45
         2.2.3.3 Immunological Effects 47
         2.2.3.4 Neurological Effects 47
         2.2.3.5 Developmental Effects 47
         2.2.3.6 Reproductive Effects 47

2.2.3.7 Genotoxic Effects . . . 47
2.2.3.8 Cancer . . . 47
2.3 TOXICOKINETICS . . . 47
2.3.1 Absorption . . . 47
2.3.1.1 Inhalation Exposure . . . 47
2.3.1.2 Oral Exposure . . . 48
2.3.1.3 Dermal Exposure . . . 49
2.3.2 Distribution . . . 50
2.3.2.1 Inhalation Exposure . . . 50
2.3.2.2 Oral Exposure . . . 50
2.3.2.3 Dermal Exposure . . . 51
2.3.3 Metabolism . . . 51
2.3.4 Excretion . . . 52
2.3.4.1 Inhalation Exposure . . . 52
2.3.4.2 Oral Exposure . . . 52
2.3.4.3 Dermal Exposure . . . 53
2.4 RELEVANCE TO PUBLIC HEALTH . . . 53
2.5 BIOMARKERS OF EXPOSURE AND EFFECT . . . 61
2.5.1 Biomarkers Used to Identify or Quantify Exposure to Cadmium . . . 61
2.5.2 Biomarkers Used to Characterize Effects Caused by Cadmium . . . 63
2.6 INTERACTIONS WITH OTHER CHEMICALS . . . 64
2.7 POPULATIONS THAT ARE UNUSUALLY SUSCEPTIBLE . . . 65
2.8 METHODS FOR REDUCING TOXIC EFFECTS . . . 65
2.8.1 Reducing Peak Absorption Following Exposure . . . 66
2.8.2 Reducing Body Burden . . . 66
2.8.3 Interfering with the Mechanism of Action for Toxic Effects . . . 67
2.9 ADEQUACY OF THE DATABASE . . . 68
2.9.1 Existing Information on Health Effects of Cadmium . . . 68
2.9.2 Identification of Data Needs . . . 70
2.9.3 On-going Studies . . . 73

3. CHEMICAL AND PHYSICAL INFORMATION . . . 77
3.1 CHEMICAL IDENTITY . . . 77
3.2 PHYSICAL AND CHEMICAL PROPERTIES . . . 77

4. PRODUCTION, IMPORT, USE, AND DISPOSAL . . . 83
4.1 PRODUCTION . . . 83
4.2 IMPORT/EXPORT . . . 83
4.3 USE . . . 83
4.4 DISPOSAL . . . 83

5. POTENTIAL FOR HUMAN EXPOSURE . . . 85
5.1 OVERVIEW . . . 85
5.2 RELEASES TO THE ENVIRONMENT . . . 87
5.2.1 Air . . . 87
5.2.2 Water . . . 87
5.2.3 Soil . . . 89
5.3 ENVIRONMENTAL FATE . . . 89
5.3.1 Transport and Partitioning . . . 90
5.3.2 Transformation and Degradation . . . 90
5.3.2.1 Air . . . 90

5.3.2.2 Water 91
5.3.2.3 Soil 91
5.4 LEVELS MONITORED OR ESTIMATED IN THE ENVIRONMENT 91
5.4.1 Air 91
5.4.2 Water 91
5.4.3 Soil 91
5.4.4 Other Environmental Media 92
5.5 GENERAL POPULATION AND OCCUPATIONAL EXPOSURE 92
5.6 POPULATIONS WITH POTENTIALLY HIGH EXPOSURES 94
5.7 ADEQUACY OF THE DATABASE 94
5.7.1 Identification of Data Needs 94
5.7.2 On-going Studies 96

6. ANALYTICAL METHODS 99
6.1 BIOLOGICAL MATERIALS 99
6.2 ENVIRONMENTAL SAMPLES 99
6.3 ADEQUACY OF THE DATABASE 102
6.3.1 Identification of Data Needs 102
6.3.2 On-going Studies 105

7. REGULATIONS AND ADVISORIES 107

8. REFERENCES 113

9. GLOSSARY 169

APPENDICES

A. USER'S GUIDE A-1

B. ACRONYMS, ABBREVIATIONS, AND SYMBOLS B-1

C. PEER REVIEW C-1

1. PUBLIC HEALTH STATEMENT

This Statement was prepared to give you information about cadmium and to emphasize the human health effects that may result from exposure to it. The Environmental Protection Agency (EPA) has identified 1,300 sites on its National Priorities List (NPL). Cadmium has been found in at least 388 of these sites. However, we do not know how many of the 1,300 NPL sites have been evaluated for cadmium. As EPA evaluates more sites, the number of sites at which cadmium is found may change. This information is important for you to know because cadmium may cause harmful health effects and because these sites are potential or actual sources of human exposure to cadmium.

When a chemical is released from a large area, such as an industrial plant, or from a container, such as a drum or bottle, it enters the environment as a chemical emission. This emission, which is also called a release, does not always lead to exposure. You can be exposed to a chemical only when you come into contact with the chemical. You may be exposed to it in the environment by breathing, eating, or drinking substances containing the chemical or from skin contact with it.

If you are exposed to a hazardous chemical such as cadmium, several factors will determine whether harmful health effects will occur and what the type and severity of those health effects will be. These factors include the dose (how much), the duration (how long), the route or pathway by which you are exposed (breathing, eating, drinking, or skin contact), the other chemicals to which you are exposed, and your individual characteristics such as age, sex, nutritional status, family traits, life style, and state of health.

1.1 WHAT IS CADMIUM?

Cadmium is an element that occurs naturally in the earth's crust. Pure cadmium is a soft, silver-white metal; however, cadmium is not usually found in the environment as a metal. It is usually found as a mineral combined with other elements such as oxygen (cadmium oxide), chlorine (cadmium chloride), or sulfur (cadmium sulfate, cadmium sulfide). These compounds are solids that may dissolve in water but do not evaporate or disappear from the environment. All soils and rocks, including coal and mineral fertilizers, have some cadmium in them. Cadmium is often found as part of small particles present in air. You cannot tell by smell or taste that cadmium is present in air or water, because it does not have any definite taste or odor.

Most cadmium used in this country is extracted during the production of other metals such as zinc, lead, or copper. Cadmium has many uses in industry and consumer products, mainly batteries, pigments, metal coatings, and plastics.

More information on the properties and uses of cadmium may be found in Chapters 3 and 4.

1.2 WHAT HAPPENS TO CADMIUM WHEN IT ENTERS THE ENVIRONMENT?

Cadmium can enter the environment in several ways. It can enter the air from the burning of coal and household waste, and metal mining and refining processes. It can enter water from disposal of waste water from households or industries. Fertilizers often have some cadmium in them and fertilizer use causes cadmium to enter the soil. Spills and leaks from hazardous waste sites can also cause cadmium to enter soil or water. Cadmium attached to small particles may get into the air and travel a long way before coming down to earth as dust or in rain or snow. Cadmium does not break down in the environment but can change into different forms. Most cadmium stays where it enters the environment for a long time. Some of the cadmium that enters water will bind to soil but some will remain in the water. Cadmium in soil can enter water or be taken up by plants. Fish, plants, and animals take up cadmium from the environment.

More information on how cadmium behaves in the environment may be found in Chapters 4 and 5.

1.3 HOW MIGHT I BE EXPOSED TO CADMIUM?

Food and cigarette smoke are the largest potential sources of cadmium exposure for members of the general population. Average cadmium levels in U.S. foods range from 2 to 40 parts of cadmium per billion parts of food (ppb) (1,000 ppb equals one part per million). Average cadmium levels in cigarettes range from 1,000 to 3,000 ppb. Air levels in U.S. cities are low, ranging from 5 to 40 nanograms per cubic meter (ng/m^3) (one million ng/m^3 equals one milligram per cubic meter). The level of cadmium in most drinking water supplies is less than 1 ppb. In the United States, the average person eats food with about 30 micrograms (μg) of cadmium in it each day. About 1–3 μg per day of cadmium is absorbed from food, and smokers absorb an additional 1–3 μg per day from cigarettes. Smoke from other people's cigarettes probably does not cause nonsmokers to take in much cadmium. Cadmium is found at hazardous waste sites at average concentrations of about 4 ppb in soil and 5 ppb in water. Workers can be exposed to cadmium in air from making cadmium products such as batteries or paints. Workers can also be exposed from working with metal by soldering or welding. Each year almost 90,000 workers are exposed to cadmium in the United States.

More information on how you might be exposed to cadmium is given in Chapter 5.

1.4 HOW CAN CADMIUM ENTER AND LEAVE MY BODY?

Cadmium can enter your body from food you eat, water you drink, or particles you breathe in. Very little cadmium enters through your skin. Your body rapidly takes in about one-quarter of the cadmium you breathe, and about one-twentieth of the cadmium you eat. The rest of the cadmium is breathed out or excreted in feces. If you do not eat foods that contain enough iron or other nutrients, you are likely to take up more cadmium from your food than usual. Cigarette smoke has cadmium in it and so smokers breathe in cadmium. Other people who breathe in cadmium are people who work with cadmium, and people who live near hazardous waste sites or factories that release cadmium into the air. The general population and people living near hazardous waste sites may eat or drink cadmium in food, dust, or water.

Cadmium that enters your body stays in your liver and kidneys. Cadmium leaves your body slowly, in urine and feces. Your body keeps most cadmium in a form that is not harmful, but too much cadmium can overload your kidneys' storage system and cause health damage.

More information on how cadmium enters and leaves the body is given in Chapter 2.

1.5 HOW CAN CADMIUM AFFECT MY HEALTH?

Cadmium has no known good effects on your health. Breathing air with very high levels of cadmium severely damages the lungs and can cause death. Breathing lower levels for years leads to a build-up of cadmium in the kidneys that can cause kidney disease. Other effects that may occur after breathing cadmium for a long time are lung damage and fragile bones. Workers who inhale cadmium for a long time may have an increased chance of getting lung cancer. No proof has been found that mice or hamsters that breathe in cadmium get lung cancer. However, some rats that breathe in cadmium do develop lung cancer. We do not know if breathing cadmium can affect your ability to have children or can harm unborn babies. Female rats and mice that breathe high levels of cadmium have fewer litters and the pups may have more birth defects than usual. Breathing cadmium causes liver damage and changes in the immune system in rats and mice. We do not know if breathing cadmium harms the liver, heart, nervous system, or immune system in humans.

Eating food or drinking water with very high cadmium levels severely irritates the stomach, leading to vomiting and diarrhea. The only people who have died from drinking cadmium are people who used cadmium to commit suicide. Eating lower levels of cadmium over a long period of time leads to a build-up of cadmium in the kidneys. This cadmium build-up causes kidney damage, and also causes bones to become fragile and

break easily. We know that if female rats or mice eat or drink cadmium, their litters may be harmed. We do not know if eating cadmium affects your ability to have children or harms unborn babies. Animals eating or drinking cadmium sometimes get high blood pressure, iron poor blood, liver disease, and nerve or brain damage. We do not know if humans eating or drinking cadmium get any of these diseases. Studies of humans or animals that eat or drink cadmium have not found increases in cancer. These studies were not strong enough to show that eating or drinking cadmium definitely does not cause cancer. The Department of Health and Human Services has determined that cadmium and cadmium compounds may reasonably be anticipated to be carcinogens. The International Agency for Research on Cancer has determined that cadmium is probably carcinogenic to humans. The EPA has determined that cadmium is a probable human carcinogen by inhalation. Skin contact with cadmium is not known to cause health effects in humans or animals.

More information on how cadmium can affect your health is given in Chapter 2.

1.6 IS THERE A MEDICAL TEST TO DETERMINE WHETHER I HAVE BEEN EXPOSED TO CADMIUM?

You may be tested for exposure to cadmium in several ways. The amount of cadmium in your blood, urine, hair, or nails may be measured in some medical laboratories. The amount of cadmium in your blood shows your recent exposure to cadmium. The amount in your urine shows both your recent and your past exposure. It is not known how reliable cadmium levels are in hair or nails. Tests are also available to measure the amount of cadmium inside your liver or kidneys. The results of these tests can help a doctor evaluate your risk of kidney disease. However, these tests are too costly and inconvenient for routine use. Your urine can be tested to see if your kidneys are damaged. These tests do not prove that cadmium caused the kidney disease.

