

MINUTES OF THE Senate COMMITTEE ON Energy and Natural ResourcesThe meeting was called to order by Senator Charlie L. Angell at  
Chairperson8:00 a.m. ~~p.m.~~ on Tuesday, February 8, 1983 in room 123-S of the Capitol.

All members were present except:  
Senator Paul Hess (Excused)  
Senator Tom Rehorn (Excused)

Committee staff present:  
Ramon Powers, Research Department  
Don Hayward, Revisor's Office  
LaVonne Mumert, Secretary to the Committee

Conferees appearing before the committee:  
Morris Kay, Regional Director of the United States Environmental Protection Agency  
James F. Aiken, Jr., Director of Division of Environment, Kansas Department of Health and  
Environment

The minutes of the February 4, 1983 meeting were approved.

Morris Kay distributed a brochure on the Environmental Protection Agency (EPA) Superfund (Attachment 1). He discussed immediate removals, planned removals and remedial actions. Mr. Kay said 84% of the Superfund is financed by the chemical industry and 16% by general appropriations from Congress. There is 1.6 billion dollars in the Superfund. EPA works closely with the state governments, local units of government, the generators of waste and people at the local level who are affected. EPA will take legal action against the responsible parties to recover expenses to the federal government for clean-up. Mr. Kay said there are now 418 sites on the National Priority List. The comment period for these 418 sites lasts until February 18 and any input pertaining to those sites must be received before that time. Sites listed on the National Priority List are eligible for remedial work, but some of these 418 are not designated at this time for federal funds because either state or local units of government have taken the lead of responsibility. The minimum cost for clean-up to states for private sites is 10% and for publicly owned or operated sites is 50%. The individual state has the responsibility to identify a suitable site to manage any waste resulting from clean-up. States are prevented from double taxation on the chemical firms.

Answering a question from Senator Roitz, Mr. Kay said that the Tar Creek site has a rating of 66.74 which applies to the potential for an adverse effect on health. Mr. Kay gave a brief background of the dioxin problem in Missouri, but emphasized they have no information which would lead them to believe there is any connection at all between the dioxin in Missouri and the Tar Creek problem.

James F. Aiken, Jr. distributed the following to the Committee: Superfund Sites (Attachment 2); Tar Creek, Cherokee County, Kansas (Attachment 3); Superfund (Attachment 4) and Summary Report of Arkansas City Refinery Phase I Investigation (Attachment 5). His presentation was illustrated by slides. Mr. Aiken said the budget of Kansas Department of Health and Environment has no money for clean-up. He said they have found low-level contamination of the groundwater on site at the Arkansas City site, but there is no indication of contamination of groundwater elsewhere or of the Arkansas River. The site contains a small pond that indicates low ph. Mr. Aiken said there has been some seepage from the Doepke Holliday site in Johnson County. EPA is in the process of making an investigation on this site. Some samples with preliminary analysis indicate some low levels of heavy metals and other materials. Mr. Aiken described the Tar Creek area. He said the abandoned mines have filled up with water and started discharging in 1979. There are chat piles located all over this area and they cause some problems with surface runoff which affects the water quality to some extent. Mr. Aiken discussed the problem of shaft collapses and subsidences. He said one of the primary concerns has been the potential for contamination from this area into the Roubidoux formation which is a source of water supply for this area. He said preliminary indications are that the natural communication of these formations is not all that great, but there are bore holes, which are probably open, through these formations and could be communication, but the extent is unknown. So far, there is no indication of any contamination. Mr. Aiken stated that Johns' Sludge Pond in Wichita is oil wastes created by an oil recycling refinery. The property belongs to the City of Wichita and they are proceeding with plans to correct the problem. The plan, basically, is to neutralize the liquid on top and then to

Unless specifically noted, the individual remarks recorded herein have not been transcribed verbatim. Individual remarks as reported herein have not been submitted to the individuals appearing before the committee for editing or corrections.

CONTINUATION SHEET

MINUTES OF THE Senate COMMITTEE ON Energy and Natural Resources,

room 123-S, Statehouse, at 8:00 a.m./~~p.m.~~ on Tuesday, February 8, 1983

solidify the remaining material and transfer it to a disposal trench. Mr. Aiken also reported on the clean-up at the NIES site near Furley, Kansas.

Answering questions about the NIES site, Mr. Aiken said the company is providing out of state alternative sites to its customers. He said they feel that containment has been successful and no contaminated groundwater is leaving the site. There is a trench on the south side of the site and the level of contamination is similar to that in the north trench but Mr. Aiken could not give the exact level.

The meeting was adjourned at 9:07 a.m. by the Chairman.

The next meeting of the Committee will be at 8:00 a.m. on February 9, 1983.

Senate Energy & Natural Resources  
Feb. 8, 1983

<u>Name</u>	<u>Organization</u>
Terry Wooten	WICHITA EAGLE
Pete McGill	Pete McGill <sup>and Assoc</sup>
Bob Moody	KDHE
Patrice Tomeray	KDHE
Howard Duncan	KDHE
Sheri L. Clutz	Dept of Admin
Wayla Z Smith	Johnson County, KS, Waste Adm.
Ralph A Hazel PhD	Johnson Co, Environmental Dept
Jim Aiken	KDHE
ROBERT L. Morby	EPA - KANSAS City
Barbara Sabel	KDHE
Kelly	UPI
Cindy Entiken	Sen. Nes's office
Ernie Aiken	
John Paul Goetz	KDHE
DALE BADENA	KGS
Bill Anderson	Water Dist #1, Jo Co
Bennett E. Kwan	u u u u
Mark R Anson	Abing Overland Park
Louise Schneider	Bill Banton

**O**n April 21, 1980, a fire of unknown origin broke out at an inactive waste treatment facility in Elizabeth, New Jersey. The site was littered with some 20,000 leaking and corroded drums containing pesticides, explosives, radioactive wastes, acids, and other hazardous substances. A cloud of toxic gases skirted heavily-populated areas one-quarter mile from the site. Significant quantities of contaminated water from firefighting ran off into the Elizabeth River.

**O**n February 26, 1979, a freight train derailed near Youngstown, Florida, puncturing a tank car containing 90,000 pounds of chlorine gas, and releasing a chlorine cloud. Eight motorists on a nearby highway were killed, 183 other people were injured, and 3,500 residents within a 7.5 mile radius were evacuated. Other derailed tank cars contained a variety of toxic and flammable substances.

**F**or two and one half decades, hundreds of tons of toxic wastes were dumped into an unfinished canal built by William T. Love in Niagara Falls, New York. The canal was covered when full; houses and a school were later built near and above the canal. In the later 1970s, alarmed by unusual health symptoms, residents of the Love Canal area called the attention of government officials to hazardous substances rising to the surface, seeping into basements, and migrating from the site.

These examples and others demonstrate that the careless disposal of hazardous wastes in the past, and the continuing threat of releases of hazardous substances to the environment are potential problems throughout the nation.

The Superfund program was created by Congress as a key part of the nation's overall response to these hazardous substance problems.

Superfund is established by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Public Law 96-510, enacted in December 1980. The United States Environmental Protection Agency (EPA) is responsible for managing the Superfund program.

## Why Superfund Is Needed

Until this law was passed, the Federal Government lacked the general authority to clean up hazardous waste sites or to respond to spills of hazardous substances onto land or into the air or non-navigable waters. Congress had addressed hazardous waste problems before, but Federal responsibilities were mostly regulatory.

- *The Resource Conservation and Recovery Act (RCRA), passed in 1976, establishes a regulatory system to track hazardous substances from the time of generation to disposal. It also requires safe and secure procedures to be used in treating, storing, and disposing of hazardous substances. RCRA is designed to prevent the creation of new Love Canals, but it does not permit the government to respond directly to the problems caused by improper hazardous waste disposal sites already in existence.*

- *The Clean Water Act and its predecessors enable the Federal Government to take action when oil or designated hazardous substances are discharged into navigable waterways. But they do not permit the government to act when hazardous substances are released elsewhere in the environment, threatening to contaminate groundwater or to emit dangerous fumes.*

These and other environmental laws, such as the Clean Air Act, authorize the Federal Government to take legal action to compel individuals or companies—generators, transporters, or disposers of hazardous substances—to clean up problems for which they are responsible. When a dumpsite is old and abandoned, however, it may be impossible to find anyone responsible for the problem—or anyone able to afford the cost of a cleanup. Moreover, many releases of hazardous substances demand prompt attention to avert serious damage. There may not be enough time for legal proceedings before action must be taken.

Some States had established their own programs for spill response or the cleanup of uncontrolled waste disposal sites. However, like the Federal Government, State governments often lacked the funds and the legal authority needed to deal fully with the problem.

## The Superfund Law

Congress therefore enacted new legislation to establish a five-year program to spearhead both Federal and State efforts to respond to releases of hazardous substances into the environment.