More information on how cadmium can be measured in exposed humans is presented in Chapters 2 and 6.

1.7 WHAT RECOMMENDATIONS HAS THE FEDERAL GOVERNMENT MADE TO PROTECT HUMAN HEALTH?

The government has taken steps to protect humans from excessive cadmium exposure. The EPA now allows 10 ppb of cadmium in drinking water, and plans to reduce the limit to 5 ppb. The EPA limits how much cadmium can be put into lakes, rivers, dumps, and cropland. The EPA does not allow cadmium in pesticides. The Food and Drug Administration (FDA) limits the amount of cadmium in food colors to 15 ppm.

The Occupational Safety and Health Administration (OSHA) now limits workplace air to 100 μg cadmium/m^3 as cadmium fumes and 200 μg cadmium/m^3 as cadmium dust. OSHA is planning to limit all cadmium compounds either to 1 or to 5 μg/m^3. Because breathing cadmium may cause lung cancer, the National Institute for Occupational Safety and Health (NIOSH) wants workers to breathe as little cadmium as possible.

More information on governmental rules regarding cadmium can be found in Chapter 7.

1.8 WHERE CAN I GET MORE INFORMATION?

If you have any more questions or concerns, please contact your community or state health or environmental quality department or:

Agency for Toxic Substances and Disease Registry
Division of Toxicology
1600 Clifton Road NE, E-29
Atlanta, Georgia 30333

This agency can also provide you with information on the location of the nearest occupational and environmental health clinic. These clinics specialize in the recognition, evaluation, and treatment of illnesses resulting from exposure to hazardous substances.

5.2.3 Soil

Land disposal of cadmium-containing wastes, land application of sewage sludge, and the use of phosphate fertilizers are the principal sources of cadmium releases to soil (EPA 1985d). Reported industrial releases of cadmium to land in 1988 totalled an estimated 542,000 pounds (TRI88 1990).

EPA estimated that about 31% of the 11 billion pounds of sewage sludge produced annually in the United States is landspread (EPA 1985a). Estimated cadmium concentrations in sewage sludge range from less than 1 μg/g to more than 1,000 μg/g (EPA 1985a). Although EPA has set limits on the cadmium content of sludge applied to land used for production of food chain crops (0.5 kg/hectare, annual rate) and has required pretreatment of cadmium-containing wastes prior to land disposal (see Table 7-1), significant amounts of cadmium are still likely to be released to soil by this practice.

Phosphate fertilizers are a major source of cadmium input to agricultural soils (EPA 1985a). The natural cadmium concentration in phosphates ranges from 3 to 100 μg/g (EPA 1985a). It is estimated that 880,000 pounds of phosphate fertilizer were used in the United States in 1980 (EPA 1985a).

Wet and dry deposition of cadmium from the atmosphere may also contribute sizable amounts of cadmium to soil in the areas surrounding sources of atmospheric emissions, such as incinerators and vehicular traffic, which may release cadmium from burned fuel and tire wear (EPA 1985a; Mielke et al. 1991).

Cadmium has been detected in soil at 74% of 388 hazardous waste sites where it has been measured, at a geometric mean concentration of 4 ppb (CLPSD 1990).

5.3 ENVIRONMENTAL FATE

5.3.1 Transport and Partitioning

Cadmium and cadmium compounds have negligible vapor pressures (see Table 3-2), but may exist in air as suspended particulate matter derived from sea spray, industrial emissions, combustion of fossil fuels, or the erosion of soils (Elinder 1985a; Keitz 1980). Cadmium emitted to the atmosphere from combustion processes is usually associated with very small particulates that are in the respirable range (less than 10 μm) and are subject to long-range transport. These cadmium pollutants may be transported from 100 to a few thousand km and have a typical atmospheric residence time of about 1–10 days before deposition occurs (Keitz 1980). Larger cadmium-containing particles from smelters and other pollutant sources are also removed from the atmosphere by gravitational settling, with substantial deposition in areas downwind of the pollutant source. Cadmium deposition in urban areas is about one order of magnitude higher than in rural areas of the United States (Keitz 1980).

Cadmium-containing particulates may dissolve in atmospheric water droplets and be removed from air by wet deposition. The reported median concentration of cadmium in precipitation is about 0.7 μg/L in rural and urban areas (Keitz 1980).

Cadmium is more mobile in aquatic environments than most other heavy metals, such as lead (Callahan et al. 1979). In natural waters, most cadmium will exist as the hydrated ion ($Cd(+2)\cdot 6H_2O$). Cadmium complexed with humic substances is also an important form of cadmium in polluted waters. Cadmium concentration in water is inversely related to the pH and the concentration of organic material in the water (Callahan et al. 1979). Because cadmium exists only in the +2 oxidation state, aqueous cadmium is not strongly influenced

by the oxidizing or reducing potential of the water. However, under reducing conditions, cadmium may form cadmium sulfide which is poorly soluble and tends to precipitate (EPA 1983c; McComish and Ong 1988).

Precipitation and sorption to mineral surfaces and organic materials are the most important removal processes for cadmium compounds. Sediment bacteria may also assist in the partitioning of cadmium from water to sediments (Burke and Pfister 1988). Both cadmium-sensitive and cadmium-resistant bacteria reduced the cadmium concentration in the water column from 1 ppm to between 0.2 and 0.6 ppm, with a corresponding increase in cadmium concentration in the sediments in the simulated environment (Burke and Pfister 1988). Studies indicate that concentrations of cadmium in sediments are at least one order of magnitude higher than in the overlying water (Callahan et al. 1979). However, cadmium may also redissolve from sediments under varying ambient conditions of pH, salinity, and redox potential (Callahan et al. 1979; Feijtel et al. 1988). Cadmium is not known to form volatile compounds, so partitioning from water to the atmosphere does not occur.

Cadmium in soils may leach into water, especially under acidic conditions (Callahan et al. 1979; Elinder 1985a). Cadmium-containing soil particles may also be entrained into the air or eroded into water, resulting in dispersion of cadmium into these media (EPA 1985a).

Aquatic and terrestrial organisms bioaccumulate cadmium. Cadmium concentrates in freshwater and marine animals to concentrations hundreds to thousands of times higher than in the water (Callahan et al. 1979). Reported bioconcentration factors (BCFs) range from 113 to 18,000 for invertebrates (EPA 1985d; van Hattum et al. 1989) and from 3 to 2,213 for fish (EPA 1985d). Bioconcentration in fish depends on the pH and humus content of the water (John et al. 1987).

The data indicate that cadmium bioaccumulates in all levels of the food chain. Cadmium accumulation has been reported in grasses and food crops, and in earthworms, poultry, cattle, horses, and wildlife (Alloway et al. 1990; Beyer et al. 1987; Gochfeld and Burger 1982; Munshower 1977; Sileo and Beyer 1985; Vos et al. 1990). However, since cadmium accumulates largely in the liver and kidneys of vertebrates and not in the muscle tissue (Harrison and Klaverkamp 1990; Sileo and Beyer 1985; Vos et al. 1990), and intestinal absorption of cadmium is low, biomagnification through the food chain may not be significant. Although some data indicate increased cadmium concentrations in animals at the top of the food chain, comparisons among animals at different trophic levels are difficult, and the data available on biomagnification are not conclusive (Beyer 1986; Gochfeld and Burger 1982). Nevertheless, uptake of cadmium from soil by feed crops may result in high levels of cadmium in beef and poultry (especially in the liver and kidneys). This accumulation of cadmium in the food chain has important implications for human exposure to cadmium, whether or not significant biomagnification occurs.

5.3.2 Transformation and Degradation

5.3.2.1 Air

Little information is available on the atmospheric reactions of cadmium (Keitz 1980). The common cadmium compounds found in air (oxide, sulfate, chloride) are stable and not subject to photochemical reactions (Keitz 1980). Cadmium sulfide may photolyze to cadmium sulfate in aqueous aerosols (Konig et al. 1992). Transformation of cadmium among types of compounds in the atmosphere is mainly by dissolution in water or dilute acids (Keitz 1980).

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Water Resources Data
Missouri
Water Year 1993

U.S. GEOLOGICAL SURVEY WATER-DATA REPORT MO-93-1

Prepared in cooperation with the Missouri Department of Natural Resources, Division of Geology and Land Survey and Division of Environmental Quality; Missouri Highway and Transportation Commission; and with other State and Federal agencies

Water Resources Data
Missouri
Water Year 1993

by H.L. Reed, T.J. Perkins, and G.L.Gray, Jr.

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Prepared in cooperation with the Missouri Department of Natural Resources, Division of Geology and Land Survey and Division of Environmental Quality; Missouri Highway and Transportation Commission; and with other State and Federal agencies

CONTENTS

	Page
Preface	iii
List of surface-water stations, in downstream order, for which records are published in this volume	vii
List of ground-water wells, by county, for which records are published in this volume	x
List of discontinued surface-water discharge or stage-only stations	xii
List of discontinued surface-water-quality stations	xiv
Introduction	1
Cooperation	1
Water use--1990	2
Missouri water-use fact sheet	2
Physiography	3
Summary of hydrologic conditions	3
Surface water--streamflow	3
Water quality--streamflow	6
Ground-water levels	7
Special networks and program	7
Explanation of the records	7
Station identification numbers	7
Downstream order and station number	8
Numbering system for wells and miscellaneous sites	8
Records of stage and water discharge	8
Collection and computation of data	9
Data presentation	9
Station manuscript	10
Data table of daily mean values	11
Statistics of monthly mean data	11
Summary statistics	11
Identifying estimated daily discharge	12
Accuracy of data and computed results	12
Other data available	13
Records of surface-water quality	13
Classification of records	13
Arrangement of records	13
Onsite measurements and sample collection	13
Water temperature	14
Sediment	14
Laboratory measurements	14
Quality assurance of water-quality data	14
Data presentation	15
Remark codes	15
Records of ground-water levels	16
Collection and computation of data	16
Data presentation	16
Access to WATSTORE data	17
Definition of terms	18
Publications on Techniques of Water-Resources Investigations	21
Surface-water station records	27
Analyses of samples collected at water-quality partial-record stations	254
Ground-water monitoring wells	256
Index	269

ILLUSTRATIONS

			Page
Figure	1.	Pie chart showing major water-use categories and percentage of surface water used in Missouri during 1990	2
	2.	Pie chart showing major water-use categories and percentage of ground water used in Missouri during 1990	2
	3.	Map showing major drainage basins, physiographic areas, and areas of greater-than-average discharge during 1993	4
	4.	Graphs showing comparison of 1993 water-year mean discharge to long-term mean discharge	5
	5.	Diagram showing system for numbering miscellaneous sites (latitude and longtitude)	8
	6.	Map showing location of surface-water stations	25
	7.	Map showing location of surface-water-quality stations	26
	8.	Map showing location of ground-water monitoring wells	256

TABLES

			Page
Table	1.	Comparisons of peak discharge for the 1993 water year with those for period of record for selected stations	3
	2.	Comparisons of 1993 7-day low flows to 7-day, 2-year low flows and minimum flows for the period of record at selected stations	6

MISSOURI RIVER MAIN STEM

06893000 MISSOURI RIVER AT KANSAS CITY, MO

LOCATION.--Lat 39°06'43", long 94°35'16", in sec.32, T.50 N., R.33 W., Jackson County, Hydrologic Unit 10300101, on downstream side of right pier of Chicago, Burlington and Quncy Railroad Bridge at Kansas City, 1.4 mi downstream from Kansas River and at mile 366.1.

DRAINAGE AREA.--485,200 mi^2, approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1897 to current year. Prior to August 1928 monthly discharge only, published in WSP 1310. Gage-height records collected at same site 1873-99 are contained in reports of Missouri River Commission; those since 1900 are contained in reports of National Weather Service.

REVISED RECORDS.--WDR MO-76-1: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 706.40 ft above sea level. Prior to May 4, 1931, nonrecording gage; May 4, 1931 to Aug. 23, 1934, water-stage recorder, at present site and datum; Aug. 24, 1934 to May 15, 1947, water-stage recorder at site 200 ft upstream at same datum; May 16, 1947 to Feb. 28, 1948, nonrecording gage at present site and datum. Feb. 29, 1948 to Oct. 1, 1989 at datum 10.00 ft higher.