The Superfund law of December 1980—CERCLA—authorizes the Federal Government to respond directly to releases (or threatened releases) of hazardous substances and pollutants or contaminants that may endanger public health or welfare. Costs are to be covered by a \$1.6 billion fund, 86 percent of which is financed by taxes on the manufacture or import of certain chemicals and petroleum, the remainder coming from general revenues. This fund is reimbursable: the government generally can take legal action to recover its cleanup costs from those subsequently identified as responsible for the release. Anyone liable for a release who fails to take ordered actions is (under specified conditions) liable for punitive damages equal to three times the government's response costs.

## How The Superfund Program Works

The guidelines and procedures that the Federal Government will follow in implementing the Superfund law are spelled out in a flexible regulatory document called "The National Contingency Plan."

The Superfund program is built on the recognition that responses and cleanups must be tailored to the specific needs of each site or each release of hazardous substances. EPA's strong enforcement effort seeks to ensure that private responsible parties finance cleanup actions when possible. Direct government action, when called for, can take the following forms:

- *Immediate removals, when a prompt response is needed to prevent harm to public health or welfare or the environment. For example, immediate removals may be ordered to avert fires or explosions, to prevent exposure to acutely toxic substances, or to protect a drinking water supply from contamination. Actions may include the installation of security fencing, the construction of physical*

*barriers to control a discharge, or the removal of hazardous substances off the site. Ordinarily, immediate removals are limited by law to six months and a total cost of \$1 million.*

- *Planned removals, when an expedited, but not necessarily immediate, response is needed. These actions are intended to minimize increases in danger or exposure that would otherwise occur if response were delayed. Planned removals are subject to the same time and cost limits as immediate removals.*

- *Remedial actions, which are longer-term and usually more expensive, aimed at permanent remedies. They may be taken only at sites identified as national priorities. EPA published an interim list of 115 national priority sites in October 1981; the list will eventually be expanded to include some 400 sites. Specific actions may include the removal of drums containing wastes from the site, the installation of a clay "cap" over the site, the construction of ditches and dikes to control surface water or drains, liners, and grout "curtains" to control groundwater, the provision of an alternate water supply, or the temporary or permanent relocation of residents.*

The primary responsibility for carrying out the Superfund program has been assigned by Executive Order to EPA. The Coast Guard, however, will respond to spills that occur in coastal areas. Other Federal agencies will provide assistance as necessary during a response. States are encouraged to take responsibility for an increasing number of Superfund-financed remedial actions. Under the law, State governments may plan and manage responses under agreement with the Federal Government. In remedial actions for which the Federal Government has lead responsibility, the Army Corps of Engineers will manage the design and construction stages for EPA. Private contractors will perform the work at a site under Federal or State government supervision.

An important part of the Superfund program is to encourage voluntary cleanup by private industries and individuals when they are responsible for releases. In fact, since the full extent of the problem has



# Superfund:

## What It Is, How It Works

### EPA Superfund Offices

**Region 1**  
John F. Kennedy Bldg.  
Boston, MA 02203  
(617) 223-5775

**Region 4**  
345 Courtland St. N.E.  
Atlanta, GA 30365  
(404) 881-3931

**Region 8**  
1860 Lincoln St.  
Denver, CO 80295  
(303) 837-6238

**Region 2**  
26 Federal Plaza  
New York, NY 10007  
(212) 264-3082

**Region 5**  
230 South Dearborn St.  
Chicago, IL 60604  
(312) 886-7570

**Region 9**  
215 Fremont St.  
San Francisco, CA 94015  
(415) 974-7466

**Region 3**  
6th and Walnut Sts.  
Philadelphia, PA 19106  
(215) 597-9023

**Region 6**  
1201 Elm Street  
Dallas, TX 75270  
(214) 767-2750

**Region 10**  
1200 6th Avenue  
Seattle, WA 98101  
(206) 442-1986

**Region 7**  
324 East 11th Street  
Kansas City, MO 64108  
(816) 374-6531

**Superfund/RCRA Hotline** (800) 424-9346  
for information on programs

**National Response Center** (800) 424-8802  
to report oil and hazardous substance releases

become understood, millions of dollars have been spent by industry for cleanup, as well as for the retrofitting of existing facilities. Additionally, industrial research and development has resulted in significant advances in hazardous waste control technologies.

Working with the local community is a key aspect of every Superfund response. At each site, officials responsible for technical work will ensure that local citizens' and officials' concerns are taken into account in the development of solutions and that information about the site is widely distributed.

### The Limits of Superfund

The \$1.6 billion Superfund is large. However, the cost of responding to a hazardous substance release can be large too, and there are many sites and spills in need of attention.

Consequently, while CERCLA authorizes the government to respond to releases of hazardous substances, it does not require the government to respond to every release. At present, private parties handle about 90 percent of all releases that would otherwise require a removal action.

In addition, CERCLA specifies that Superfund money can be spent only under carefully prescribed conditions.

● *A Superfund-financed response may not be taken if EPA determines that the owner, operator, or other responsible party is undertaking an appropriate cleanup.*

● *Immediate removals are taken only to bring a release of hazardous substances under control; they are not intended to eliminate completely every long-term problem. As noted, both immediate and planned removals usually must be limited in cost and duration.*

● *Before a remedial action or planned removal can be taken, States must agree to pay 10 percent of project costs (at least 50 percent if the site was owned by the State or a local government). State governments must also agree to maintain the site after response work is completed and provide for off-site disposal if necessary.*

● *Response under Superfund is not authorized in specified situations that may be covered by other laws (e.g., for certain releases of source, byproduct, or special nuclear material from a nuclear incident).*

Because remedial actions may confront technically complex problems that are expensive to resolve, they are subject to further conditions. Technical measures can be selected only after evaluation of all feasible alternatives on the basis of economic, engineering, and environmental factors. The National Contingency Plan explains how to determine the extent of cleanup that is appropriate and most cost-effective for a particular site. In addition:

● *The law requires that wherever possible, the remedy selected should avoid the costly step of excavating hazardous wastes and transporting them off the site for disposal elsewhere.*

● *The benefits to be derived from continued work at a remedial action site must be weighed against the benefits of working at other sites in the nation. A project could be delayed or terminated to allow funds to be shifted where they are most needed.*

The intent of these conditions is to derive the maximum benefit from Superfund for the nation as a whole.

The Superfund program, in sum, is a coordinated effort of the Federal Government, State and local governments, private industry, and citizens. The problems are widespread and often will require time to resolve. But the Superfund program is a significant part of our national response to one of the major environmental challenges of the decade.

This leaflet provides an overview of Superfund. For further information, please contact an EPA Regional Office or call the national information number listed on back. The toll-free number of the National Response Center is also provided for citizens to report releases of oil and hazardous substances into the environment.



United States  
Environmental Protection  
Agency

Official Business  
Penalty for Private Use  
\$300

Office of Solid Waste and  
Emergency Response (WH-562A)  
Washington DC 20460

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## SUPERFUND SITES

Kansas Department of Health  
and Environment  
February 8, 1983

On December 20, 1982, EPA announced a priorities list of Superfund candidates which totaled 418 sites nationally, thirteen within the four-state EPA Region VII, and four Kansas locations. The sixty-day comment period on that listing will close February 18, 1983. The four Kansas sites are identified as Arkansas City Milliken Refinery site at Arkansas City, Doepke Disposal Service site near Holiday in Johnson County, Tar Creek site which is an area in Southern Cherokee County, and John's Sludge Pond site in Wichita.

## ARKANSAS CITY MILLIKEN REFINERY SITE

This site located near the west edge of Arkansas City was abandoned about fifty years ago following an explosion and fire. The property has since been purchased from the city by A. C. Industries which has partially renovated the area, developed and sold lots for commercial use. Although some wastes were removed from the area, about five acres are still covered by wastes remaining at the site. Known wastes and contaminants at the site include two areas estimated at four to five acres total of hardened asphaltic-like residues and a small pond of low pH water.

The Phase I investigation (funded by EPA) was completed by KDHE in September 1982. Trace quantities of priority pollutants have been detected in the groundwater near the immediate vicinity of the waste disposal areas. Phase II investigations will complete additional groundwater monitoring and propose a site cleanup program.

## DOEPKE DISPOSAL SERVICE SITE

This Johnson County site near Holiday, is located south of the Kansas River and west of Interstate 435. Drainage samples from this area indicate low levels of copper, lead, nickel, zinc, phenols, and cyanides. The site, operated by Doepke Disposal Services, Inc., received industrial wastes during the 1960's. It was closed in 1969 under a plan approved by KDHE. In 1979 and 1980, the site was further covered with excavation material from the construction of Interstate 435. EPA is conducting a field investigation of the site.

## TAR CREEK

EPA and KDHE recommended this site for the Superfund list after Tar Creek in Oklahoma was listed as one of the ten worst sites in the nation. The main causes of concern are the abandoned lead/zinc mines in the area which have been contaminating surface water and have the potential for groundwater contamination. Health surveys have shown a higher than expected cancer death rate. While this can be partially but not fully explained by smoking, there is as yet no conclusive evidence to prove that this is a result of environmental problems associated with the abandoned mines. The KDHE Division of

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Health is presently conducting studies in this connection. EPA Region VII is closely coordinating the investigation with the State of Oklahoma and EPA Region VIII. Aerial overflights of the area carried out by EPA in September are presently being interpreted by their Los Vegas Office.

#### JOHNS' SLUDGE POND

Johns' Sludge Pond located near 29th and Hydraulic Streets in Wichita was used by a waste oil refinery during the 1950's and 1960's for disposing of acidic oil sludge. The pond is about an acre and has an estimated depth of eight to fifteen feet. A June 1982 investigation by EPA revealed that groundwater near the immediate vicinity of the pond is contaminated with lead. Polychlorinated biphenols (PCB's) have also been detected in the waste. The property owner (City of Wichita) has submitted a plan for remedial action which will schedule completion of the project in the Spring of 1984.

Tar Creek  
Cherokee Co., Kansas

February 8, 1983  
KDHE

Tar Creek is one of the four designated hazardous waste sites in Kansas and the only site Kansas shares with another state, Oklahoma. Tar Creek is a small creek with a drainage area of approximately 50 square miles, of which 17 square miles are in Kansas and 35 square miles are in Oklahoma. Tar Creek originates in Cherokee County, Kansas about 5 miles north of the state line and empties into the Neosho River 9 miles south of the state line in Ottawa County, Oklahoma after flowing nearly straight south. Tar Creek overlays most of one particular minefield which is part of the larger Tri State Mining District. The larger Tri State Mining District extends from north and east of Joplin, Missouri along a diagonal through southeast Kansas into Oklahoma. The minefield under Tar Creek is known as the Pitcher Field and was richest of the Tri State Mining District with over 1 billion dollars worth of lead and zinc mined. The Pitcher Field is the most southern and western extension of the Tri State Mining District and encompasses approximately 10 square miles. About  $2\frac{1}{4}$  square miles lay in Kansas and  $7\frac{3}{4}$  square miles in Oklahoma.

The problems in the Tar Creek area are directly attributable to the lead and zinc mining operations which began around the turn of the century and wound down in the 1960's. The Pitcher Field and Tar Creek is not the only portion of the Tri State Mining District which has problems associated with past mining, only the most recent and best publicized.

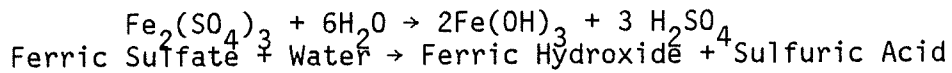
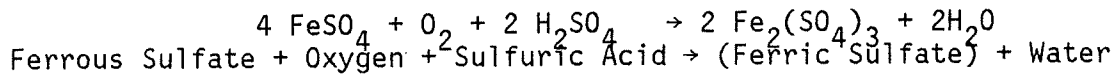
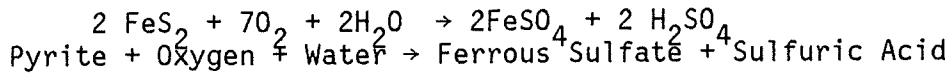
To understand the problems associated with Tar Creek one needs an understanding of the geology of the area and a history of the mining that took place. Figure 1 shows a geologic cross section. The geologic units that are of greatest concern are the Boone Formation and the deeper Roubidoux Formation. It is in the Boone Formation that the lead and zinc ores were found and mined. Before mining took place the Boone Formation was saturated with water, and pumped for drinking water. The metals present in the rock were in reduced form and were not very soluble in water. When mining began wells were drilled into the Boone Formation and pumped. The pumping caused a dry area called a cone of depression, in which the mines could be worked. As the mining spread out, more and more pumps were needed. During the peak production in the 1930's up to 23 million gallons a day was pumped.

At the same time vast quantities of rock were hauled to the surface, crushed, and the fraction containing lead and zinc separated out. The total volume of rock worked in the Pitcher Field was approximately 100,000 acre/ft. which is equivalent to a rock pile covering a square mile 156 ft. deep. This volume is also by necessity the estimate of void space in the Boone Formation left by mining. This waste rock, called chat, was reworked several times as recovery techniques improved, and the government gave incentives for reprocessing. The chat has been, and is continuing to be, used for road mix, gravel roads and railroad ballast.

In the process of mining, iron present mainly as pyrite in the rock around the ore was exposed to fresh air. Under moist conditions with oxygen in the air, acid formation took place. The principal reactions in the acid formation are as follows:

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When iron compounds were flooded the sulfuric acid caused low pH conditions and some metals were leached out of the surrounding rock and went into solution. This sort of acid production is common in mining operation exposing pyrite, such as coal mining operations. This flooding took place when an area had been "played out" and the pumps to maintain the area dry were turned off or removed. Unused mines began to fill with acid water. By 1970 all the pumps had been turned off and the water was refilling in all the mines. In addition to water naturally moving into the mined area another pathway was open for water to fill up the mines. That pathway was direct surface runoff flowing down old mine shafts, well holes, bore holes, and collapsed areas. The number of possible paths is enormous. There were well over 400 mines in the Pitcher Field, some of which had over 500 bore holes drilled to determine the extent of the ore bodies. Some of the mine shafts were closed off but most were just abandoned. The main shafts are in various stages of collapse from graded over, to open, to collapse, to a pit. The bore holes also are in various conditions. It was a common practice that if ore was not found in the exploratory bore hole, the hole was sealed off using a section of a telephone pole. Even when the bore holes were lined with iron casing, with time the casings can and do rust out. What further complicates the bore hole problems are that locations are not well documented.

With the siltation in Tar Creek and Lytle Creek caused by the mining operation and chat pile runoff, many areas of the creek have become wide, shallow "swamps." A number of borehole casings can be seen rising from the water. The number of these shafts and holes open to the mined area but unseen is unknown. At least 5 areas of direct inflow are known, 2 of which are in Kansas and 3 of which are in Oklahoma. The location of the various known inflows in the past has caused questions to be raised as to the possible direction of flow in the groundwater. The Hittman report out of the Tar Creek Task Force in Oklahoma, and current studies by the USGS in Lawrence indicate that the flow of the water in the groundwater is generally in a westerly direction, not in a southerly direction as had been presumed.

Due to natural and manmade recharge, the Boone Formation rapidly refilled and in November of 1979 began to discharge at the surface. The initial seep was located in a horse pasture near Commerce, Oklahoma. Several months later a second seep was found 2 miles farther north. This seep, which is the most northern so far is still 3 miles south of the Kansas-Oklahoma state line. The surface water in Tar Creek above where these seeps enter, including all of the Kansas portion, is relatively good quality. KDHE sampling however does indicate the water quality is effected to some degree by runoff from existing chat piles.

The water coming out of the seeps in Oklahoma is of the same water quality as that found in the old mine systems, that is high in acid, iron, sulfates, zinc, various other metals, and low in pH. This acid water caused a fish kill in Tar Creek when the discharge began.

The Tar Creek site was petitioned by Oklahoma to be declared a Hazardous Waste Site. EPA evaluated the site, declared it a hazardous waste site, and provided Oklahoma Superfund monies to study the problem and possibly solutions. Besides studying the impact of the surface water, the possibility of contaminating the deeper Roubidoux Formation is also being studied. The Roubidoux is widely used as a water supply source and is the major concern of the Tar Creek problem. The completed reports of these studies are to be released shortly. The results that have been released so far by the Oklahoma Water Resource Board indicate that the formations between Boone and the Roubidoux, the Cotter and Jefferson City, are highly impermeable in nature. The results also show that mine water reacts with the formation and form precipitates which further reduce the permeability with time. Although the exact chemical reactions have not been studied by Oklahoma, it is probable that part of the precipitate consists of heavy metals, and the precipitation is caused by neutralization of the acid. This reaction would improve the water quality. Natural movement of water from the Boone Formation into the Roubidoux Formation appear from these results to be limited, however the extent of downward movement due to old abandoned wells and other opened drill holes penetrating into the Roubidoux Formation has not been assessed.

Tar Creek was also rated a hazardous site on factors besides surface water and groundwater quality. The land surface is a physical hazard due to collapses and subsidences. This is also due to the mining history and technique. Even when a mine was "played out" there is still rich ores present in the form of rock pillars supporting the roof of the mine. When the first mining company finished rights to mine these supporting pillars was sold to individuals appropriately named "gougers". Sometimes the mine pillars would be gouged by a succession of miners. Mines without sufficient support have collapsed and continue to collapse, leading both to a possible safety problem and creating new areas for potential inflow to the Boone Formation.