REMARKS.--Estimated daily discharges: May 21-23. Water-discharge records good. Some regulation from many upstream reservoirs. Several observations of water temperature and specific conductance were made during the year. National Weather Service gage-height and U.S. Army Corps of Engineers satellite telemeters at station.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of June 16, 1844, reached a stage of 38.0 ft; discharge, about 625,000 ft^3/s, computed by U.S. Army Corps of Engineers.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	40300	30600	43000	40100	35500	37700	173000	84000	94500	142000	303000	135000
2	39300	31700	41300	34900	36200	43400	176000	80400	93800	180000	276000	138000
3	38500	35900	40700	31400	39000	85600	154000	88100	94300	196000	251000	133000
4	38400	44600	40500	33100	44400	94600	166000	87900	99200	173000	228000	122000
5	38200	42800	40000	32000	52500	97700	168000	89600	96700	160000	207000	112000
6	37700	38500	39900	29800	57800	111000	143000	90400	105000	200000	187000	107000
7	37700	35600	39800	30000	55400	104000	123000	117000	123000	233000	168000	107000
8	38400	33800	40400	32200	55800	103000	130000	123000	112000	220000	154000	107000
9	40400	32900	40800	34000	57700	107000	132000	200000	106000	220000	144000	104000
10	56600	33200	41100	32700	57300	125000	120000	242000	96800	275000	135000	99600
11	78600	33900	42600	31900	58800	144000	113000	240000	84700	288000	126000	95100
12	72000	36100	42800	33200	67700	145000	112000	243000	80500	248000	126000	92100
13	70400	35200	57900	33900	77300	137000	133000	219000	77900	228000	120000	97800
14	68600	33600	94900	33000	70300	123000	134000	185000	74300	231000	123000	110000
15	65700	32300	110000	31000	67400	101000	114000	163000	96400	247000	117000	96200
16	62100	31500	103000	30200	64700	85500	103000	143000	94700	250000	110000	84400
17	59100	31300	89200	30800	61500	80600	102000	126000	80800	242000	108000	77500
18	56100	31200	82100	31000	58800	83300	105000	119000	84900	237000	106000	72000
19	52600	34700	75700	30300	55000	87500	103000	111000	87200	267000	112000	85500
20	50500	69000	65900	30400	49800	81700	101000	105000	103000	289000	117000	117000
21	48500	88800	58400	31200	45400	75000	100000	100000	112000	288000	126000	104000
22	46000	71200	56200	31800	43800	71200	108000	98800	98600	310000	131000	109000
23	42200	63300	54900	32700	42700	71200	114000	99100	90900	340000	122000	147000
24	39500	59300	53300	33500	43000	77400	107000	103000	90800	359000	118000	159000
25	37700	56400	51700	33300	43600	79300	99000	106000	99600	414000	118000	186000
26	36000	55800	49300	32500	41000	76900	93100	100000	119000	503000	114000	169000
27	33900	52800	44900	32700	38600	81600	89500	94000	118000	529000	107000	150000
28	32000	49300	42700	34300	37600	84300	89400	96700	115000	501000	94700	134000
29	32200	46500	43100	36700	---	94100	93200	101000	124000	443000	102000	116000
30	31800	44400	44500	36600	---	101000	88800	98200	131000	385000	101000	101000
31	30200	---	43000	35800	---	125000	---	94300	---	338000	122000	---
MEAN	46810	43870	55280	32810	52090	94020	119600	127300	99490	288300	144300	115600
MAX	78600	88800	110000	40100	77300	145000	176000	243000	131000	529000	303000	186000
MIN	30200	30600	39800	29800	35500	37700	88800	80400	74300	142000	94700	72000
IN.	.11	.10	.13	.08	.11	.22	.28	.30	.23	.69	.34	.27

STATISTICS OF MONTHLY MEAN DATA FOR PERIOD OF RECORD, BY WATER YEAR (WY)**

MEAN	45780	41040	27110	23140	32180	53730	69410	65400	82600	70630	49420	49360
MAX	135200	93340	75370	60980	77690	133700	215000	138500	193000	288300	144300	121300
(WY)	1974	1974	1987	1973	1973	1979	1952	1984	1947	1993	1993	1951
MIN	12360	13230	7906	5010	9308	16090	26030	26420	37280	28210	12480	13200
(WY)	1940	1937	1938	1940	1940	1957	1957	1934	1956	1934	1934	1934

SUMMARY STATISTICS**	FOR 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		FOR PERIOD OF RECORD	
ANNUAL MEAN	49600		102100		50850	
HIGHEST ANNUAL MEAN					102100	1993
LOWEST ANNUAL MEAN					22300	1934
HIGHEST DAILY MEAN	165000	Jul 31	529000	Jul 27	558000	Jul 14 1951
LOWEST DAILY MEAN	21600	Jan 20	29800	Jan 6	1500	Jan 10 1937
INSTANTANEOUS PEAK FLOW	--		541000	Jul 27	573000	Jul 14 1951
INSTANTANEOUS PEAK STAGE	--		48.87	Jul 27	48.87	Jul 27 1993
INSTANTANEOUS LOW FLOW	--		29300	Jan 6	1500	Jan 9 1937
ANNUAL SEVEN-DAY MINIMUM	24300	Jan 18	30700	Jan 15	2140	Jan 4 1940
ANNUAL RUNOFF (INCHES)	1.39		2.86		1.42	
10 PERCENT EXCEEDS	80600		198000		92400	
50 PERCENT EXCEEDS	43200		89600		42000	
90 PERCENT EXCEEDS	26800		33700		17400	

**Statistics based only on years with complete daily discharge record.

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WATER RESOURCES OF THE KANSAS CITY AREA MISSOURI AND KANSAS

Quality

Chemical analyses of samples collected from the Little Blue River are given in table 7. The water is the calcium carbonate type.

Temperatures of the waters of the Little Blue River fluctuate with the mean daily air temperature.

GROUND WATER

Ground water occurs throughout the Kansas City area; however, it is not available everywhere in such quantity or quality as to be an important resource for industrial and municipal use. The nature and position of the geologic formations exert an important control over the occurrence, quantity, and quality of ground water. A brief description of the geology with emphasis on the principal water-bearing deposits follows.

The Kansas City area is underlain by relatively old consolidated rocks. The consolidated rocks (bedrock) crop out in the uplands, but in the flood plains they are overlain by alluvium deposited by the streams. This alluvial material in the valleys of the larger streams is the only important source of large quantities of ground water in the Kansas City area.

In general water obtained from a well in consolidated rock is relatively constant in chemical quality and temperature. No comparable constancy exists, however, for wells in the alluvium in the Kansas City area. The chemical quality of water in the alluvium is dependent upon the quantity of water drawn from the bedrocks, the quantity of more dilute river water moving into the alluvium from the river, and the quantity of material dissolved from the alluvium. Under natural conditions the balance between inflow of water from bedrock and water from the river is dependent on the hydraulic gradient, the permeability of the bedrock as well as the alluvium, the river stage, and the position of the well in the alluvium in relation to the bedrock and the river. Any shift in the balance by changes of the river stage or in the quality of the river water will be reflected in the chemical quality and to a lesser extent in the temperature of water from wells in the alluvium near the river.

Because of the relatively high permeability of the alluvium of the Kansas and Missouri Rivers and the lower permeability of the bedrock, pumpage of a well, or wells, in the vicinity may displace the balance in favor of increased inflow from the river, which results in a decrease in mineral concentration of the water. An example is evident at a well on a narrow stretch of alluvium at the foot of Grand Avenue in Kansas City, Mo. The dissolved solids in the water in this well decreased from 548 ppm when not operating to 492 ppm when pumped at 175 gpm during a test in 1952. The effect of pumping on other characteristics of the water from this well is shown in figure 28.

Observed chemical quality of water in the alluvium and the effect of river stage and pumpage on the chemical quality of the water are presented in the sections on ground-water quality and induced infiltration. Geologic and hydrologic conditions are too variable to predict in detail the quality of water from the alluvium; however, the analyses do indicate variations in chemical quality.

Consolidated formations

The rocks of this region consist of beds of limestone, shale, and sandstone dipping gently to the northwest about ten feet to the mile. This dip is prevalent over all of eastern Kansas and the adjacent area in Missouri. The land surface is not parallel to the dipping rock layers, but slopes downward to the east, which accounts for the cropping out of the older rocks in the eastern part of the area and the younger rocks in the western part.

Bedrock aquifers of Wyandotte and Johnson Counties, Kans., supply sufficient water for farm and domestic needs but are not generally considered sources of good quality water. Information from the Missouri Division of Geological Survey and Water Resources indicates small yields of mineralized water from the rock formations in Platte and Clay Counties, Mo., and small yields of fresh water in wells to depths of 500 feet from consolidated material in Jackson County, Mo. Although many of the water-bearing materials yield brines and water otherwise unfit for domestic or industrial utilization, some of the better quality water in the Kansas City area is also available from bedrock formations.

Unconsolidated deposits

Alluvium occurs in the Kansas and Missouri River valley and some of their larger tributaries including Blue and Little Blue River valleys. The alluvium consists of stream-laid deposits that range in texture from clay and silt to sand and very coarse gravel. The character of the alluvium differs greatly from place to place depending on its origin and mode of deposition. Much of the alluvium in the Kansas River valley near Kansas City is probably of glacial origin, having been deposited as glacial outwash by the swollen streams that emanated from the melting ice sheets just north of the area. Test holes were drilled along 5 lines across the Kansas River valley and along 2 lines across the Missouri River valley to determine the thickness and character of the alluvium in the 2 valleys. A cross section of the Missouri River valley and 3 cross sections of the Kansas River valley are shown in figure 21. The locations of the cross sections are shown on plate 2, and the logs of the test holes are given by Fishel (1948, p. 58-106).

The Kansas City area has been divided into 5 subareas for purposes of discussion. These subareas are 1, the Fairfax district, North Kansas City and northeast district; 2, Independence and Little Blue River area; 3, East Armourdale and central districts; 4, Argentine and west Armourdale districts; and 5, Kansas River valley, west of Kansas City. (See plate 1.) The availability and quality of the ground water will be discussed for each area.

Fairfax district, North Kansas City, and northeast district

The flood plain of the Missouri River valley adjacent to Kansas City is divided by the river into 3 industrial districts. The Fairfax district is in a loop south of the river and is in Kansas. Across the river to the east is the North Kansas City area and across the river to the southeast from North Kansas City is the northeast industrial district. The flood plain of the Missouri River comprising the 3 districts is about 2 miles wide and

The alluvial deposits in this area average about 95 feet in thickness. The deposits consist of clay, silt, sand, and gravel. Over much of the area the material near the surface consists of fairly impermeable clay and silt; however, at some places the upper material consists of fairly permeable silt and sand. The underlying material down to bedrock consists of beds of fairly well-sorted sand and gravel interbedded with layers of silt and clay. The material in the lower part of the deposits is generally very permeable. The following log of a test hole drilled by the State Geological Survey of Kansas in 1944 is typical of the material found in much of the area. The test hole is in the southeast corner NE¼ NE¼ sec. 28, T. 10 S., R. 25 E., near the south end of the bridge on Seventh Street Trafficway (Fishel, 1948, p. 61, log 8).

	Thickness (feet)	Depth (feet)
Alluvium:		
Silt, partly clayey, yellow gray; contains some fine sand..	10	10
Sand, medium to fine; containing very little fine gravel (water level, 13.8 feet below land surface).....	10	20
Sand, coarse to fine, and some coarse to fine gravel.....	10	30
Gravel, fine to coarse, and medium sand.....	20	50
Gravel, medium to fine, medium sand, and gray-green silt.....	10	60
Gravel, fine to medium, and medium sand.....	10	70
Gravel, coarse to fine, and medium sand.....	34	104
Bedrock: Shale, light gray-green, and gray-green sandstone.....	2	106

The water table in this part of the Missouri River valley lies from about 6 to 20 feet below the land surface, but it may be considerably lower in cones of depression near pumped wells. The approximate thickness of the saturated alluvium is shown in figure 22. The Missouri River valley includes a large area where the alluvium has a saturated thickness of more than 80 feet; in some places it is more than 100 feet.