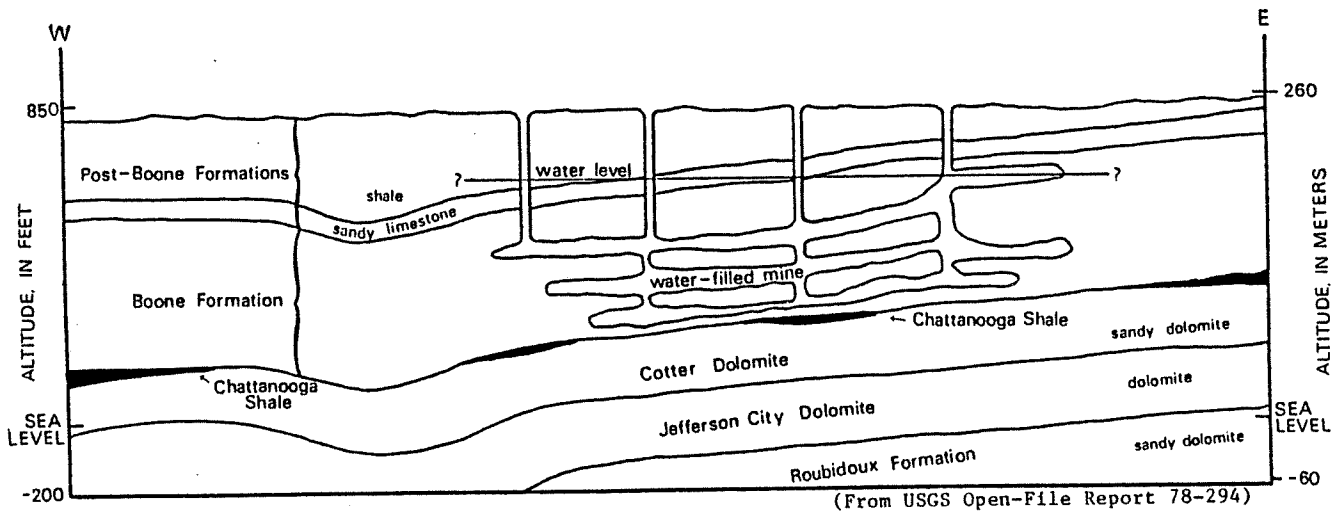


Figure 1--Generalized geologic section showing relationship of rock formations to water-filled mines.

## SUPERFUND

Kansas Department of Health  
and Environment  
February 8, 1983

Background

The program known as Superfund was established by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Public Law 96-510, enacted in December 1980. It is administered by the U. S. Environmental Protection Agency (EPA) for addressing environmental pollution situations which are not manageable under the basic environmental laws: the Resource Conservation and Recovery Act (RCRA), the Clean Water Act, and the Clean Air Act. These other environmental laws authorize the Federal Government to take legal action to compel individuals or companies--generators, transporters, or disposers of hazardous substances--to cleanup problems for which they are responsible. When a dumpsite is old and abandoned, however, it may be impossible to find anyone responsible for the problem--or anyone able to afford the cost of a cleanup. Moreover, many releases of hazardous substances demand prompt attention to avert serious damage. There may not be enough time for legal proceedings before action must be taken.

CERCLA allows a direct response to releases (or threatened releases) of hazardous substances and pollutants or contaminants that may endanger public health or welfare. Costs are to be covered by a \$1.6 billion fund, 86 percent of which is financed by taxes on the manufacture or import of certain chemicals and petroleum, the remainder coming from general revenues. This fund is reimbursable; the government generally can take legal action to recover its cleanup costs from those subsequently identified as responsible for the release. Anyone liable for a release who fails to take ordered actions is (under specified conditions) liable for punitive damages equal to three times the government's response costs.

Types of Actions

The guidelines and procedures that the Federal Government will follow in implementing the Superfund law are spelled out in a document called "The National Contingency Plan." The Superfund program is built on the recognition that responses and cleanups must be tailored to the specific needs of each site or each release of hazardous substances. EPA's strong enforcement effort seeks to ensure that private responsible parties finance cleanup actions when possible. Direct government action, when called for, can take the following forms:

(Immediate removals) - Used when a prompt response is needed to prevent harm to public health or welfare or the environment. For example, immediate removals may be ordered to avert fires or explosions, to prevent exposure

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to acutely toxic substances, or to protect a drinking water supply from contamination. Actions may include the installation of security fencing, the construction of physical barriers to control a discharge, or the removal of hazardous substances off the site. Ordinarily, immediate removals are limited by law to six months and a total cost of \$1 million.

(Planned removals) - Used when an expedited, but not necessarily immediate, response is needed. These actions are intended to minimize increases in danger or exposure that would otherwise occur if response were delayed. Planned removals are subject to the same time and cost limits as immediate removals.

(Remedial actions) - Used for situations which are longer-term and usually more expensive, aimed at permanent remedies. They may be taken only at sites identified as national priorities. EPA published an interim list of 115 national priority sites in October 1981; the list has been expanded to include some 418 sites. Specific actions may include the removal of drums containing wastes from the site, the installation of a clay "cap" over the site, the construction of ditches and dikes to control surface water or drains, liners, and grout "curtains" to control groundwater, the provision of an alternate water supply, or the temporary or permanent relocation of residents.

### Responsibilities

The primary responsibility for carrying out the Superfund Program has been assigned to EPA. The Coast Guard, however, will respond to spills that occur in coastal areas. Other federal agencies will provide assistance as necessary during a response. States are encouraged to take responsibility for an increasing number of Superfund-financed remedial actions. Under the law, state governments may plan and manage responses under agreement with the Federal Government. In remedial actions for which the Federal Government has lead responsibility, the Army Corps of Engineers will manage the design and construction stages for EPA. Private contractors will perform the work at a site under federal or state government supervision.

An important part of the Superfund Program is to encourage voluntary cleanup by private industries and individuals when they are responsible for releases. In fact, since the full extent of the problem has become understood, millions of dollars have been spent by industry for cleanup, as well as for the retrofitting of existing facilities. Additionally, industrial research and development has resulted in significant advances in hazardous waste control technologies.

Working with the local community is a key aspect of every Superfund response. At each site, officials responsible for technical work will ensure that local citizens' and officials' concerns are taken into account in the development of solutions and that information about the site is widely distributed.

## Limitations

The \$1.6 billion Superfund is large. However, the cost of responding to a hazardous substance release can be large too, and there are many sites and spills in need of attention. Consequently, while CERCLA authorizes the government to respond to releases of hazardous substances, it does not require the government to respond to every release. At present, private parties handle about 90 percent of all releases that would otherwise require a removal action. In addition, CERCLA specifies that Superfund money can be spent only under carefully prescribed conditions. A Superfund-financed response may not be taken if EPA determines that the owner, operator, or other responsible party is undertaking an appropriate cleanup.

Immediate removals are taken only to bring a release of hazardous substances under control; they are not intended to eliminate completely every long-term problem. As noted, both immediate and planned removals usually must be limited in cost and duration.

Before a remedial action or planned removal can be taken, states must agree to pay ten percent of project costs (at least 50 percent if the site was owned by the state or a local government). State governments must also agree to maintain the site after response work is completed and provide for off-site disposal if necessary.

Response under Superfund is not authorized in specified situations that may be covered by other laws (e.g., for certain releases of source, by-product, or special nuclear material from a nuclear incident).

Because remedial actions may confront technically complex problems that are expensive to resolve, they are subject to further conditions. Technical measures can be selected only after evaluation of all feasible alternatives on the basis of economic, engineering, and environmental factors. The National Contingency Plan explains how to determine the extent of cleanup that is appropriate and most cost effective for a particular site.

The law requires that wherever possible, the remedy selected should avoid the costly step of excavating hazardous wastes and transporting them off the site for disposal elsewhere.

The benefits to be derived from continued work at a remedial action site must be weighed against the benefits of working at other sites in the nation. A project could be delayed or terminated to allow funds to be shifted where they are most needed. The intent of these conditions is to derive the maximum benefit from Superfund for the nation as a whole.

The Superfund Program, in sum, is a coordinated effort of the Federal Government, state and local government, private industry, and citizens. The problems are widespread and often will require time to resolve. But, the Superfund Program is a significant part of our response to one of the major environmental challenges of the decade.

SUMMARY REPORT  
OF  
ARKANSAS CITY REFINERY  
PHASE I INVESTIGATION

BY

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT

1 October 1982

*Atch. 5*

Summary Report of Arkansas City Refinery  
Phase I Investigation

Background

The former Milliken Refinery located in the NW/4 Section 36, Township 34S, Range 3E, Cowley County, Kansas was owned by the Milliken Company of St. Louis during the early 1900's. According to local property owners, there was a big explosion and fire at the refinery around 1924 after which it went out of business. Brown and Strauss acquired either a part or whole of the former refinery during the 1930's and carried out most of the salvaging operations after the fire.

A large portion of the former refinery site is presently owned by the City of Arkansas City and A. C. Industries, a local community based industrial development organization. Since 1967, A.C. Industries has developed part of the site and sold several tracts of land to small businesses located on the north and east edge of site.

After a preliminary inspection of the site during the Fall of 1980 by the Kansas Department of Health and Environment (KDHE), it was decided that further investigations were necessary to determine if the wastes spread over an area of about 4-5 acres were creating any environmental problems to the surrounding community. This report summarizes the results of this investigation.

1. Field Investigation

The field investigation of the site was initiated by the Kansas Department of Health and Environment (KDHE) in May 1982. The investigation included collection of environmental and waste samples. A series of eight monitoring wells were drilled in and around the former Milliken Refinery site. A summary of the sampling locations and a map showing the monitoring wells installed are included in Table I and Attachment I respectively.