The alluvial deposits in this area are very permeable. Pumping tests were made on 2 wells in the Fairfax district to determine permeability (Fishel, 1948, p. 25). The 2 tests indicate that the water-bearing materials in the Fairfax district have a permeability of about 3,000 measured in Meinzer's units which give the permeability in gallons per day, conducted laterally through each mile of the water-bearing bed under investigation (measured at right angles to the direction of flow) for each foot of thickness of the bed and for each foot per mile of hydraulic gradient and at 60 F. Thus, the quantity of water that theoretically can move in 1 day through an area 1 mile wide underlain by 100 feet of saturated sand and gravel is 3 million gallons when the gradient of the water table is 10 feet per mile.

Wells on which records were collected have an average yield of 980 gpm (gallons per minute) and an average specific capacity of 60. The specific capicity of a well is its rate of yield in gallons per minute per foot of drawdown. A well drilled for North American Aviation Co., Inc. (now owned by General Motors Corp.) had a yield of 1,500 gpm with a drawdown of about 5 feet.

Chemical analyses of water from the Missouri River alluvium are given in table 9. High hardness and iron concentrations characterize these waters. Bicarbonate is present in near equivalent proportion to hardness-forming calcium and magnesium in most of the water. In general, water of this type is limited to cooling and other industrial uses that do not require soaps or drastic changes in temperature of the water. An increase in temperature favors the decomposition of calcium bicarbonate to the relatively insoluble calcium carbonate. At high temperature calcium carbonate is very insoluble. Iron, when present in the concentrations found in the majority of these samples, is likely to precipitate in pipes, coils, and radiators; this results in loss of flow and heat exchange capacity.

A summation of the concentrations of a few of the more important chemical constituents of the ground-water samples from the Fairfax and North Kansas City areas is given in table 10.

A cross section showing hardness and iron concentrations of water from wells in the Missouri River alluvium in the Fairfax district is shown in figure 21. The lower hardness of water near the river shows the effect of recharge from the river. Differences in the iron content of samples from these wells are not significant.

Ground water of the best quality in the Fairfax and North Kansas City area is within the bends of the great gooseneck of the Missouri River. As indicated in figure 21, wells adjacent to the river and farthest from the outer alluvium fringe will yield the better quality water.

Temperature of the ground water fluctuates between a much narrower range than the temperature of the air. This fluctuation is particularly characteristic of wells near the river that are affected by seasonal recharge of the ground-water reservoir with river water. The average temperature of the water from wells sampled in this area was 58 F; the minimum, 53 F; and the maximum, 64 F.

Record Information

1. Site Name: Leo Eisenberg's Property
   (as entered in CERCLIS)

2. Site CERCLIS Number: MOD985768175

3. Site Reviewer: Julie A. Bloss

4. Date: August 9, 1995

5. Site Location: North Kansas City/Clay, Missouri
   (City/County,State)

6. Congressional District: MO-06

7. Site Coordinates: Single

   Latitude: 39 08'19.3" Longitude: 094 33'42.9"

Site Description

1. Setting: Urban

2. Current Owner: Private - Industrial

3. Current Site Status: Active

4. Years of Operation: Unknown

5. How Initially Identified: State/Local Program

6. Entity Responsible for Waste Generation:

   - Unknown

7. Site Activities/Waste Deposition:

   - Illegal Dumping
   - Unauthorized Duming by a Third Party

Waste Description

8. Wastes Deposited or Detected Onsite:

   - Organic Chemicals
   - Metals
   - Construction Waste

Response Actions

9. Response/Removal Actions:

RCRA Information

10. For All Active Facilities, RCRA Site Status:

    - Not Applicable

Demographic Information

11. Workers Present Onsite: Yes

12. Distance to Nearest Non-Worker Individual: > 10 Feet - 1/4 Mile

13. Residential Population Within 1 Mile: 4105.0

14. Residential Population Within 4 Miles: 76169.0

Water Use Information

15. Local Drinking Water Supply Source:

    - Ground Water (within 4 mile distance limit)

16. Total Population Served by Local Drinking Water Supply Source: 236435.0

17. Drinking Water Supply System Type for Local Drinking Water Supply Sources:

- Municipal (Services over 25 People)

18. Surface Water Adjacent to/Draining Site:

- Other - intermittent stream
- River

HRS DOCUMENTATION RECORD
Leo Eisenberg's Property - 08/09/95

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   Latitude: 39 08'19.3" Longitude: 094 33'42.9"

	Score
Ground Water Migration Pathway Score (Sgw)	100.00
Surface Water Migration Pathway Score (Ssw)	1.05
Soil Exposure Pathway Score (Ss)	1.07
Air Migration Pathway Score (Sa)	2.04

Site Score	50.02

NOTE

EPA uses the terms "facility," "site," and "release" interchangeably. The term "facility" is broadly defined in CERCLA to include any area where hazardous substances have "come to be located" (CERCLA Section 109(9)), and the listing process is not intended to define or reflect boundaries of such facilities or releases. Site names, and references to specific parcels or properties, are provided for general identification purposes only. Knowledge regarding the extent of sites will be refined as more information is developed during the RI/FS and even during implementation of the remedy.

GROUND WATER MIGRATION PATHWAY SCORESHEET
Leo Eisenberg's Property - 08/09/95

GROUND WATER MIGRATION PATHWAY Factor Categories & Factors	Maximum Value	Value Assigned
Likelihood of Release to an Aquifer Aquifer: Alluvial		
1. Observed Release	550	0
2. Potential to Release		
2a. Containment	10	10
2b. Net Precipitation	10	1
2c. Depth to Aquifer	5	5
2d. Travel Time	35	25
2e. Potential to Release [lines 2a(2b+2c+2d)]	500	310
3. Likelihood of Release	550	310
Waste Characteristics		
4. Toxicity/Mobility	*	2.00E+03
5. Hazardous Waste Quantity	*	10000
6. Waste Characteristics	100	56
Targets		
7. Nearest Well	50	9.00E+00
8. Population		
8a. Level I Concentrations	**	0.00E+00
8b. Level II Concentrations	**	0.00E+00
8c. Potential Contamination	**	3.32E+03
8d. Population (lines 8a+8b+8c)	**	3.32E+03
9. Resources	5	5.00E+00
10. Wellhead Protection Area	20	0.00E+00
11. Targets (lines 7+8d+9+10)	**	3.33E+03
12. Targets (including overlaying aquifers)	**	3.33E+03
13. Aquifer Score	100	100.00
GROUND WATER MIGRATION PATHWAY SCORE (Sgw)	100	100.00

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET
Leo Eisenberg's Property - 08/09/95

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT Factor Categories & Factors DRINKING WATER THREAT	Maximum Value	Value Assigned
Likelihood of Release		
1. Observed Release	550	0
2. Potential to Release by Overland Flow		
2a. Containment	10	10
2b. Runoff	25	2
2c. Distance to Surface Water	25	6
2d. Potential to Release by Overland Flow [lines 2a(2b+2c)]	500	80
3. Potential to Release by Flood		
3a. Containment (Flood)	10	10
3b. Flood Frequency	50	7
3c. Potential to Release by Flood (lines 3a x 3b)	500	70
4. Potential to Release (lines 2d+3c)	500	150
5. Likelihood of Release	550	150
Waste Characteristics		
6. Toxicity/Persistence	*	1.00E+04
7. Hazardous Waste Quantity	*	10000
8. Waste Characteristics	100	100
Targets		
9. Nearest Intake	50	0.00E+00
10. Population		
10a. Level I Concentrations	**	0.00E+00
10b. Level II Concentrations	**	0.00E+00
10c. Potential Contamination	**	0.00E+00
10d. Population (lines 10a+10b+10c)	**	0.00E+00
11. Resources	5	5.00E+00
12. Targets (lines 9+10d+11)	**	5.00E+00
13. DRINKING WATER THREAT SCORE	100	0.91

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET
Leo Eisenberg's Property - 08/09/95

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT Factor Categories & Factors HUMAN FOOD CHAIN THREAT	Maximum Value	Value Assigned
Likelihood of Release		
14. Likelihood of Release (same as line 5)	550	150
Waste Characteristics		
15. Toxicity/Persistence/Bioaccumulation	*	5.00E+07
16. Hazardous Waste Quantity	*	10000
17. Waste Characteristics	1000	560
Targets		
18. Food Chain Individual	50	0.00E+00
19. Population		
19a. Level I Concentrations	**	0.00E+00
19b. Level II Concentrations	**	0.00E+00
19c. Pot. Human Food Chain Contamination	**	3.00E-05
19d. Population (lines 19a+19b+19c)	**	3.00E-05
20. Targets (lines 18+19d)	**	3.00E-05
21. HUMAN FOOD CHAIN THREAT SCORE	100	0.00

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET
Leo Eisenberg's Property - 08/09/95

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT Factor Categories & Factors ENVIRONMENTAL THREAT	Maximum Value	Value Assigned
Likelihood of Release		
22. Likelihood of Release (same as line 5)	550	150
Waste Characteristics		
23. Ecosystem Toxicity/Persistence/Bioacc.	*	5.00E+08
24. Hazardous Waste Quantity	*	10000
25. Waste Characteristics	1000	1000
Targets		
26. Sensitive Environments		
26a. Level I Concentrations	**	0.00E+00
26b. Level II Concentrations	**	0.00E+00
26c. Potential Contamination	**	3.50E-03
26d. Sensitive Environments (lines 26a+26b+26c)	**	3.50E-03
27. Targets (line 26d)	**	3.50E-03
28. ENVIRONMENTAL THREAT SCORE	60	0.01
29. WATERSHED SCORE	100	0.92
30. SW: OVERLAND/FLOOD COMPONENT SCORE (Sof)	100	0.92

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

SOIL EXPOSURE PATHWAY SCORESHEET
Leo Eisenberg's Property - 08/09/95

SOIL EXPOSURE PATHWAY Factor Categories & Factors RESIDENT POPULATION THREAT	Maximum Value	Value Assigned
Likelihood of Exposure		
1. Likelihood of Exposure	550	550
Waste Characteristics		
2. Toxicity	*	1.00E+04
3. Hazardous Waste Quantity	*	100
4. Waste Characteristics	100	32
Targets		
5. Resident Individual	50	0.00E+00
6. Resident Population		
6a. Level I Concentrations	**	0.00E+00
6b. Level II Concentrations	**	0.00E+00
6c. Resident Population (lines 6a+6b)	**	0.00E+00
7. Workers	15	5.00E+00
8. Resources	5	0.00E+00
9. Terrestrial Sensitive Environments	***	0.00E+00
10. Targets (lines 5+6c+7+8+9)	**	5.00E+00
11. RESIDENT POPULATION THREAT SCORE	**	8.80E+04

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.
*** No specific maximum value applies, see HRS for details.

SOIL EXPOSURE PATHWAY SCORESHEET
Leo Eisenberg's Property - 08/09/95

SOIL EXPOSURE PATHWAY Factor Categories & Factors NEARBY POPULATION THREAT	Maximum Value	Value Assigned
Likelihood of Exposure		
12. Attractiveness/Accessibility	100	1.00E+01
13. Area of Contamination	100	5.00E+00
14. Likelihood of Exposure	500	5.00E+00
Waste Characteristics		
15. Toxicity	*	1.00E+04
16. Hazardous Waste Quantity	*	100
17. Waste Characteristics	100	32
Targets		
18. Nearby Individual	1	0.00E+00
19. Population Within 1 Mile	**	3.00E+00
20. Targets (lines 18+19)	**	3.00E+00
21. NEARBY POPULATION THREAT SCORE	**	4.80E+02
SOIL EXPOSURE PATHWAY SCORE (Ss)	100	1.07

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

AIR PATHWAY SCORESHEET
Leo Eisenberg's Property - 08/09/95

AIR MIGRATION PATHWAY Factor Categories & Factors	Maximum Value	Value Assigned
Likelihood of Release		
1. Observed Release	550	0
2. Potential to Release		
2a. Gas Potential to Release	500	280
2b. Particulate Potential to Release	500	340
2c. Potential to Release	500	340
3. Likelihood of Release	550	340
Waste Characteristics		
4. Toxicity/Mobility	*	2.00E+01
5. Hazardous Waste Quantity	*	10000
6. Waste Characteristics	100	18
Targets		
7. Nearest Individual	50	2.00E+00
8. Population		
8a. Level I Concentrations	**	0.00E+00
8b. Level II Concentrations	**	0.00E+00
8c. Potential Contamination	**	2.50E+01
8d. Population (lines 8a+8b+8c)	**	2.50E+01
9. Resources	5	0.00E+00
10. Sensitive Environments		
10a. Actual Contamination	***	0.00E+00
10b. Potential Contamination	***	4.64E-01
10c. Sens. Environments(lines 10a+10b)	***	4.64E-01
11. Targets (lines 7+8d+9+10c)	**	2.75E+01
AIR MIGRATION PATHWAY SCORE (Sa)	100	2.04E+00

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.
*** No specific maximum value applies, see HRS for details.

1. WASTESTREAM QUANTITY SUMMARY TABLE, SOURCE: Gray sludge

a. Wastestream ID	
b. Hazardous Constituent Quantity (C) (lbs.)	0.00
c. Data Complete?	NO
d. Hazardous Wastestream Quantity (W) (lbs.)	0.00
e. Data Complete?	NO
f. Wastestream Quantity Value (W/5,000)	0.00E+00

2. SOURCE HAZARDOUS WASTE QUANTITY FACTOR TABLE

a. Source ID	Gray sludge	
b. Source Type	Waste Pile	
c. Secondary Source Type	N.A.	
d. Source Vol.(yd3/gal) | Source Area (ft2)	0.00	291852.00
e. Source Volume/Area Value	2.25E+04	
f. Source Hazardous Constituent Quantity (HCQ) Value (sum of 1b)	0.00E+00	
g. Data Complete?	NO	
h. Source Hazardous Wastestream Quantity (WSQ) Value (sum of 1f)	0.00E+00	
i. Data Complete?	NO	
k. Source Hazardous Waste Quantity (HWQ) Value (2e, 2f, or 2h)	2.25E+04	

Source Hazardous Substances	Depth (feet)	Liquid	Concent.	Units
Dibenzofuran	< 2	NO	2.4E-02	ppm
Methyl Napthalene, 2-	< 2	NO	8.2E-02	ppm
Naphthalene	< 2	NO	3.5E-02	ppm
Phenanthrene	< 2	NO	8.6E-02	ppm
Selenium	< 2	NO	2.8E+00	ppm

Documentation for Source Type:

The source of contamination at the site is contaminated fill dumped in piles across the site (photo #46-17A in SI report).

Reference:

Documentation for Source Hazardous Substances:

This sample, 95-0644, was collected from a pile of a grayish sludge-like material similar to the pile in photo #46-17A. The values listed either exceed the background sample, 95-0644, where the background sample is non-detect, or are greater than 3X the quantity in the background sample (Reference 44).

These samples were collected by MDNR on April 27, 1995 in support of the SI2.

Reference: 44

Documentation for Source Area:

The contaminated fill is estimated to cover 1/3 of the vacant 20 acres of the 30 acre Eisenberg Fill property.

1/3 of 20 acres = 6.7 acres
6.7 acres x 43,560 square feet/acre = 291,852 square feet

Reference: 4,13

1. WASTESTREAM QUANTITY SUMMARY TABLE, SOURCE: Contaminated fill

a. Wastestream ID	
b. Hazardous Constituent Quantity (C) (lbs.)	0.00
c. Data Complete?	NO
d. Hazardous Wastestream Quantity (W) (lbs.)	0.00
e. Data Complete?	NO
f. Wastestream Quantity Value (W/5,000)	0.00E+00

2. SOURCE HAZARDOUS WASTE QUANTITY FACTOR TABLE

a. Source ID	Contaminated fill
b. Source Type	Contaminated Soil
c. Secondary Source Type	N.A.
d. Source Vol.(yd3/gal) | Source Area (ft2)	1.00 | 0.00
e. Source Volume/Area Value	4.00E-04
f. Source Hazardous Constituent Quantity (HCQ) Value (sum of 1b)	0.00E+00
g. Data Complete?	NO
h. Source Hazardous Wastestream Quantity (WSQ) Value (sum of 1f)	0.00E+00
i. Data Complete?	NO
k. Source Hazardous Waste Quantity (HWQ) Value (2e, 2f, or 2h)	4.00E-04

Source Hazardous Substances	Depth (feet)	Liquid	Concent.	Units
Acenaphthene	< 2	NO	6.2E-01	ppm
Anthracene	< 2	NO	5.1E+00	ppm
Benz(a)anthracene	< 2	NO	6.9E+00	ppm
Benzo(j,k)fluorene	< 2	NO	2.1E+01	ppm
Cadmium	< 2	NO	4.1E+00	ppm
Dibenzofuran	< 2	NO	9.3E-01	ppm
Fluorene	< 2	NO	1.0E+00	ppm
Lead	< 2	NO	1.3E+02	ppm
Phenanthrene	< 2	NO	1.3E+01	ppm
Phenol	< 2	NO	1.2E-01	ppm
Pyrene	< 2	NO	9.8E+00	ppm

Documentation for Source Type:

This source type was contaminated fill material (Reference 13).

Reference: 13

Documentation for Source Volume:

This sample, 95-0638, was collected from the top two feet of soil within the 10 acre Mo-Kan portion of the Eisenberg Fill property. A minimal waste quantity size was assigned to this sample. The other sample collected from Mo-Kan, 95-0637, detected a different range of contaminants, with the exception of fluoranthene and pyrene (Reference 44).

Sample 95-0640 was taken as a background sample, collected off the property from the 0-2 foot depth. All values listed for sample 95-0638 either exceeded the background sample (if background was non-detect) or were greater than 3 times background (Reference 44).

These samples were collected on April 27, 1995, in support of the SI2.

Reference: 44

3. SITE HAZARDOUS WASTE QUANTITY SUMMARY

No.	Source ID	Migration Pathways	Vol. or Area Value (2e)	Constituent or Wastestream Value (2f,2h)	Hazardous Waste Qty. Value (2k)
1	Gray sludge	GW-SW-SE-A	2.25E+04	0.00E+00	2.25E+04
2	Contaminated fill	GW-SW-SE-A	4.00E-04	0.00E+00	4.00E-04

4. PATHWAY HAZARDOUS WASTE QUANTITY AND WASTE CHARACTERISTICS SUMMARY TABLE

Migration Pathway	Contaminant Values		HWQVs*	WCVs**
Ground Water	Toxicity/Mobility	2.00E+03	10000	56
SW: Overland Flow, DW	Tox./Persistence	1.00E+04	10000	100
SW: Overland Flow, HFC	Tox./Persis./Bioacc.	5.00E+07	10000	560
SW: Overland Flow, Env	Etox./Persis./Bioacc.	5.00E+08	10000	1000
SW: GW to SW, DW	Tox./Persistence	2.00E+03	10000	56
SW: GW to SW, HFC	Tox./Persis./Bioacc.	1.00E+07	10000	560
SW: GW to SW, Env	Etox./Persis./Bioacc.	1.00E+06	10000	320
Soil Exposure:Resident	Toxicity	1.00E+04	100	32
Soil Exposure: Nearby	Toxicity	1.00E+04	100	32
Air	Toxicity/Mobility	2.00E+01	10000	18

* Hazardous Waste Quantity Factor Values
** Waste Characteristics Factor Category Values

Note: SW = Surface Water
GW = Ground Water
DW = Drinking Water Threat
HFC = Human Food Chain Threat
Env = Environmental Threat

GROUND WATER PATHWAY AQUIFER SUMMARY
Leo Eisenberg's Property - 08/09/95

No.	Aquifer ID	Type	Overlaying No.	Inter-Connected with	Likelihood of Release	Targets
1	Alluvial	Non K	0	0	310	3.33E+03

Containment

No.	Source ID	HWQ Value	Containment Value
1	Gray sludge	2.25E+04	10
2	Contaminated fill	4.00E-04	10
	Containment Factor		10

Documentation for Ground Water Containment, Source Gray sludge:

This source at the Eisenberg Fill site is piles of gray sludge-like piles of introduced fill. These piles are not contained for any pathway (Reference 18).

Reference: 18

Documentation for Ground Water Containment, Source Contaminated fill:

This source at the Eisenberg Fill site is contaminated fill. It is not contained for any pathway.

Reference: 13

Net Precipitation

Net Precipitation (inches) 3.5

Aquifer: Alluvial

Type of Aquifer: Non Karst

Overlaying Aquifer: 0

Interconnected with: 0

Documentation for Alluvial Aquifer:

The Missouri River alluvium covers approximately 150 square miles through the Kansas City area and is the major aquifer in northwestern Missouri (Reference 8, p.2; 10, p.1). Depth to the alluvial aquifer is estimated at 15 to 30 feet below ground surface. It is expected that the thickness of the alluvial material above bedrock is in the range of 70 to 140 feet. The composition of the alluvium varies from highly permeable course sand and gravel to finer sand (Reference 8, p.1-2).

Reference: 8,10,49

OBSERVED RELEASE

No.	Well ID	Well Type	Distance (miles)	Level of Contamination
- N/A and/or data not specified				

Observed Release Factor 0

POTENTIAL TO RELEASE

Containment

Containment Factor	10	

Net Precipitation

Net Precipitation Factor	1	

Depth to Aquifer

A. Depth of Hazardous Substances	0.00	feet
B. Depth to Aquifer from Surface	15.00	feet

Documentation for Depth to Aquifer from Surface :

The average depth to groundwater in the alluvium is between 20 and 30 feet below ground surface. However, during prolonged high river stages, the Missouri River can recharge the alluvial aquifer and increase the water table to an estimated 15 feet below ground surface (Reference 17, p.1).

Reference: 17

C. Depth to Aquifer (B - A)	15.00	feet
Depth to Aquifer Factor	5	

Travel Time

Are All Layers Karst?	NO	
Thickness of Layer(s) with Lowest Conductivity	10.00	feet

Documentation for Thickness of Layers with Lowest Conductivity:

There is a 10-foot layer of medium to fine sand located beneath the first layer of silt (Reference 49). This layer is assigned a hydraulic conductivity value of 1 x 10-4 (Reference 1).

Reference: 1,49

Hydraulic Conductivity (cm/sec)	1.0E-04
Travel Time Factor	25

==========

Potential to Release Factor	310

Source: 1 Gray sludge

Source Hazardous Waste Quantity Value: 22450.15

Hazardous Substance	Toxicity Value	Mobility Value	Toxicity/ Mobility Value
Dibenzofuran	100	2.00E-05	2.00E-03
Methyl Napthalene, 2-	100	2.00E-03	2.00E-01
Naphthalene	1	2.00E-03	2.00E-03
Phenanthrene	100	2.00E-05	2.00E-03
Selenium	100	1.00E-02	1.00E+00

Source: 2 Contaminated fill

Source Hazardous Waste Quantity Value: 0.00

Hazardous Substance	Toxicity Value	Mobility Value	Toxicity/ Mobility Value
Acenaphthene	10	2.00E-03	2.00E-02
Anthracene	10	2.00E-07	2.00E-06
Benz(a)anthracene	1000	2.00E-09	2.00E-06
Benzo(j,k)fluorene	100	2.00E-07	2.00E-05
Cadmium	10000	2.00E-01	2.00E+03
Dibenzofuran	100	2.00E-05	2.00E-03
Fluorene	100	2.00E-03	2.00E-01
Lead	10000	2.00E-05	2.00E-01
Phenanthrene	100	2.00E-05	2.00E-03
Phenol	1	1.00E+00	1.00E+00
Pyrene	100	2.00E-09	2.00E-07

Hazardous Substances Found in an Observed Release

Well No.	Observed Release Hazardous Substance	Toxicity Value	Mobility Value	Toxicity/ Mobility Value

- N/A and/or data not specified

Toxicity/Mobility Value from Source Hazardous Substances:	2.00E+03
Toxicity/Mobility Value from Observed Release Hazardous Substances:	0.00E+00
Toxicity/Mobility Factor:	2.00E+03
Sum of Source Hazardous Waste Quantity Values:	2.25E+04
Hazardous Waste Quantity Factor:	10000
Waste Characteristics Factor Category:	56

Population by Well

No.	Well ID	Sample Type	Distance (miles)	Level of Contamination	Population

- N/A and/or data not specified

Level I Population Factor: 0.00

Level II Population Factor: 0.00

Potential Contamination by Distance Category

Distance Category (miles)	Population	Value
> 0 to 1/4	0.0	0.00E+00
> 1/4 to 1/2	0.0	0.00E+00
> 1/2 to 1	5000.0	1.67E+02
> 1 to 2	202718.0	2.94E+03
> 2 to 3	25000.0	2.12E+02
> 3 to 4	0.0	0.00E+00

Potential Contamination Factor: 3318.000

Documentation for Target Population > 1/2 to 1 mile Distance Category:

The five North Kansas City municipal water wells lie 0.9 miles northwest of the site. These wells are cased at depths of 90 to 110 feet (Reference 15). In 1991, the North Kansas City water system supplied water to 5,000 people (Reference 16).