2. Analytical Results and Waste Characteristics

The waste present at the site is segregated into four distinct locations as follows:

1. North Waste Pile (NWP) with Acid Pit (AP)
2. East Waste Pile (EWP) - partially buried
3. South Waste Pile (SWP)
4. Series of Ponds (SPN)

The locations have been shown on the map in Attachment II. The laboratory test results of various samples collected during the investigation are summarized in Attachment III. Identification of various sample codes in the summary reports is included at the end of the same attachment.

TABLE 1  
SAMPLING LOCATIONS AND NUMBER OF SAMPLES

		Number and Types of Samples				
		Soil Core	Waste Sample	Ground Water	Surface Water	Total
I. Environmental Samples						
(A) Off-site:						
1.	North boundary of the site* (MW1)	1	-	1 well	-	2
2.	East boundary of site* (MW2)	2	-	1 well	-	3
3.	Ark River, upstream	-	-	-	1	1
4.	Ark River, downstream	-	-	-	1	1
5.	West of the levee* (MW3 and 4)	2	-	2 wells	-	4
6.	Sand pit	-	-	-	1	1
7.	Far East Pond	-	-	-	1	1
(B) On-site:						
1.	Vicinity of the north waste pile* (MW5)	2	-	1 well	-	3
2.	Vicinity of the south waste pile (MW6)	2	-	1 well	-	3
3.	Vicinity of wastes buried on east side of site* (MW7)	2	-	1 well	-	3
4.	Series of ponds on south edge of site* (MW8)	1	-	1 well	-	2
II. Waste Samples						
1.	North waste pile	-	1	-	-	1
2.	South waste pile	-	1	-	-	1
3.	Buried waste on east side	-	1	-	-	1
4.	Series of ponds on south edge	-	2	-	-	2
5.	Acid pit	-	-	-	1	1
TOTAL		12	5	8	5	30

\*Monitoring wells



As noted in the summary of inorganic test results, there was no significant heavy metals contamination in any of the test holes drilled (MW1S through MW8S), although petroleum type hydrocarbon odors were noted in Test Holes MW2, MW5, MW6, and MW7 during drilling operations. Test Holes MW1 and MW4 are upgradient and serve as background or control points. Although most of the waste samples (NWP, EWP, SWP, SPN1 and SPN2) show significant concentrations of heavy metals, none of them exhibit any hazardous waste characteristics of ignitability, corrosivity, reactivity and EP Toxicity. (The EP Toxicity test measures the ability of the heavy metals in the wastes to leach into the groundwater.) The heavy metals in the waste are not of sufficient water-solubility characteristics to categorize the material as a hazardous waste. It should be noted that in the past the pH of water in the acid pit near the north waste pile has been measured to be about 1.5, although during this investigation, it was found to be about 2.5. Wastes with pH less than 2.0 are defined as hazardous. The only heavy metal which appears to be of concern is lead (170 mg/kilogram) in the north waste pile. However, no appreciable concentrations of lead was found in MW5 which is closest to this waste location. Generally, the wastes are thought to be containing highly complex polynuclear aromatic hydrocarbons and high molecular weight aliphatic hydrocarbons which tend to undergo direct photolysis and degradation. Most of these aromatic hydrocarbons are listed as hazardous substances under "Superfund".

Attachment IV is a test report on the asphalt-like sludge material. As seen in the analytical report, the asphaltene content of the waste is almost twice the percentage normally found in asphalt used for road construction. As asphalt ages, the asphaltenes content increases with a corresponding decrease in the polar compounds and the first and second paraffins.

### 3. Public Health and Environmental Hazard Report

The preliminary test results indicate that the wastes disposed of at the site do not meet the criteria for hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). These include the following:

- ignitability
- corrosivity
- reactivity
- EP Toxicity

The only waste disposal area that has met one of these criteria in the past is the acid pit near the north waste pile. The pH of water in this pit has been measured to be about 1.5 a few months ago, although it was found to be about 2.5 during this investigation. Wastes with pH of less than 2.0 are considered hazardous wastes. This change is probably due to heavy rains during the investigation.

Attachment III includes summaries of inorganic and organic analysis of surface and groundwater near the site. The preliminary results indicate that monitoring wells number 4 and 5 are contaminated with lead. Not much significance is attached to this because MW4 is supposed to be an upgradient-well and the contamination is either due to laboratory errors or cross contamination. The only concern about groundwater contamination is from polynuclear aromatic hydrocarbons (PNA's) which are shown in the same attachment. Most of the PNA's are listed as hazardous substances under "Superfund". This contamination which has been mainly detected in the downgradient wells is in trace amounts (micrograms per liter). A review of EPA Water Quality Criteria document indicates acute toxicity to salt water aquatic life occurs at 300 ug/liter. Levels which may result in incremental increase of cancer risk in humans over the lifetime through ingestion of contaminated water and contaminated aquatic organism are estimated at  $10^{-5}$ ,  $10^{-6}$ , and  $10^{-7}$ . The corresponding criteria are 28 ng/l, 2.8 ng/l and 0.28 ng/l, respectively. This means that there is a probability of one additional case of cancer in a population of 100,000 when water contaminated with 28 ng/l of PNA's is ingested by humans as the sole water supply source over an extended period of decades.

Groundwater in the area appears to be flowing in the south and southwesterly direction towards the Sand Pit and Arkansas River. There are no drinking water wells downgradient from the site. Two private wells near the east-edge of the site which are being used for washing trucks and for application of fertilizer and pesticides did not indicate any contamination from the refinery within limits of detection. PNA's were also not detected in the Sand Pit and the Arkansas River. It is our finding that the contamination is confined to the waste disposal areas. In the light of this determination it appears that there is no immediate environmental threat to the surrounding community.

An Organic Vapor Survey of the site done by EPA contractors generally concluded that, in general, the organic vapor concentrations above the wastes were relatively low with the exception of high methane readings recorded at the south waste pile. At one point in this area, a relatively heavy, only slightly volatile organic mixture component was also detected. Based on information available at the time, it was generally agreed that most of the more volatile chemicals have dissipated by now at least from the surface of the waste. However, safety precautions should be taken if the waste is disturbed.

#### 4. CONCLUSIONS

Based on our investigation of the former Milliken Refinery and results of preliminary sampling, the following conclusions can be drawn:

- i. Most of waste disposed of by the refinery operators in the past does not now meet the hazardous waste characteristics as defined by RCRA. The only disposal area which has exhibited these characteristics in

the past is the acid pit near the north waste pile. The water in the pit has been measured to have a pH of about 1.5.

- ii. Although there are no records to substantiate, there is a possibility that when the refinery was in operation, the following waste streams "listed" as hazardous waste in Subpart D, Title 40, Code of Federal Regulations, Part 261, were probably disposed of at the site:

K048-Dissolved air floatation from the petroleum refining industry  
K049-Slop oil emulsion solids from the petroleum refining industry  
K050-Heat exchanger bundle cleaning sludge from the petroleum refining industry.

K051-Tank bottoms (leaded) from the petroleum refining industry.

- iii. Polynuclear aromatic hydrocarbons which are known to be present in refinery wastes are leaching into the groundwater even after 50 years. Trace amounts in micrograms/liter of these compounds have been detected in some of the downgradient monitoring wells during initial sampling. The highly permeable sandy soil in the area does not in any way help in minimizing the migration of contaminants. Considering the fact that there are no downgradient drinking water wells and no contamination was detected in the Arkansas River and the Sand Pit, it is concluded that there is no immediate environmental threat or health hazard to the surrounding community.
- iv. Most of the more volatile chemicals from the surface of the waste have dissipated over the last 50 years and no toxic vapors or gases are emanating from the area at the present time. However, safety precautions must be taken if the waste is disturbed.

## 5. RECOMMENDATIONS

The results of the Phase I investigation at the former Milliken Refinery have shown that the fluids in the water-bearing zones beneath the site contain varying concentrations of chemical parameters known to be present in the refinery wastes disposed of at the site. From this investigation it appears that these chemicals which fall into the category of polynuclear aromatic hydrocarbons are essentially confined to on-site areas.

Based on the results it is recommended that the following action be taken:

- i. A Phase II investigation must be initiated and will include the following elements:
  - (a) The groundwater contamination detected during the Phase I investigation must be closely monitored by collecting samples on a quarterly basis.

- (b) Additional monitoring wells must be installed and a leachate plume developed to determine the extent of contamination.
  - (c) Any additional private wells near the east and southeast of the site must be surveyed.
  - (d) A detailed hydrogeologic report describing site specific conditions including concerns for the bedrock aquifer system.
  - (e) The waste and contaminated areas must be sampled at greater depths. It is possible that the waste characteristics at the bottom of the piles and ponds are different than the surface characteristics.
- ii. The present property owners must take all precautions to restrict access of the general public to the waste disposal areas.
- iii. Feasibility studies proposing different options for remedial action must be incorporated in the Phase II plan. The options recommended for these studies are:
- (a) Recovery of the waste as fuel. It has been reported in literature that the energy content of these sludges vary from 7000 to 15,400 Btu/lb.
  - (b) Recovery of oil and other hydrocarbons from the waste. Recent trends in technology indicate that recovery of these products could be feasible.
  - (c) Recovery of waste as asphalt for road construction. Preliminary test results indicate that the waste has degraded over the last several years and formed larger molecular compounds like asphaltenes and the waste as such would not be suitable as asphalt. However, the possibility of blending it with fresh asphalt and using for road construction must be considered. It is believed that considerable amount of research will be required prior to doing this.
  - (d) Encapsulation of the waste with an impermeable cover. By doing this groundwater infiltration could be minimized and eventually eliminated.
  - (e) Land treatment of waste on-site. Since refinery wastes have been traditionally treated by this method, this option must be considered.