Reference: 15,16

Documentation for Target Population > 1 to 2 miles Distance Category:

The 11 wells of the Kansas City municipal water system lie within 2 miles of the site (Reference 15). This water system supplies water to over 30 other communities (Reference 30).

One-quarter of Kansas City's water supply comes from well water (Reference 22). Kansas City municipal water serves from 650,000 - 700,000 people (Reference 30), for a total of 175,000 (25% of 700,000) people served by this water system alone. The Kansas City water company supplies water to 30 other suppliers (Reference 22).

Additional calculations are provided in the Eisenberg Fill SI2 narrative text as Table 2, Population Served By Groundwater Wells Within Four Miles of the Site.

Reference: 15,22,30

Documentation for Target Population > 2 to 3 miles Distance Category:

Gladstone's water supply wells are located within the 2-3 mile distance ring. They are gravel-walled and are 95 feet deep (Reference 15). In 1991, Gladstone served 25,000 people (Reference 16).

Reference: 15,16

Nearest Well

Level of Contamination: Potential
Distance in miles: 0.90

Nearest Well Factor: 9.00E+00

Resources

Resource Use: YES

Resource Factor: 5.00E+00

Wellhead Protection Area

No wellhead protection area

Wellhead Protection Area Factor: 0.00E+00

Documentation for Wellhead Protection Area:

The Kansas City area is under evaluation as a wellhead protection area, but it has not yet been implemented (Reference 10, p.1).

Reference: 10

SURFACE WATER PATHWAY SEGMENT SUMMARY
Leo Eisenberg's Property - 08/09/95

No.	Segment ID	Segment Type	Water Type	Start Point (mi)	End Point (mi)	Average Flow (cfs)
1	Missouri River	River	Fresh	1.50	15.00	50850

Documentation for segment: Missouri River:

Overland flow from the site enters intermittent drainage ditches on the northwestern and southeastern portions of the site (Reference 13). This flow is probably channeled into the municipal sewer system.

The shortest distance between the site and the Missouri River is 1.5 miles (Reference 4). The flow of the Missouri River near Kansas City, Missouri was 50,850 cubic feet per second for the period of record 1897-1993 (Reference 48).

Reference: 4,13,48

SURFACE WATER PATHWAY OVERLAND FLOW/FLOOD COMPONENT LIKELIHOOD OF RELEASE

Leo Eisenberg's Property - 08/09/95

OBSERVED RELEASE

No.	Sample ID	Sample Type	Distance (miles)	Level of Contamination DW	HFC	Env

- N/A and/or data not specified

==========

Observed Release Factor 0

SURFACE WATER PATHWAY OVERLAND FLOW/FLOOD COMPONENT LIKELIHOOD OF RELEASE

Leo Eisenberg's Property - 08/09/95

POTENTIAL TO RELEASE

Potential to Release by Overland Flow

Containment

No.	Source ID	HWQ Value	Containment Value
1	Gray sludge	2.25E+04	10
2	Contaminated fill	4.00E-04	10

Containment Factor: 10

SURFACE WATER PATHWAY OVERLAND FLOW/FLOOD COMPONENT LIKELIHOOD OF RELEASE

Leo Eisenberg's Property - 08/09/95

Distance to Surface Water

Distance to Surface Water:	7920.0 feet
Distance to Surface Water Factor:	6

Runoff

A. Drainage Area:	50.0 acres
B. 2-year, 24-hour Rainfall:	3.5 inches
C. Soil Group: Medium-textured soils with moderate infiltration rates	B
Runoff Factor:	2

==========

Potential to Release by Overland Flow Factor:	80

SURFACE WATER PATHWAY OVERLAND FLOW/FLOOD COMPONENT LIKELIHOOD OF RELEASE
Leo Eisenberg's Property - 08/09/95

Potential to Release by Flood

No.	Source ID	HWQ Value	Flood Containment Value	Flood Frequency Value	Potential to Release by Flood
1	Gray sludge	2.25E+04	10	7	70
2	Contaminated fill	4.00E-04	10	7	70

Potential to Release by Flood Factor: 70

Documentation for Flood Frequency, Source Gray sludge:

The site is located in a minimal flood hazard area (Reference 24).

Reference: 24

Source: 1 Gray sludge

Source Hazardous Waste Quantity Value: 22450.15

Hazardous Substance	Toxicity Value	Persistence Value	Toxicity/ Persistence Value
Dibenzofuran	0	1.00E+00	0.00E+00
Methyl Napthalene, 2-	0	4.00E-01	0.00E+00
Naphthalene	1	4.00E-01	4.00E-01
Phenanthrene	0	4.00E-01	0.00E+00
Selenium	100	1.00E+00	1.00E+02

SW PATHWAY: OVERLAND/FLOOD DRINKING WATER THREAT WASTE CHARACTERISTICS
Leo Eisenberg's Property - 08/09/95

Source: 2 Contaminated fill

Source Hazardous Waste Quantity Value: 0.00

Hazardous Substance	Toxicity Value	Persistence Value	Toxicity/ Persistence Value
Acenaphthene	10	4.00E-01	4.00E+00
Anthracene	10	4.00E-01	4.00E+00
Benz(a)anthracene	1000	1.00E+00	1.00E+03
Benzo(j,k)fluorene	100	1.00E+00	1.00E+02
Cadmium	10000	1.00E+00	1.00E+04
Dibenzofuran	0	1.00E+00	0.00E+00
Fluorene	100	1.00E+00	1.00E+02
Lead	10000	1.00E+00	1.00E+04
Phenanthrene	0	4.00E-01	0.00E+00
Phenol	1	1.00E+00	1.00E+00
Pyrene	100	1.00E+00	1.00E+02

Hazardous Substances Found in an Observed Release

Sample No.	Observed Release Hazardous Substance	Toxicity Value	Persistence Value	Toxicity/ Persistence Value

- N/A and/or data not specified

SW PATHWAY: OVERLAND/FLOOD DRINKING WATER THREAT WASTE CHARACTERISTICS
Leo Eisenberg's Property - 08/09/95

Toxicity/Persistence Value from Source Hazardous Substances:	1.00E+04
Toxicity/Persistence Value from Observed Release Hazardous Substances:	0.00E+00
Toxicity/Persistence Factor:	1.00E+04
Sum of Source Hazardous Waste Quantity Values:	2.25E+04
Hazardous Waste Quantity Factor:	10000
Waste Characteristics Factor Category:	100

Level I Concentrations

- N/A and/or data not specified

Level II Concentrations

- N/A and/or data not specified

Most Distant Level I Sample

- N/A and/or data not specified

Most Distant Level II Sample

- N/A and/or data not specified

SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT DRINKING WATER THREAT TARGETS
Leo Eisenberg's Property - 08/09/95

Level I Concentrations

Intake	Distance Along the In-water Segment from the Probable Point of Entry (miles)	Population
- N/A and/or data not specified		

Population Served by Level I Intakes: 0.0

Level I Population Factor: 0.00E+00

SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT DRINKING WATER THREAT TARGETS
Leo Eisenberg's Property - 08/09/95

Level II Concentrations

Intake	Distance Along the In-water Segment from the Probable Point of Entry (miles)	Population
- N/A and/or data not specified		

Population Served by Level II Intakes: 0.0

Level II Population Factor: 0.00E+00

Potential Contamination

Intake ID	Average Annual Flow (cfs)	Population Served
- N/A and/or data not specified		

Type of Surface Water Body	Total Population	Dilution-Weighted Population
- N/A and/or data not specified		

==========

Dilution-Weighted Population Served
by Potentially Contaminated Intakes: 0.0

Potential Contamination Factor: 0.0

Nearest Intake

Location of Nearest Drinking Water Intake: N.A.

Nearest Intake Factor: 0.00

Resources

Resource Use: YES

Resource Value: 5.00E+00

Documentation for Resources:

The Missouri River is state-classified for drinking water use (Reference 33). There are no known drinking water intakes within 15 downsteam miles of the site (References 14; 15).

Reference: 14,15,33

SW PATHWAY: OVERLAND/FLOOD HUMAN FOOD CHAIN THREAT WASTE CHARACTERISTICS
Leo Eisenberg's Property - 08/09/95

Source: 1 Gray sludge

Source Hazardous Waste Quantity Value: 22450.15

Hazardous Substance	Toxicity Value	Persistence Value	Bio-accum. Value	Toxicity/ Persistence/ Bioaccum. Value
Dibenzofuran	0	1.00E+00	5.00E+02	0.00E+00
Methyl Napthalene, 2-	0	4.00E-01	5.00E+03	0.00E+00
Naphthalene	1	4.00E-01	5.00E+02	2.00E+02
Phenanthrene	0	4.00E-01	5.00E+01	0.00E+00
Selenium	100	1.00E+00	5.00E+03	5.00E+05

SW PATHWAY: OVERLAND/FLOOD HUMAN FOOD CHAIN THREAT WASTE CHARACTERISTICS
Leo Eisenberg's Property - 08/09/95

Source: 2 Contaminated fill

Source Hazardous Waste Quantity Value: 0.00

Hazardous Substance	Toxicity Value	Persistence Value	Bio-accum. Value	Toxicity/ Persistence/ Bioaccum. Value
Acenaphthene	10	4.00E-01	5.00E+02	2.00E+03
Anthracene	10	4.00E-01	5.00E+03	2.00E+04
Benz(a)anthracene	1000	1.00E+00	5.00E+04	5.00E+07
Benzo(j,k)fluorene	100	1.00E+00	5.00E+03	5.00E+05
Cadmium	10000	1.00E+00	5.00E+03	5.00E+07
Dibenzofuran	0	1.00E+00	5.00E+02	0.00E+00
Fluorene	100	1.00E+00	5.00E+03	5.00E+05
Lead	10000	1.00E+00	5.00E+01	5.00E+05
Phenanthrene	0	4.00E-01	5.00E+01	0.00E+00
Phenol	1	1.00E+00	5.00E+00	5.00E+00
Pyrene	100	1.00E+00	5.00E+01	5.00E+03

Hazardous Substances Found in an Observed Release

Sample No.	Observed Release Hazardous Substance	Toxicity Value	Persistence Value	Bio-accum. Value	Toxicity/ Persistence/ Bioaccum. Value

- N/A and/or data not specified

Toxicity/Persistence/Bioaccumulation Value from Source Hazardous Substances:	5.00E+07
Toxicity/Persistence/Bioaccumulation Value from Observed Release Hazardous Substances:	0.00E+00
Toxicity/Persistence/Bioaccumulation Factor:	5.00E+07
Sum of Source Hazardous Waste Quantity Values:	2.25E+04
Hazardous Waste Quantity Factor:	10000
Waste Characteristics Factor Category:	560

Level I Concentrations

- N/A and/or data not specified

Level II Concentrations

- N/A and/or data not specified

Most Distant Level I Sample

- N/A and/or data not specified

Most Distant Level II Sample

- N/A and/or data not specified

SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT HUMAN FOOD CHAIN THREAT TARGETS
Leo Eisenberg's Property - 08/09/95

Level I Concentrations

Fishery	Annual Production (pounds)	Human Food Chain Population Value
- N/A and/or data not specified		

Sum of Human Food Chain Population Values: 0.00E+00

Level I Concentrations Factor: 0.00E+00

SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT HUMAN FOOD CHAIN THREAT TARGETS
Leo Eisenberg's Property - 08/09/95

Level II Concentrations

Fishery	Annual Production (pounds)	Human Food Chain Population Value
- N/A and/or data not specified		

Sum of Human Food Chain Population Values: 0.00E+00

Level II Concentrations Factor: 0.00E+00

Potential Contamination

Fishery	Annnual Production (pounds)	Type of Surface Water Body	Average Annual Flow (cfs)	Pop. Value (Pi)	Dilution Weight (Di)	Pi*Di
1 Missouri River	2138.0	River	50850	3.0	1.00E-04	3.00E-04

Sum of (Pi*Di): 3.00E-04

Potential Human Food Chain Contamination Factor: 3.00E-05

Documentation for Missouri River Fishery:

Combined, 2,138 pounds of fish were harvested from the Missouri River in Jackson and Clay counties in 1993 (Reference 42). Although this value is a high end estimate of the amount of fish harvested 15 miles downstream of the site, as it falls within the 1000 - 10,000 pounds of fish harvested range, it is a reasonable value.