- (f) Off-site disposal of waste. It is estimated that the quantity of waste at the site ranges anywhere from 300,000 to 670,000 cubic feet. Both hazardous and non-hazardous wastes off-site disposal costs must be evaluated.

It must be noted that in evaluating the options listed above all the environmental technical, economical and social issues will be considered.

ATTACHMENT I

Map showing monitoring wells

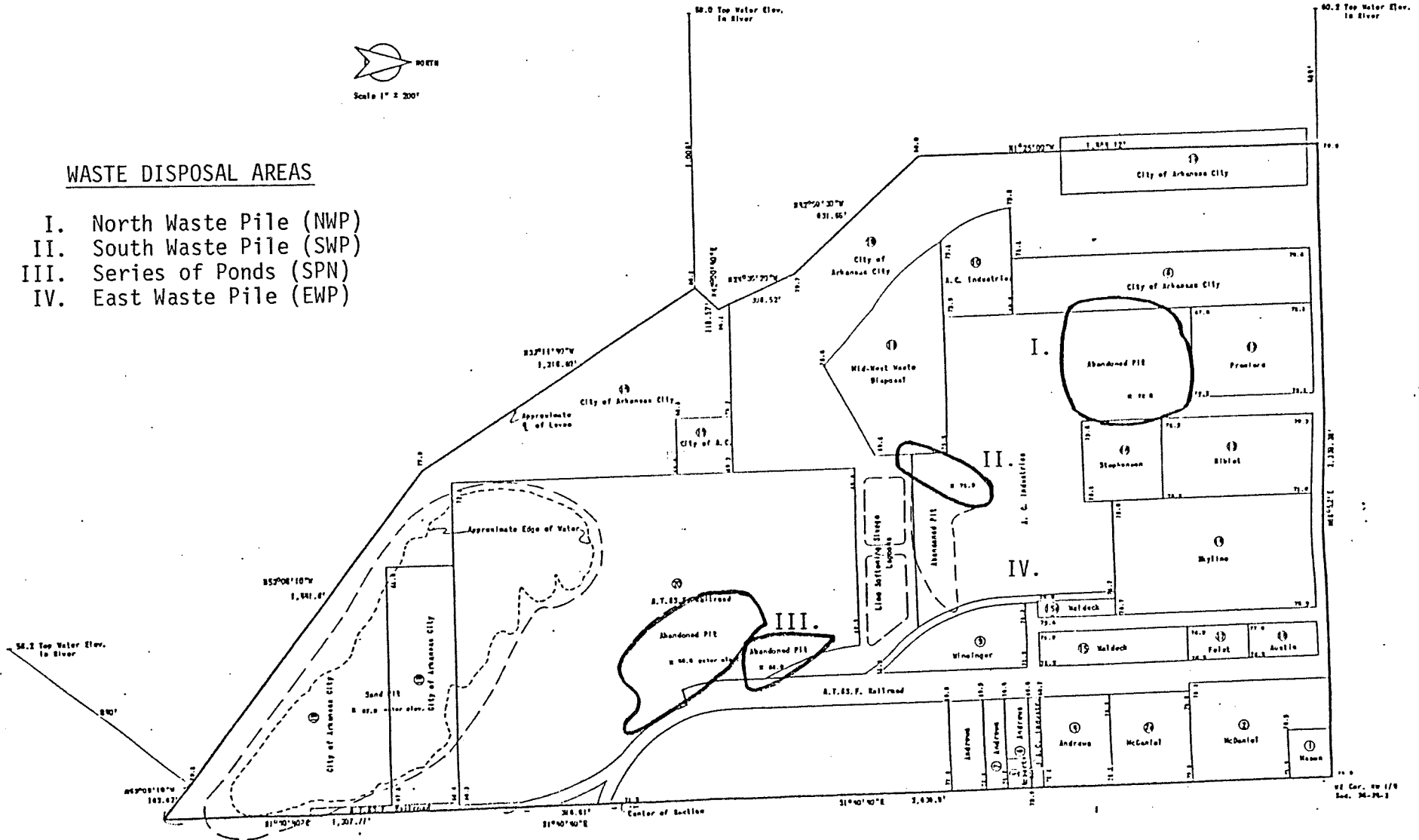




Scale 1" = 200'

## WASTE DISPOSAL AREAS

- I. North Waste Pile (NWP)
- II. South Waste Pile (SWP)
- III. Series of Ponds (SPN)
- IV. East Waste Pile (EWP)



BENCH MARK: "E3" set in curb of S & S Bullock building at Northwest corner. Elev. 1078.18 USGL



ATTACHMENT II

Map showing waste locations

ATTACHMENT III

Summary of Laboratory Test Results

KEY

AR1	-	Arkansas River Upstream
AR2	-	Arkansas River Downstream
SP	-	Sand Pit
AP	-	Acid Pit
SPN	-	Series of Ponds
FEP	-	Far east pond
SWP	-	South waste pile
LW	-	Wineinger well
WD	-	Waldeck well
MW1	-	Test Hole/Monitoring Well No. 1
MW2	-	" " " " " 2
MW3	-	" " " " " 3
MW4	-	" " " " " 4
MW5	-	" " " " " 5
MW6	-	" " " " " 6
MW7	-	" " " " " 7
MW8	-	" " " " " 8

Note: Subscript 'L' in the tables indicates water sample  
Subscript 'S' indicates soil/sludge sample

	AR1L	AR2L	SP1L	AP1L	SPH1L	1P1L	SWP1L	1W1L	WD1L	MW1L	MW2L	MW3L	MW4L	MW5L	MW6L	MW7L	MW8L
Arsenic	0	0.01	0	0.02	0.01	0.01	0	0.01	0	0.04	0.01	0.01	0.03	0.01	0.03	0.01	0.03
Barium	0.2	0.2	0.2	0.1	0.3	0.2	0.1	0.3	0.4	0.4	0.2	0.3	0.4	0.3	0.1	0.2	1.6
Beryllium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01
Cadmium	0	0	0	0.01	0	0	0	0	0	0.001	0	0.001	0.004	0.004	0	0.002	0.005
Chromium	0	0	0	0	0	0.01	0	0.01	0.01	0.01	0	0.01	0.02	0.02	0	0.01	0.03
Copper	0.01	0.01	0.01	0.04	0	0.01	0	0	0.01	0.03	0.01	0.03	0.07	0.02	0.02	0.04	0.20
Iron	0.58	1.0	0.17	8.0	0.85	0.48	0.93	3.22	0.04	18.0	1.9	6.7	28.0	9.5	21.0	8.5	32.0
x Lead	0	0.01	0	0.26	0	0.01	0.01	0	0	0.04	0.01	0.04	0.07	0.06	0.02	0.07	0.20
Manganese	0.22	0.22	0.14	0.32	1.1	0.46	0.12	1.99	1.7	1.0	0.33	1.2	4.4	0.98	1.9	0.85	4.9
Mercury	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0005	0
Nickel	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0.1	0.1
Selenium	0.003	0.002	0.003	0.009	0.006	0.002	0	0.003	0.001	0.002	0.004	0.002	0.004	0.002	0.002	0.002	0.001
Silver	0.01	0.01	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zinc	0.01	0.02	0.02	0.65	0.01	0.02	0.01	0.10	0.01	0.08	0.11	0.08	0.35	0.12	0.04	0.15	0.32
Sodium	-	-	-	3.4	166	153	0.8	109	85	129	78	147	172	61	86	105	96
Chloride	77	91	215	0	266	233	0	129	156	207	142	205	275	99	141	169	107
Sulfate	-	-	-	514	45	116	<5	117	122	105	100	134	85	54	100	89	19
Nitrate (ASH)	-	17	-	0.3	0.1	0	0	0.1	0.3	7.9	110	0	0.1	0	0.1	52	0
Ammonia (ASH)	0.22	0.19	0.37	0.42	1.2	3.4	0.04	1.2	14	1.2	16	0.59	0.68	0.03	0.54	5.4	0.06
Spec. conductance	582	643	1260	2910	1220	1280	44	1230	1730	1340	1800	1270	1340	954	1300	1310	912
pH	6.1	7.0	7.3	2.5	7.4	7.3	5.6	7.6	7.3	7.7	6.8	7.9	7.5	7.4	7.4	6.8	7.7
Total Alk.	-	97	-	0	257	264	3.0	399	296	307	351	265	246	343	376	163	346

Surface Water

Groundwater

SUMMARY OF INORGANIC WATER ANALYSIS

- Exceeding recommended drinking water standards for taste characteristics
- x — Exceeding maximum permissible drinking water standards.

All values reported in mg/l

August 1982

ACID LEACH	MWP15	EW15	SWP15	SPN15	SPN25	MW15	MW25	MW25-A	MW35	MW45	MW55	MW55-A	MW66	MW65-A	MW75	MW75-A	MW85
Arsenic	2.0 ( $<0.1$ )	1.0 ( $<0.05$ )	5.0 ( $<0.3$ )	2.0 ( $<0.1$ )	22.0 ( $<0.1$ )	1.0 ( $<0.1$ )	1.0 ( $<0.1$ )	3.0 ( $<0.3$ )	2.0 ( $<0.1$ )	1.0 (0)	1.0 ( $<0.1$ )	2.0 ( $<0.1$ )	2.0 ( $<0.1$ )	2.0 (0.1)	2.0 (0.1)	2.0 (0.1)	1.0 (0.1)
Barium	40.0 ( $<2.0$ )	20.0 ( $<1.0$ )	110.0 ( $<6.0$ )	80.0 ( $<4.0$ )	80.0 ( $<4.0$ )	40.0 ( $<4.0$ )	50.0 ( $<5.0$ )	50.0 ( $<5.0$ )	50.0 ( $<3.0$ )	30.0 ( $<3.0$ )	50.0 ( $<3.0$ )	30.0 ( $<2.0$ )	70.0 ( $<4.0$ )	60.0 ( $<3.0$ )	70.0 ( $<4.0$ )	250.0 ( $<13.0$ )	30.0 ( $<1.0$ )
Beryllium	0	0	1.0	0	0	0	0	0	0	0	0	1.0	0	0	0	0	0
Calcium	1.0 ( $<0.1$ )	1.0 ( $<0.05$ )	1.0 ( $<0.05$ )	1.0 ( $<0.1$ )	1.0 ( $<0.05$ )	0	0	0	0	0	1.0 ( $<0.1$ )	1.0 ( $<0.1$ )	2.0 ( $<0.1$ )	1.0 ( $<0.1$ )	2.0 ( $<0.1$ )	1.0 ( $<0.1$ )	0
Chromium	0	2.0 ( $<0.1$ )	11.0 ( $<0.6$ )	4.0 ( $<0.2$ )	4.0 ( $<0.2$ )	2.0 ( $<0.2$ )	4.0 ( $<0.4$ )	4.0 ( $<0.4$ )	4.0 ( $<0.2$ )	2.0 ( $<0.2$ )	3.0 ( $<0.2$ )	2.0 ( $<0.1$ )	5.0 ( $<0.3$ )	4.0 ( $<0.2$ )	5.0 ( $<0.3$ )	4.0 ( $<0.2$ )	2.0 ( $<0.1$ )
Copper	4.0	11.0	10.0	6.0	6.0	4.0	3.0	4.0	4.0	3.0	4.0	6.0	5.0	4.0	6.0	5.0	2.0
Iron	1700	3470	13000	5800	5410	2300	4100	4600	4700	1700	3700	4300	4500	4400	4300	5000	2600
Lead	170.0 (0.5)	4.0 ( $<0.2$ )	2.0 ( $<0.1$ )	20.0 ( $<1.0$ )	2.0 ( $<0.1$ )	10.0 ( $<1.0$ )	0	0	0	10.0 ( $<1.0$ )	20.0 ( $<1.0$ )	20.0 ( $<1.0$ )	20.0 ( $<1.0$ )	10.0 ( $<0.5$ )	20.0 ( $<1.0$ )	10.0 ( $<0.5$ )	0
Manganese	56	29	220	190	192	50	60	49	125	65	24	42	110	70	77	105	92
Mercury	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nickel	0	0	20	10	10	10	0	0	20	10	0	10	10	0	20	10	0
Selenium	0.5 ( $<0.05$ )	0.1 ( $<0.01$ )	0.4 ( $<0.02$ )	0.2 ( $<0.05$ )	0.3 ( $<0.02$ )	0.1 ( $<0.01$ )	0	0.1 ( $<0.02$ )	0.1 ( $<0.01$ )	0	0.1 ( $<0.05$ )	0.2 ( $<0.05$ )	0.2 ( $<0.05$ )	0.1 ( $<0.05$ )	0	0.2 ( $<0.05$ )	0.1 ( $<0.01$ )
Silver	1.0 ( $<0.1$ )	1.0 ( $<0.05$ )	1.0 ( $<0.05$ )	0	1.0 ( $<0.05$ )	1.0 ( $<0.05$ )	1.0 ( $<0.1$ )	1.0 ( $<0.1$ )	1.0 ( $<0.05$ )	0	0	0	0	0	0	1.0 ( $<0.1$ )	1.0 ( $<0.05$ )
Zinc	9	43	50	33	37	13	15	20	10	14	13	17	14	11	360	17	8

### SUMMARY OF INORGANIC ANALYSIS

Note: All values reported in mg/kg  
 Values reported in parenthesis are EP Toxicity Values (mg/l)

GC/MS ANALYSIS REPORT

BASE NEUTRAL EXTRACTABLE COMPOUNDS-PRIORITY POLLUTANTS

	AR1L	AR2L	SP1L	AP1L	SPN1L	EP1L	SWP1L	LW1L	WD1L	MW1L	MW2L	MW3L	MW4L	MW5L	MW6L	MW7L	MW8L
1,3-DICHLOROBENZENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-DICHLOROBENZENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-DICHLOROBENZENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HEXACHLOROETHANE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BIS (2-CHLOROETHYL) ETHER	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BIS (2-CHLOROISOPROPYL) ETHER	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NITROBENZENE NOT ANALYSED	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HEXACHLOROBUTADIENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4-TRICHLOROBENZENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ISOPHORONE NOT ANALYSED	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*NAPHTHALENE	-	-	-	0.6	-	-	-	-	-	-	-	-	-	1.5	-	-	-
BIS (2-CHLOROETHOXY) METHANE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-CHLORONAPHTHALENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*ACENAPHTHYLENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*ACENAPHTHENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DIMETHYL PHTHALATE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,6-DINITROTOLUENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*FLUORENE	-	-	-	2.8	-	-	-	-	-	-	-	-	-	2.7	4.3	-	-
4-CHLOROPHENYL PHENYL ETHER	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-DINITROTOLUENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DIETHYL PHTHALATE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HEXACHLOROBENZENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-BROMOPHENYL PHENYL ETHER	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*PHENANTHRENE	-	-	-	75.4	-	-	7.1	-	-	-	2.6	-	-	6.5	31.8	3.5	-
*ANTHRACENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DI-N-BUTYL PHTHALATE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*FLUORANTHENE	-	-	-	6.7	-	-	1.8	-	-	-	0.9	-	-	2.7	15.5	2.7	12.5
*PYRENE	-	-	-	57.0	-	-	9.6	-	-	-	7.5	-	-	-	-	-	-
BUTYL BENZYL PHTHALATE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BIS (2-ETHYLHEXYL) PHTHALATE	-	13.0	-	-	-	-	-	-	-	-	17.7	10.8	-	-	37.0	21.3	-
*CHRYSENE	-	-	-	295	-	-	11.2	-	-	-	6.4	-	-	6.0	12.6	2.3	-
*BENZO (A) ANTHRACENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3,3'-DICHLOROBENZIDINE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DI-N-OCTYL PHTHALATE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*BENZO (B) FLUORANTHENE	-	-	-	41.6	-	-	1.4	-	-	-	1.7	-	-	-	1.3	-	-
*BENZO (K) FLUORANTHENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*BENZO (A) PYRENE	-	-	-	276	-	-	9.9	-	-	-	12.0	-	-	3.5	10.7	3.0	-
*INDENO (1,2,3-C,D) PYRENE	-	-	-	11.4	-	-	-	-	-	-	1.4	-	-	-	-	-	-
*DIBENZO (A,H) ANTHRACENE	-	-	-	42.6	-	-	-	-	-	-	-	-	-	-	-	-	-
*BENZO (G,H,I) PERYLENE	-	-	-	23.9	-	-	2.5	-	-	-	14.9	-	-	-	3.3	-	-

SURFACE WATER

GROUND WATER

\*POLYNUCLEAR AROMATICS

ALL CONCENTRATIONS REPORTED IN MICROGRAMS/LITER (µG/L)  
DETECTION LIMITS: 5-10 µG/L

August 1982

GC/MS ANALYSIS REPORT

ACID EXTRACTABLE COMPOUNDS - PRIORITY POLLUTANTS (ALL)

- PRIORITY POLLUTANTS

0-CHLOROPHENOL  
2-NITROPHENOL  
PHENOL  
2,4-DIMETHYL PHENOL<sub>3</sub>  
2,4-DICHLOROPHENOL  
2, 4, 6-TRICHLOROPHENOL  
4-CHLORO-M-CRESOL  
2, 4-DINITROPHENOL  
4, 6-DINITRO-O-CRESOL  
PENTACHLOROPHENOL  
4-NITROPHENOL