Reference: 42

Food Chain Individual

Location of Nearest Fishery: Missouri River
Distance from the Probable Point of Entry: 1.50 miles
Type of Surface Water Body: River
Dilution Weight: 0.0001000
Level of Contamination: Potential

Food Chain Individual Factor: 0.00

Documentation for Missouri River:

Overland flow from the site enters intermittent drainage ditches on the northwestern and southeastern portions of the site (Reference 13). This flow is probably channeled into the municipal sewer system.

The shortest distance between the site and the Missouri River is 1.5 miles (Reference 4). The flow of the Missouri River near Kansas City, Missouri was 50,850 cubic feet per second for the period of record 1897-1993 (Reference 48).

Reference: 4,13,48

SW PATHWAY: OVERLAND FLOW/FLOOD ENVIRONMENTAL THREAT WASTE CHARACTERISTICS
Leo Eisenberg's Property - 08/09/95

Source: 1 Gray sludge

Source Hazardous Waste Quantity Value: 22450.15

Hazardous Substance	Eco-toxicity Value	Persistence Value	Bio-accum. Value	Ecotoxicity/ Persistence/ Bioaccum. Value
Dibenzofuran	100	1.00E+00	5.00E+02	5.00E+04
Methyl Napthalene, 2-	1000	4.00E-01	5.00E+03	2.00E+06
Naphthalene	1000	4.00E-01	5.00E+02	2.00E+05
Phenanthrene	1000	4.00E-01	5.00E+03	2.00E+06
Selenium	100	1.00E+00	5.00E+03	5.00E+05

Source: 2 Contaminated fill

Source Hazardous Waste Quantity Value: 0.00

Hazardous Substance	Eco-toxicity Value	Persistence Value	Bio-accum. Value	Ecotoxicity/ Persistence/ Bioaccum. Value
Acenaphthene	10000	4.00E-01	5.00E+02	2.00E+06
Anthracene	10000	4.00E-01	5.00E+03	2.00E+07
Benz(a)anthracene	10000	1.00E+00	5.00E+04	5.00E+08
Benzo(j,k)fluorene	10000	1.00E+00	5.00E+03	5.00E+07
Cadmium	1000	1.00E+00	5.00E+03	5.00E+06
Dibenzofuran	100	1.00E+00	5.00E+02	5.00E+04
Fluorene	1000	1.00E+00	5.00E+03	5.00E+06
Lead	1000	1.00E+00	5.00E+03	5.00E+06
Phenanthrene	1000	4.00E-01	5.00E+03	2.00E+06
Phenol	10000	1.00E+00	5.00E+00	5.00E+04
Pyrene	0	1.00E+00	5.00E+01	0.00E+00

Hazardous Substances Found in an Observed Release

Sample No.	Observed Release Hazardous Substance	Eco-toxicity Value	Persistence Value	Bio-accum. Value	Ecotoxicity/ Persistence/ Bioaccum. Value

- N/A and/or data not specified

Ecotoxicity/Persistence/Bioaccummulation Value from Source Hazardous Substances:	5.00E+08
Ecotoxicity/Persistence/Bioaccummulation Value from Observed Release Hazardous Substances:	0.00E+00
Ecotoxicity/Persistence/Bioaccummulation Factor:	5.00E+08
Sum of Source Hazardous Waste Quantity Values:	2.25E+04
Hazardous Waste Quantity Factor:	10000
Waste Characteristics Factor Category:	1000

Level I Concentrations

- N/A and/or data not specified

Level II Concentrations

- N/A and/or data not specified

Most Distant Level I Sample

- N/A and/or data not specified

Most Distant Level II Sample

- N/A and/or data not specified

SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT ENVIRONMENTAL THREAT TARGETS
Leo Eisenberg's Property - 08/09/95

Level I Concentrations

Sensitive Environment	Distance from Probable Point of Entry to Sensitive Env. (miles)	Sensitive Environment Value
- N/A and/or data not specified		

Sum of Sensitive Environments Values: 0

Wetlands

Wetland	Distance from Probable Point of Entry to Wetland (miles)	Wetlands Frontage (miles)
- N/A and/or data not specified		

Total Wetlands Frontage: 0.00 Miles Total Wetlands Value: 0

Sum of Sensitive Environments Value + Wetlands Value: 0.00E+00

Level I Concentrations Factor: 0.00E+00

SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT ENVIRONMENTAL THREAT TARGETS
Leo Eisenberg's Property - 08/09/95

Level II Concentrations

Sensitive Environment	Distance from Probable Point of Entry to Sensitive Env. (miles)	Sensitive Environment Value
- N/A and/or data not specified		

Sum of Sensitive Environments Values: 0

Wetlands

Wetland	Distance from Probable Point of Entry to Wetland (miles)	Wetlands Frontage (miles)
- N/A and/or data not specified		

Total Wetlands Frontage: 0.00 Miles Total Wetlands Value: 0

Sum of Sensitive Environments Value + Wetlands Value: 0.00E+00

Level II Concentrations Factor: 0.00E+00

SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT ENVIRONMENTAL THREAT TARGETS
Leo Eisenberg's Property - 08/09/95

Potential Contamination

Sensitive Environments

Type of Surface Water Body	Sensitive Environment	Sensitive Environment Value

Wetlands

Type of Surface Water Body	Sensitive Environment	Wetlands Frontage	Wetlands Value

- N/A and/or data not specified

SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT ENVIRONMENTAL THREAT TARGETS
Leo Eisenberg's Property - 08/09/95

Type of Surface Water Body	Sum of Sens. Environment Values(Sj)	Sum of Wetland Frontage Values(Wj)	Dilution Weight (Dj)	Dj(Wj+Sj)

- N/A and/or data not specified

Sum of Dj(Wj+Sj): 0.00E+00
Sum of Dj(Wj+Sj)/10: 0.00E+00

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Potential Contamination Sensitive Environment Factor: 3.50E-03

SOIL EXPOSURE PATHWAY RESIDENT POPULATION THREAT LIKELIHOOD OF EXPOSURE
Leo Eisenberg's Property - 08/09/95

Likelihood of Exposure

No.	Source ID	Level of Contamination
1	Gray sludge	Level II
2	Contaminated fill	Level II

Likelihood of Exposure Factor: 550

Documentation for Area of Contamination, Source Gray sludge:

Reference:

Source No.	Hazardous Substance	Depth (ft.)	Concent.	Cancer	RFD	Units
1	Dibenzofuran	< 2	2.4E-02	0.0E+00	0.0E+00	ppm
1	Methyl Napthalene, 2-	< 2	8.2E-02	0.0E+00	0.0E+00	ppm
1	Naphthalene	< 2	3.5E-02	0.0E+00	0.0E+00	ppm
1	Phenanthrene	< 2	8.6E-02	0.0E+00	0.0E+00	ppm
1	Selenium	< 2	2.8E+00	0.0E+00	2.9E+03	ppm
2	Acenaphthene	< 2	6.2E-01	0.0E+00	3.5E+04	ppm
2	Anthracene	< 2	5.1E+00	0.0E+00	1.7E+05	ppm
2	Benz(a)anthracene	< 2	6.9E+00	0.0E+00	0.0E+00	ppm
2	Benzo(j,k)fluorene	< 2	2.1E+01	0.0E+00	2.3E+04	ppm
2	Cadmium	< 2	4.1E+00	0.0E+00	2.9E+02	ppm
2	Dibenzofuran	< 2	9.3E-01	0.0E+00	0.0E+00	ppm
2	Fluorene	< 2	1.0E+00	0.0E+00	2.3E+04	ppm
2	Lead	< 2	1.3E+02	0.0E+00	0.0E+00	ppm
2	Phenanthrene	< 2	1.3E+01	0.0E+00	0.0E+00	ppm
2	Phenol	< 2	1.2E-01	0.0E+00	3.5E+05	ppm
2	Pyrene	< 2	9.8E+00	0.0E+00	1.7E+04	ppm

Documentation for Source Gray sludge, Contaminants:

This sample, 95-0644, was collected from a pile of a grayish sludge-like material similar to the pile in photo #46-17A. The values listed either exceed the background sample, 95-0644, where the background sample is non-detect, or are greater than 3X the

quantity in the background sample (Reference 44).

These samples were collected by MDNR on April 27, 1995 in support of the SI2.

Reference: 44

SOIL EXPOSURE PATHWAY RESIDENT POPULATION THREAT WASTE CHARACTERISTICS

Leo Eisenberg's Property - 08/09/95

Source: 1 Gray sludge

Source Hazardous Waste Quantity Value: 8583.88

Hazardous Substance	Toxicity Value
Dibenzofuran	0
Methyl Napthalene, 2-	0
Naphthalene	1
Phenanthrene	0
Selenium	100

SOIL EXPOSURE PATHWAY RESIDENT POPULATION THREAT WASTE CHARACTERISTICS
Leo Eisenberg's Property - 08/09/95

Source: 2 Contaminated fill

Source Hazardous Waste Quantity Value: 0.00

Hazardous Substance	Toxicity Value
Acenaphthene	10
Anthracene	10
Benz(a)anthracene	1000
Benzo(j,k)fluorene	100
Cadmium	10000
Dibenzofuran	0
Fluorene	100
Lead	10000
Phenanthrene	0
Phenol	1
Pyrene	100

SOIL EXPOSURE PATHWAY RESIDENT POPULATION THREAT WASTE CHARACTERISTICS

Leo Eisenberg's Property - 08/09/95

Toxicity Factor:	1.00E+04
Sum of Source Hazardous Waste Quantity Values:	8.58E+03
Hazardous Waste Quantity Factor:	100
Waste Characteristics Factor Category:	32

Targets

Level I Population:	0.0	Value:	0.00

Documentation for Level I Population:

There is no resident population within 0.25 miles of the site (References 4; 13).

Reference: 4,13

Level II Population:	0.0	Value:	0.00
Workers:	4.0	Value:	5.00

Documentation for Workers:

Mo-Kan Container Service employs four permanent workers. Additional people visit the site daily to rent containers (Reference 13).

Reference: 13

Resident Individual:	Potentia	Value:	0.00
Resources:	NO	Value:	0.00

Documentation for Resources:

No resources identified. The site is located in a heavy industrial area (References 4; 13).

Reference: 4,13

SOIL EXPOSURE PATHWAY RESIDENT POPULATION THREAT TARGETS

Leo Eisenberg's Property - 08/09/95

Terrestial Sensitive Environment	Value
- N/A and/or data not specified	

Terrestrial Sensitive Environments Factor: 0.00

SOIL EXPOSURE PATHWAY NEARBY POPULATION THREAT LIKELIHOOD OF EXPOSURE
Leo Eisenberg's Property - 08/09/95

Likelihood of Exposure

No.	Source ID	Level of Contamination	Attractiveness/ Accessibility	Area of Contam. (sq. feet)
1	Gray sludge	Level II	10	0
2	Contaminated fill	Level II	10	9

Highest Attractiveness/Accessibility Value: 10
Sum of Eligible Areas Of Contamination (sq. feet): 9
Area of Contamination Value: 5

Likelihood of Exposure Factor Category: 5

Documentation for Attractiveness/Accessibility, Source Gray sludge:

The Eisenberg Fill site is located in an industrial area. It is partially surrounded by a maintained fence and has a check-in station near the entrance to the Mo-Kan container service (Reference 13).

Reference: 13

Source No.	Hazardous Substance	Depth (ft.)	Concent.	Cancer	RFD	Units
1	Dibenzofuran	< 2	2.4E-02	0.0E+00	0.0E+00	ppm
1	Methyl Napthalene, 2-	< 2	8.2E-02	0.0E+00	0.0E+00	ppm
1	Naphthalene	< 2	3.5E-02	0.0E+00	0.0E+00	ppm
1	Phenanthrene	< 2	8.6E-02	0.0E+00	0.0E+00	ppm
1	Selenium	< 2	2.8E+00	0.0E+00	2.9E+03	ppm
2	Acenaphthene	< 2	6.2E-01	0.0E+00	3.5E+04	ppm
2	Anthracene	< 2	5.1E+00	0.0E+00	1.7E+05	ppm
2	Benz(a)anthracene	< 2	6.9E+00	0.0E+00	0.0E+00	ppm
2	Benzo(j,k)fluorene	< 2	2.1E+01	0.0E+00	2.3E+04	ppm
2	Cadmium	< 2	4.1E+00	0.0E+00	2.9E+02	ppm
2	Dibenzofuran	< 2	9.3E-01	0.0E+00	0.0E+00	ppm
2	Fluorene	< 2	1.0E+00	0.0E+00	2.3E+04	ppm
2	Lead	< 2	1.3E+02	0.0E+00	0.0E+00	ppm
2	Phenanthrene	< 2	1.3E+01	0.0E+00	0.0E+00	ppm
2	Phenol	< 2	1.2E-01	0.0E+00	3.5E+05	ppm
2	Pyrene	< 2	9.8E+00	0.0E+00	1.7E+04	ppm

Documentation for Source Gray sludge, Contaminants:

This sample, 95-0644, was collected from a pile of a grayish sludge-like material similar to the pile in photo #46-17A. The values listed either exceed the background sample, 95-0644, where the background sample is non-detect, or are greater than 3X the quantity in the background sample (Reference 44).

These samples were collected by MDNR on April 27, 1995 in support of the SI2.

Reference: 44

SOIL EXPOSURE PATHWAY NEARBY POPULATION THREAT WASTE CHARACTERISTICS
Leo Eisenberg's Property - 08/09/95

Source: 1 Gray sludge

Source Hazardous Waste Quantity Value: 8583.88

Hazardous Substance	Toxicity Value
Dibenzofuran	0
Methyl Napthalene, 2-	0
Naphthalene	1
Phenanthrene	0
Selenium	100

Source: 2 Contaminated fill

Source Hazardous Waste Quantity Value: 0.00

Hazardous Substance	Toxicity Value
Acenaphthene	10
Anthracene	10
Benz(a)anthracene	1000
Benzo(j,k)fluorene	100
Cadmium	10000
Dibenzofuran	0
Fluorene	100
Lead	10000
Phenanthrene	0
Phenol	1
Pyrene	100

SOIL EXPOSURE PATHWAY NEARBY POPULATION THREAT WASTE CHARACTERISTICS

Leo Eisenberg's Property - 08/09/95

Toxicity Factor:	1.00E+04
Sum of Source Hazardous Waste Quantity Values:	8.58E+03
Hazardous Waste Quantity Factor:	100
Waste Characteristics Factor Category:	32

Nearby Individual

Population within 1/4 mile: 0.0

Nearby Individual Value: 0.0

Population Within 1 Mile

Travel Distance Category	Number of People	Value
> 0 to 1/4 mile	0.0	0.0
> 1/4 to 1/2 mile	1368.0	2.0
> 1/2 to 1 mile	2737.0	1.0
	Population Within 1 Mile Factor:	3.0

Documentation for Population > 0 to 1/4 mile Distance Category:

Based upon the topographic map for North Kansas City and a visit to the site on April 27, 1995, there do not appear to be any residential dwellings within 0.25 miles of the site (References 4, 13).

Reference: 4,13

Documentation for Population > 1/4 to 1/2 mile Distance Category:

These values were estimated from topographic maps and data from the 1990 census (References 4 and 34).

Reference: 4,34

OBSERVED RELEASE

No.	Sample ID	Distance (miles)	Level of Contamination

- N/A and/or data not specified

Observed Release Factor: 0

Gas Migration Potential

GAS POTENTIAL TO RELEASE

Source ID	Source Type	Gas Contain. Value (A)	Gas Source Type Value (B)	Gas Migrtn. Potent. Value (C)	Sum (B+C)	Gas Potential to Rel. Value A(B+C)
Gray sludge	Waste Pile	10	17	11	28	280
Contaminated fill	Contaminated Soil	10	0	11	11	110

Gas Potential to Release Factor: 280

Documentation for Source Type, Source Gray sludge:

The source of contamination at the site is contaminated fill dumped in piles across the site (photo #46-17A in SI report).

Reference:

Documentation for Source Type, Source Contaminated fill:

This source type was contaminated fill material (Reference 13).

Reference: 13

Source: Gray sludge

Gaseous Hazardous Substance	Hazardous Substance Gas Migration Potential Value
Dibenzofuran	11
Methyl Napthalene, 2-	11
Naphthalene	11
Phenanthrene	11

Average of Gas Migration Potential Value for 3 Hazardous Substances: 11.000

Gas Migration Potential Value From Table 6-7: 11

Source: Contaminated fill

Gaseous Hazardous Substance	Hazardous Substance Gas Migration Potential Value
Acenaphthene	11
Anthracene	6
Benz(a)anthracene	6
Benzo(j,k)fluorene	6
Dibenzofuran	11
Fluorene	11
Phenanthrene	11
Phenol	11
Pyrene	6

Average of Gas Migration Potential Value for 3 Hazardous Substances: 11.000

Gas Migration Potential Value From Table 6-7: 11

Particulate Migration Potential

PARTICULATE POTENTIAL TO RELEASE

Source ID	Source Type	Partic. Contain. Value (A)	Partic. Source Type Value (B)	Partic. Migrtn. Potent. Value (C)	Sum (B+C)	Partic. Potential to Rel. Value A(B+C)
Gray sludge	Waste Pile	10	28	6	34	340
Contaminated fill	Contaminated Soil	10	0	6	6	60

Particulate Potential to Release Factor: 340

Documentation for Source Type, Source Gray sludge:

The source of contamination at the site is contaminated fill dumped in piles across the site (photo #46-17A in SI report).

Reference:

Documentation for Source Type, Source Contaminated fill:

This source type was contaminated fill material (Reference 13).

Reference: 13

Source: Gray sludge

Particulate Hazardous Substance
Dibenzofuran
Methyl Napthalene, 2-
Naphthalene
Phenanthrene
Selenium

Source: Contaminated fill

Particulate Hazardous Substance
Acenaphthene
Anthracene
Benz(a)anthracene
Benzo(j,k)fluorene
Cadmium
Dibenzofuran
Fluorene
Lead
Phenanthrene
Pyrene

Source: 1 Gray sludge

Source Hazardous Waste Quantity Value: 22450.15

Hazardous Substance	Toxicity Value	Gas Mobility Value	Particulate Mobility Value	Toxicity/ Mobility Value
Dibenzofuran	100	2.00E-02	2.00E-04	2.00E+00
Methyl Napthalene, 2-	100	2.00E-01	2.00E-04	2.00E+01
Naphthalene	1	2.00E-01	2.00E-04	2.00E-01
Phenanthrene	100	2.00E-02	2.00E-04	2.00E+00
Selenium	100	NA	2.00E-04	2.00E-02

Source: 2 Contaminated fill

Source Hazardous Waste Quantity Value: 0.00

Hazardous Substance	Toxicity Value	Gas Mobility Value	Particulate Mobility Value	Toxicity/ Mobility Value
Acenaphthene	10	2.00E-01	2.00E-04	2.00E+00
Anthracene	10	2.00E-03	2.00E-04	2.00E-02
Benz(a)anthracene	1000	2.00E-04	2.00E-04	2.00E-01
Benzo(j,k)fluorene	100	2.00E-04	2.00E-04	2.00E-02
Cadmium	10000	NA	2.00E-04	2.00E+00
Dibenzofuran	100	2.00E-02	2.00E-04	2.00E+00
Fluorene	100	2.00E-01	2.00E-04	2.00E+01
Lead	10000	NA	2.00E-04	2.00E+00
Phenanthrene	100	2.00E-02	2.00E-04	2.00E+00
Phenol	1	1.00E+00	NA	1.00E+00
Pyrene	100	2.00E-03	2.00E-04	2.00E-01

Hazardous Substances Found in an Observed Release

Sample ID	Observed Release Hazardous Substance	Particulate Toxicity/ Mobility Value	Gas Toxicity/ Mobility Value

- N/A and/or data not specified

AIR PATHWAY WASTE CHARACTERISTICS
Leo Eisenberg's Property - 08/09/95

Toxicity/Mobility Value from Source Hazardous Substances:	2.00E+01
Toxicity/Mobility Value from Observed Release Hazardous Substances:	0.00E+00
Toxicity/Mobility Factor:	2.00E+01
Sum of Source Hazardous Waste Quantity Values:	2.25E+04
Hazardous Waste Quantity Factor:	10000
Waste Characteristics Factor Category:	18

Actual Contamination

No.	Sample ID	Distance (miles)	Level of Contamination

- N/A and/or data not specified

Potential Contamination

Distance Categories Subject to Potential Contamination	Population	Value
Onsite	0.0	0.0000
> 0 to 1/4 mile	0.0	0.0000
> 1/4 to 1/2 mile	1368.0	8.8000
> 1/2 to 1 mile	2737.0	2.6000
> 1 to 2 miles	5365.0	2.7000
> 2 to 3 miles	23074.0	3.8000
> 3 to 4 miles	43625.0	7.3000

Potential Contaminantion Factor: 25.0000

Documentation for Population Onsite Distance Category:

The 2-3 and 3-4 mile distance rings included 4710 people attributed to Kansas City, Kansas. The Kansas population was calculated as follows: approximately 3.39 square miles of the four mile distance ring fell in Kansas. The average population per square mile in Kansas City, Kansas in 1990 was 1,389.3 people. This equates to 1570 people attributed to the 2-3 mile distance ring and 3140 people to the 3-4 mile distance ring (References 4; 35).

Reference:

Nearest Individual Factor

Level of Contamination: Potential
Distance in miles: > 1/4 to

Nearest Individual Value: 2

Resources

Resource Use: NO

Resource Value: 0

Documentation for Resources:

No resources identified.

Reference: 4,13

Actual Contamination, Sensitive Environments

Sensitive Environment	Distance (miles)	Sensitive Environment Value
- N/A and/or data not specified		

Actual Contamination, Wetlands

Distance Category	Wetland Acreage	Wetland Acreage Value
- N/A and/or data not specified		

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Sensitive Environments Actual Contamination Factor: 0.000
(Sum of Sensitive Environments + Wetlands Values)

Potential Contamination, Sensitive Environments

Sensitive Environment	Distance (miles)	Sensitive Environment Value	Distance Weight	Weighted Value/10
- N/A and/or data not specified				

Potential Contamination, Wetlands

Distance Category	Wetland Acreage	Wetland Acreage Value	Distance Weight	Weighted Value/10
> 1 to 2 miles	150.0	125.0	0.0051	0.064
> 1/2 to 1 mile	250.0	250.0	0.0160	0.400

Total Wetland Acreage: 400.0

Sum of Wetland Weighted Acreage Values/10: 0.464

Sensitive Environment Potential Contamination Factor: 0.464

Documentation for Sensitive Environment Wetland #1:

Riverfront Park, on the southern bank of the Missouri River, is located approximately 1 mile from the site. This wetland is about 250 acres in size (Reference 43).

Reference: 43

Documentation for Sensitive Environment Wetland #2:

There is a wetland of approximately 150 acres located 1.5 to 3 miles southwest of the site (Reference 43).

Reference: 43

REFERENCES

Leo Eisenberg's Property - 08/09/95

1. References contained within the Eisenberg Fill SI2 narrative report.