-OTHER POLLUTANTS

2,4,5-TRICHLOROPHENOL  
2,3,5,6-TETRACHLOROPHENOL  
3,4-DICHLOROPHENOL  
3,4,5-TRICHLOROPHENOL  
2,6-DICHLOROPHENOL  
P-CHLOROPHENOL<sub>4</sub>  
2,3,4-TRICHLOROPHENOL  
2,3,4,6-TETRACHLOROPHENOL  
2,3,4,5-TETRACHLOROPHENOL

NONE OF THESE ORGANICS DETECTED  
IN ANY OF THE WATER SAMPLES COL-  
LECTED. #DETECTION LIMITS: 2-15  
µG/L

August 1982







## ANALYTICAL DATA REPORT

ACTIVITY NO: AL07

FRACTION: VOLATILES

METHOD NO: EP005WF

MATRIX: WATER

UNITS: UG/L

LAB: EPA REGION VII

DESCRIPTION: WATER FROM ARK CITY KANSAS FOR VOLATILES

COMPOUND NAME (CAS # STORET #)		MW1 AL0701	MW3 AL0703	MW4 AL0704	MW5 SAMPLE NUMBER AL0705	MW6 AL0706	MW7 AL0707	MW8 AL0708
ACROLEIN		< 12.	< 12.	< 12.	< 12.	< 12.	< 12.	< 12.
107-02-8	34210							
ACRYLONITRILE		< 19.	< 19.	< 19.	< 19.	< 19.	< 19.	< 19.
107-13-1	34215							
CHLOROMETHANE		< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
74-87-3	34418							
BROMOMETHANE		< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
74-83-9	34413							
VINYL CHLORIDE		< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4
75-01-4	39175							
CHLOROETHANE		< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4
75-00-3	34311							
METHYLENE CHLORIDE		< 7.0	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0
75-09-2	34423							
1,1-DICHLOROETHYLENE		< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200
75-35-4	34501							
1,1 DICHLOROETHANE		< 0.300	< 0.300	< 0.300	< 0.300	< 0.300	< 0.300	< 0.300
75-34-3	34496							
TRANS-1,2-DICHLOROETHYLENE		< 0.400	< 0.400	< 0.400	< 0.400	< 0.400	< 0.400	< 0.400
156-60-5	34546							
CHLOROFORM		< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200
67-66-3	32106							
1,2-DICHLOROETHANE		< 0.300	< 0.300	< 0.300	< 0.300	< 0.300	< 0.300	< 0.300
107-06-2	32103							
1,1,1-TRICHLOROETHANE		< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500
71-55-6	34506							
CARBON TETRACHLORIDE		< 0.400	< 0.400	< 0.400	< 0.400	< 0.400	< 0.400	< 0.400
56-23-5	32102							
BROMODICHLOROMETHANE		< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200
75-27-4	32101							
1,2-DICHLOROPROPANE		< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200
78-87-5	34541							
BENZENE		< 0.700	< 0.700	< 0.700	< 0.700	< 0.700	< 0.700	< 0.700
71-43-2	34030							
TRANS-1,3-DICHLOROPROPENE		< 0.400	< 0.400	< 0.400	< 0.400	< 0.400	< 0.400	< 0.400
1006-10-26	34699							
TRICHLOROETHYLENE		< 0.300	< 0.300	< 0.300	< 0.300	< 0.300	< 0.300	< 0.300
79-01-6	39180							
CIS-1,3-DICHLOROPROPENE		< 0.300	< 0.300	< 0.300	< 0.300	< 0.300	< 0.300	< 0.300
1006-10-15	34704							
DIBROMOCHLOROMETHANE		< 0.400	< 0.400	< 0.400	< 0.400	< 0.400	< 0.400	< 0.400
124-48-1	32105							



## ANALYTICAL DATA REPORT

ACTIVITY NO: AL07

FRACTION: VOLATILES

METHOD NO: EP005WP

MATRIX: WATER

UNITS: UG/L

LAB: EPA REGION VII

DESCRIPTION: WATER FROM ARK CITY KANSAS FOR VOLATILES

COMPOUND NAME		LW	WD	
(CAS #)	STORET #)	AL0709	AL0710	AL0711
		SAMPLE NUMBER		
ACROLEIN		< 12.	< 12.	< 12.
107-02-8	34210			
ACRYLONITRILE		< 19.	< 19.	< 19.
107-13-1	34215			
CHLOROMETHANE		< 1.2	< 1.2	< 1.2
74-87-3	34418			
BROMOMETHANE		< 2.2	< 2.2	< 2.2
74-83-9	34413			
VINYL CHLORIDE		< 1.4	< 1.4	< 1.4
75-01-4	39175			
CHLOROETHANE		< 1.4	< 1.4	< 1.4
75-00-3	34311			
METHYLENE CHLORIDE		< 7.0	< 7.0	< 7.0
75-09-2	34423			
1,1-DICHLOROETHYLENE		< 0.200	< 0.200	< 0.200
75-35-4	34501			
1,1-DICHLOROETHANE		< 0.300	< 0.300	< 0.300
75-34-3	34496			
TRANS-1,2-DICHLOROETHYLENE		< 0.400	< 0.400	< 0.400
156-60-5	34546			
CHLOROFORM		< 0.200	< 0.200	< 0.200
67-66-3	32106			
1,2-DICHLOROETHANE		< 0.300	< 0.300	< 0.300
107-06-2	32103			
1,1,1-TRICHLOROETHANE		< 0.500	< 0.500	< 0.500
71-55-6	34506			
CARBON TETRACHLORIDE		< 0.400	< 0.400	< 0.400
56-23-5	32102			
BROMODICHLOROMETHANE		< 0.200	< 0.200	< 0.200
75-27-4	32101			
1,2-DICHLOROPROPANE		< 0.200	< 0.200	< 0.200
78-87-5	34541			
BENZENE		< 0.700	< 0.700	< 0.700
71-43-2	34030			
TRANS-1,3-DICHLOROPROPENE		< 0.400	< 0.400	< 0.400
1006-10-26	34699			
TRICHLOROETHYLENE		< 0.300	< 0.300	< 0.300
79-01-6	39180			
CIS-1,3-DICHLOROPROPENE		< 0.300	< 0.300	< 0.300
1006-10-15	34704			
DIBROMOCHLOROMETHANE		< 0.400	< 0.400	< 0.400
124-48-1	32105			

## ANALYTICAL DATA REPORT

ACTIVITY NO: AL07

FRACTION: VOLATILES

METHOD NO: EP005WP

MATRIX: WATER

UNITS: UG/L

LAB: EPA REGION VII

DESCRIPTION: WATER FROM ARK CITY KANSAS FOR VOLATILES

COMPOUND NAME (CAS # STORET #)	LW	WD	SAMPLE NUMBER
	AL0709	AL0710	
1, 1, 2-TRICHLOROETHANE 79-00-5 34511	< 0.400	< 0.400	< 0.400
2-CHLOROETHYL VINYL ETHER 110-75-8 34576	< 1.8	< 1.8	< 1.8
BROMOFORM 75-25-2 32104	< 0.500	< 0.500	< 0.500
1, 1, 2, 2-TETRACHLOROETHENE 127-18-4 34475	< 0.400	4.0	< 0.400
TOLUENE 108-88-3 34010	< 0.700	< 0.700	1.0
1, 1, 2, 2-TETRACHLOROETHANE 79-34-3 34516	< 0.300	< 0.300	< 0.300
CHLOROBENZENE 108-90-7 34301	< 0.200	< 0.200	< 0.200
ETHYL BENZENE 100-41-4 34371	< 0.300	< 0.300	< 0.300
1, 3-DICHLOROBENZENE 541-73-1 34566	< 1.0	< 1.0	< 1.0
1, 2-DICHLOROBENZENE 95-50-1 34536	< 1.0	< 1.0	< 1.0
1, 4-DICHLOROBENZENE 106-46-7 34571	< 1.0	< 1.0	< 1.0
ANALYST INITIALS	DME	DME	DME
DATE	07/28/82	07/28/82	07/28/82

ATTACHMENT IV

Asphalt Test Results

SUMMARY OF KDOT ANALYSES FOR ASPHALT

<u>PARAMETER</u>	<u>WASTE LOCATION</u>		
	<u>NORTH</u>	<u>SOUTH</u>	<u>EAST</u>
%Water	38.4	18.2	4.0
%Solubility in Trichloroethylene	60.51	38.43	77.33
Rostler Analysis: Asphaltenes	55.25	55.14	67.13
Polar Compds.	3.98	7.35	3.67
First Acidaffins	2.71	3.30	4.21
Second Acidaffins	14.72	12.07	20.32
Paraffins	23.34	12.14	4.67

Note: Typically the asphaltene content in asphalt used for road construction varies from 10% to 25%. As asphalt ages, the asphaltenes content increases with a corresponding decrease in the polar compounds and the first and second acidaffins. The paraffins do not change much.

August 1982